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Hippocratic Pharmaology: Investigations into the Theoretical Assumptions and Function of Drug Therapy in the Corpus Hippocraticum

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..... the Corpus Hippocraticum.....

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**Hippocratic Pharmacology: Investigations into the Theoretical Assumptions
and Function of Drug Therapy in the *Corpus Hippocraticum***

Edward G. Soltesz

Submitted in partial fulfillment of the requirements
of the Fenwick Scholar Program

College of the Holy Cross
Worcester, Massachusetts

May, 1994

Acknowledgments

The beginnings of this project span back to 1992 when, during my study at the American School of Classical Studies, in Athens, Greece, I became interested in ancient medicine. There I studied Asklepios and his temple sanctuaries, but quickly discovered that Hippocratic medicine was a far richer source for ancient medical studies. In the winter of 1992, Dr. Guido Majno, Professor and Chairman of the Department of Pathology at the University of Massachusetts Medical School lectured on Greek medicine at Holy Cross. His insights into ancient medicine drew my interest together, and in the Spring of 1993, I visited him to define an area of Hippocratic scholarship for my senior thesis. A few phone calls to friends in the history of medicine suggested a topic in Hippocratic Therapeutics, with a focus on drug therapy. My award of the Fenwick Scholarship shortly after allowed me the freedom to pursue this ambitious topic. Quickly, the topic became more defined, and resulted in the current thesis: Hippocratic Pharmacology. While I intended to examine drugs and their efficacy in therapeutics, I soon realized the gravity of this undertaking: John Riddle and John Scarborough have been working on this for decades; my year's work would accomplish little. Instead, I found that work needed to be done in investigating the theoretical assumptions which the Corpus authors held about drug use: how did they believe these medicines worked? What were their underlying concepts? The methodological difficulty in answering these questions is evident at once. I decided to pursue this topic in two ways: first, to examine explicit statements by various authors about pharmacology (of which there are few), and second, to look at the prescriptions themselves and work backward to the theory at their foundation. This implied some debatable assumptions, yet was feasible. The following are the results of this form of investigation.

Although my interest in ancient medicine was sparked over two years ago, I had little knowledge of the subject until this year. I read not only on Hippocratic drug use, but also on ancient Greek medicine in general, taking, at times, a short diversion into Egyptian and Chinese medicine. The bibliography represents my reading for the past two semesters, a feat made possible by the freedom afforded by the Fenwick Scholarship.

Many individuals have been of assistance in formulating these ideas. My two advisors, Dr. Guido Majno and Professor John D.B. Hamilton, have been more than helpful and patient with me through this project. Dr. Majno has not only been model mentor but also an inspiration to my future career in medicine. All his work -- his translations, late nights at his house, long lunch hours, and more -- will not go unappreciated. Professor Hamilton has undoubtedly guided me these past four years; his help with my translation and his grateful gift of his office for a semester cannot go without thanks. Also, many thanks to my parents who did so much for me during this project. Also, I cannot say enough for Deirdre O'Brien, who had the patience to deal with me and added a great amount of support.

E.G.S.

Table of Contents

I. Brief Introduction to Hippocratic Medicine	3
II. Archaic Drug Use: Evidence from the Homeric Epics	8
II.1 Introduction	8
II.2 Drug Use in Homer	8
II.3 Homeric Pathology and Drug Function	9
II.4 <i>Pharmakon</i>	13
II.5 Wound Treatment	15
II.6 Μῶλυ (Moly)	17
II.7 Conclusion	18
III. Early Hippocratic Pharmacology	19
III.1 Introduction	19
III.2 Adoption of Folk Medicine in the <i>Materia Medica</i> Early Hippocratic Pharmacology	21
III.3 Early Hippocratic Pharmacology and the <i>Cnidai Gnomai</i>	29
III.4 <i>Anonymus Londinensis</i> and Early Physiology: <i>Perissomata</i>	37
III.5 Relationship between Egyptian Medicine and Early-Hippocratic Medicine	40
III.6 <i>On Diseases</i> II.12-75 and its Relationship to Early-Hippocratic Pharmacology	42
IV. Theory of Drug Use in the Corpus Hippocraticum	48
IV.1 Introduction	48
IV.2 Scholarship by Dierbach, Stannard, Scarborough, and Harig	51
IV.3 Explicit Theoretical Statements in the Corpus Hippocraticum	57
IV.3.1 <i>On Affection</i>	58
IV.3.2 <i>Ancient Medicine</i>	63
IV.3.3 <i>On Regimen</i> II	64
IV.3.4 <i>Places in Man</i>	65
IV.3.5 <i>Nature of Man</i>	69
IV.3.6 <i>On Diseases</i> I, III	70
IV.4 Conclusions	71
V. Hippocratic Drug Categories	73
V.1 Introduction	73
V.2 Major Drug Categories	81
V.2.1 Purge	81
V.2.2 Cholagogue	89
V.2.3 Phlegmagogue	91
V.2.4 Diuretic	92
V.2.5 Cooling agent	94
V.2.6 Drying agent	96
V.2.7 Expectorant	97
V.2.8 Analgesiac	99
V.2.9 Warming agent	101
V.3 Classification schema (and tables VI.1,2,3)	103

VI. Pharmacological Theory in Pseudo-Aristotelian <i>Problems</i>	105
VI.1 Introduction	105
VI.2 Background	106
VI.3 Theoretical Assumptions of Drug Use	107
VI.4 Theoretical Concepts in <i>Problems</i>	117
Bibliography	120

CHAPTER I:

Brief Introduction to Hippocratic Medicine



Hippocratic medicine had its abrupt beginnings in the fifth century BC amidst a very tumultuous period in the history of Western Classical antiquity. The fifth century was not only a period of rapid growth in literature, the arts, and politics, but also a time of deep self-reflection marked by the continual challenge of old ideas by new doctrine. The increased participation in the political sphere by each Athenian citizen led to a greater awareness and familiarity with rhetoric, with the necessity for justification of a position. The agonistic spirit that ensued spread not only to literature, athletics, and architecture, but also to medicine. The fifth century can be characterized by a number of striking features: (1) the growth of a new critical spirit in philosophy and science fostered by the interest in debate in law and politics, (2) the publication of books and the rise of literacy which not only resulted in preservation and spread of ideas but also made these concepts easier to scrutinize and modify, and (3) the recurrent concern with foundational principles and with explicit justification of a position. Within this social background, then, Hippocratic medicine had its dawn.

The primary evidence for most all Hippocratic medicine of this period is a collection of nearly 60 treatises, some in more than one book, written between 430 and 330 BC on a variety of subjects, including pathology, physiology, nosology, embryology, and ethics. This corpus is the production of a large number of medical writers having contributed or edited parts of this collection at some point during its one-hundred year creation period. Each of the treatises in the

corpus display strikingly opposed viewpoints not only on medical theories in particular, but in the goals and aims of medicine in general. Although all the texts are anonymous, they have been traditionally ascribed to a certain Hippocrates of Cos who was historically a very famous physician living on the island of Cos during the latter half of the fifth century BC. The ascription of this body of medical writings to Hippocrates, however, is the result of Alexandrian scholars who held the romantic notions of ascribing to a large collection of texts the name of an important individual within the field. This has only been realized quite recently by scholars who previously were vexed with the Hippocratic Question: the unanswerable quandary of which texts were actually written by the historical Hippocrates. All that can be justifiably affirmed is the skepticism surrounding the authorship of these texts.

At the center of Hippocratic medicine was the Hippocratic physician (ἰατρός). Unlike modern medical doctors, Hippocratic physicians were bound by no laws, no professional restrictions:

Medicine is the only art that our states have made subject to no penalty except dishonor.

(*Law*, 1)

This unrestricted position left the physician a part of a medical community where anyone could be a doctor, and where physicians found other ways to distinguish themselves from the other “healers” in the medical community.¹ This severe competition coupled with the lack of any legal definition of the medical status of the Hippocratic physicians left him in a fairly insecure position and compelled him to routinely convince patients of his competence and the advantages of his

¹ Included in these other “healers” are the temples of Asklepios (especially at Athens and Epidauros), traditional folk practitioners, midwives (especially in the context of gynecological work), herbalists, drug sellers, and ritualistic purifiers (who are castigated by the author of *On the Sacred Disease*).

methods of medical thought and therapy. The ability to state and defend views on medicine accurately and effectively was essential:

When you have considered these questions, you must pay careful attention in discussions, and when someone makes an error in one of these points...you must catch him there and attack him in your rebuttal.
(On Diseases I.1)

Furthermore, in consultations with patients, the physicians was not only expected to detail the future course of disease, but also to recount the previous symptoms leading up to the patient's current condition. In this way, the patient would gain confidence in the Hippocratic doctor. The author of *Prognosis*, 1, notes this salient feature of Hippocratic medicine accurately when he notes that the doctor should fill in the details that the patients themselves have omitted: he will thereby:

increase his reputation as a medical practitioner and people will have no qualms in putting themselves in his care.

Finally, as a indirect result of his insecure position in the social hierarchy, the physician was obliged to formulate and articulate the theoretical assumptions underlying his practice. These different theoretical frameworks are evidenced in the corpus writings, where polemic arguments among Hippocratic physicians betray the competition within the medical *techne*. It is interesting, however, that each author, in rebuking another for his lack of specificity or the like in theoretical understanding, offers nothing better.

The foundation for all therapy was a systematic understanding of the mechanism of disease, a nosology. Throughout all the Hippocratic corpus, there is no dominant doctrine which details a theory of disease. While there are over 200 disease names, one cause of disease can be posited as universal: an imbalance or disturbance of the body. Most nosological doctrines had their origin in the pre-Socratic natural philosophers, especially Alcmaeon and Empedocles. The latter

was to exert a considerable influence on Hippocratic medicine with his theory of the four elements: air, earth, wind, and fire. While the four humoral system was not a direct descendant of Empedoclean elemental theory, it is closely analogous and represents a later stage in a semi-continuous genetic line. The most dominant nosology, however, was the theory of the four humors, which envisioned the body as composed of black bile, yellow bile, blood, and phlegm. An imbalance of the delicate equilibrium required to maintain health resulted in a disease state. The Greek doctors has, at this point in the history of medicine, no knowledge of the many causal factors relating to the conditions they encountered. They had no concept of microorganisms, yet theories developed which provided a framework to place the myriad of observations they had made (e.g., periodicities of disease and discharges of the body). All of these theories were more or less speculative; no laboratories or double-blind randomized studies provided a means of measurement. These early scientists, however, relied on a much more powerful and much more dangerous tool: the sight of the mind (*gnomes opsei*).

Therapy follows logically from nosology and includes the re-establishment of humoral or qualitative imbalances, evacuation of disease material, and repair of physical damage (especially in wounds). Therapy was also chronologically modulated around certain points in a disease progress called crises. At these specifically defined points, a patient would either become well or revert to a worse condition and die. Hippocratic therapeutics involved three forms of healing: (1) surgical, including the knife and cautery, (2) dietetic, which focused not only on regulating food intake but also concentrated on exercise, and (3) pharmacological treatment. As Goltz notes, drug therapy was the least important form of treatment for the Hippocratic physician, yet it was guided by theory. Two dominant doctrines can be traced throughout the corpus, the theory of curing by

opposites² and by similars³. In the most basic pharmacological dogma, drugs reestablished the equilibrium of humors, elements, and qualities. For this, over 320 different drugs are used by the Hippocratics, most of which are identified with a particular element or quality.

Little scholarly effort has been expended in examining pharmacology in the Hippocratic writings, presumably because these remedies were once thought to be a part of a random pharmacopoeia used without rules in therapy. Yet, recent work has pointed to a distinct set of theoretical assumptions which underlie the use of drugs. The following study examines the theoretical assumptions which lie at the foundation of drug use for the Hippocratic physicians. A universal pharmacology will not be sought, since these corpus authors share in a unique social and personal competitiveness that compels and even necessitates the formulation of new doctrine in an agonistic spirit. Thus, a unified Hippocratic pharmacology should not even be expected. For this study, individual treatises will be the subject of critical scrutiny, and instead of yielding a generalization, this study will attempt to demonstrate that distinct progression in pharmacological theory can be discerned in the Corpus treatises.

² *Contraria contrariis curantur.*

³ *Similia similibus curantur.*

CHAPTER II:

Archaic Drug Use: Evidence from the Homeric Epics



II.1 Introduction	8
II.2 Drug Use in Homer	8
II.3 Homeric Pathology and Drug Function	9
II.4 <i>Pharmakon</i>	13
II.5 Wound Treatment	15
II.6 Μῶλυ (Moly)	17
II.7 Conclusion	18

II.1 Introduction

The beginnings of pharmacology in the modern Western sense are justifiably attributed to the Hippocratic period of medicine which insisted on a theoretical foundation for an empirical practice. Drug use was a common practice long before the first Hippocratic physicians in the early fifth century BC provided a theoretical framework for them. The Homeric epics, the *Iliad* and the *Odyssey*, provide the first literary reference to the use of drugs for medicinal purposes, although they offer no explicit understanding of how drugs function physiologically. All cultures have basic assumptions about health and disease; similarly, they understand the use of drugs within some nosological framework.⁴ Unfortunately, these concepts are never clearly articulated; even the Hippocratic medical texts state a surprisingly small number of theoretical assumptions about drug functions. The examination of archaic drug use as evidenced in the Homeric epics is a proper prolegomenon to Hippocratic pharmacology which is the result of a tradition in direct genetic line with archaic Greek medical ideas.

⁴ See Scarborough (1991), 141, who asserts that the Homeric, like the Hippocratic, held similar concepts that included how drugs worked.

II.2 Drug Use in Homer

The *Iliad* and *Odyssey* record the first ascribed use of drugs in classical antiquity. These works, echoing the social ideology of the 9-8th century yet portraying events from Mycenaean culture, offer the earliest glimpse of Western pharmacology in extant texts. While scholars have rigorously debated the chronology of these oral compositions, and likewise the period which they represent, it is reasonably safe to posit that drug use in the *Iliad* and *Odyssey* reflects a trend current in the late 9th to early 8th century BC.⁵

Even though the *Iliad* and *Odyssey* together offer over 26 instances of drug use, concentrated in the *Odyssey*, it is difficult to draw conclusions beyond the scope of the epics. Concentrating on epic alone ignores the many other spheres in which drug use was important, including some untransmitted oral folk traditions.⁶ Appreciating the diversity of practice, the tensions, and the pluralism of medicine is difficult with only the Homeric epics as windows to the 9th and 8th century BC. The world pictured by these epics is an artificial world, just as the language is an artificial language, a mixture of Aeolian and Ionian. These texts are not compendia of medical wisdom like the Hippocratic texts or the Egyptian medical papyri; their purpose is not to document with anatomical and physiological precision the pathological realities of a contemporary society.⁷ These shortcomings, however, do not prevent the medical historian from gleaning some information, albeit unrefined, about contemporary medical beliefs and practices. The Homeric epics, the only and earliest Western source where drugs were used medicinally, provides a suitable starting point and offers some interesting comments on drugs and their use.

II.3 Homeric Pathology and Drug Function

⁵ I defer my critical remarks on the chronology of the Homeric epics others. I follow the lead of most medical historians in attributing the drug use in the *Iliad* and *Odyssey* to the 9-8th century B.C. See Sigerist (1961), 19, and Majno (1975), 142.

⁶ See Riddle (1991i) and (1991j). See also my chapter III on Early Hippocratic Pharmacology, esp. III.2.

⁷ Sigerist (1961), 19f., enumerates the difficulties with the Homeric epics as a source for medical information.

Homeric pathology envisioned disease either as sent by the gods, most prominently by the divine agency of Apollo and Artemis, or as the result of battle wounds. Internal illness is scarcely mentioned⁸, except in complications arising from battle-related injuries. The Roman medical writer Celsus corroborates this point:

Homer stated, however, that they [the archaic physicians] did not give any aid in pestilence or in the various sorts of disease, but that they only relieved wounds by the knife and by medications.⁹

As Sigerist comments, a man suffering from dysentery is not a very heroic subject to be pictured in hexameters.¹⁰ Healing was assigned to the providence of the gods, who were able to stop the hemorrhage of Glaucus¹¹, rescue Aeneas from a hip injury¹², and heal Diomedes from a disastrous battle wound¹³. Human intervention was equally important, especially in the external application of medications to wounds, but was devoid of any drug treatment for internal illnesses. It is for the warrior wounded by a spear that drugs function therapeutically and from which a glimpse of archaic use of medications can be grasped.

Drug therapy functions within a set of beliefs of what disease and health are; a nosology underlies every pharmacology. In the Homeric epics, while no coherent nosology is present, a set of assumptions surfaces "about the direct interaction between person and environment in health and disease and in his life-cycle, suggestions of the equivalency of health and sanity with balance and order among bodily components, and other indications of the peculiar Greek outlook which later medicine elaborated."¹⁴ Smith argues that these concepts of health and disease, albeit crude,

⁸ Grmek (1989), 36-7, notes that there was no plurality of diseases, but one one disease *par excellence*, a chronic wasting away, or consumption. He argues that, although this one disease has often been interpreted by medical historians as *phthisis* (pulmonary tuberculosis) or malarial cachexia, the poet's language is far to imprecise. He does admit, though, that these two diseases were the major components of nosological reality for the Homeric texts. The word *τηκεδῶν*, a substantitive derived from the verb *τήκω* ("melt", "dissolve"), appears in a passage where Odysseus' mother draws the distinction between a beautiful death and one caused by divine arrows causes (*Od.*, II, 201).

⁹ Celsus, *Proem.*: *Quos tamen Homerus non in pestilentia neque in variis generibus morborum aliquid adtulisse auxilii, sed vulneribus tantummodo ferro et medicamentis mediri solitos esse proposuit.*

¹⁰ Sigerist (1961), 22.

¹¹ *Il.*, XVI, 514f.

¹² *Il.*, V, 305f., 447f.

¹³ *Il.*, V, 99f.

¹⁴ Smith (1966), 549, who is the source for most of the material for this disquisition of Homeric physiology.

are the raw material of assumptions which later were moulded into abstract physiological systems in fifth century medicine. Since a theoretical framework for drug use is founded in a theory of disease, these concepts of health and disease in the Homeric epics adumbrate not only future Hippocratic nosologies but also have a great influence in forming the theoretical assumptions of pharmacology. Examination of this crude Homeric physiology might provide a foundation for understanding the assumptions at the basis of their drug therapy.

Most of Homeric physiology is derived from the observation of growing things. Comparisons between man and leaves, stalks, and other plants offer nice illustrations of the supposed similarities in lifecycles. Yet, behind these picturesque descriptions lies a process of association far broader which sees man's health as a complex set of interrelations with the environment. The Homeric epics insist on the importance of climate, and climatic changes as the cause of disease and pestilence. The utopia of environments is the Elysium plain, where men have all the *pharmaka* to cure evil. The uniformity and persistence of this belief in the effects of climate on health can no better be illustrated than in the medical treatise, *On Airs, Waters, Places*, which emphasizes the importance of climate on health. The Homeric belief that men are what they consume prefigures the Hippocratic texts *On Regimen*, *Ancient Medicine*, and the ideology of dietetic therapeutics in general. The happiness drug of Helen, the drugs of Circe which changed Odysseus' men into swine, and the notion that barley is the marrow of oarsmen suggest the relationship of regimen to the constitution of the human body.¹⁵ While the Homeric epics had no word for an organism, they did describe the body's constitution in terms of tension and balance -- integrated or dissolved. The formulae for the dissolving of a limb are not used exclusively for death, but also disorganization prior to death -- loss of control in fear or even collapse from weakness. The medical writers similarly understood *nosos* as *taraxis*, which led to the supposition

¹⁵ Dietetic therapy, which focuses on the regulation of foods to maintain a healthy state, has been regarded as wholly unique to Hippocratic medicine by many, especially Lonie (1977), Smith (1990), Smith (1978). Lonie argues that dietetic theory was a relatively late development, coinciding with the establishment of internal medicine, and that it was associated with the theories about nature prevalent in the fifth century BC. The establishment of a link between food and bodily composition was recognized in the Homeric period, but no systematic method, or for that matter even the concept, of regulating food to counteract disease (one main import of Hippocratic dietetics) is present in these epics.

that fevers are caused by emotional upsets, physical blows, and frights.¹⁶ The humoral theory popular in most Corpus treatises, and the related concept of disease as an imbalance, is adumbrated in the Homeric belief of an imbalance caused by one faculty overwhelming another. When Patroclus departs for Troy, instead of going back, *μεγ' ἄασθε* (*ate* overcame him)¹⁷ describes the situation. The overwhelming surge of *ate*, an imbalance within a sensitive organism, caused his anger and violence. Finally, and most importantly, the Homeric poems describe emotions as fluids. *Cholos*, which is not bile, nor is produced in the liver, is the emotional fluid of anger that is said to enter the body through food. When it is stimulated, it rises, but can be controlled (*παύσαι*, *ἔχειν*, and *σβεννύναι*) or become digested. But when this fluid is not controlled, it runs its course. Similar is the Hippocratic notion that madness arises from bile's ascent into the brain, where, if dissipated, sanity is recovered.¹⁸ In sum, Homeric physiology, indirectly gleaned from the poetic descriptions of the body and its functions, prefigured the abstract physiological theories present in the Corpus Hippocraticum. Environment and diet were both recognized as important in constitution of the body, which was spoken of in terms of balance and tension (dissolution and integration). Prefiguring the idea of disease as an imbalance of humors was concept of imbalance at the basis of description of warriors overcome by *ate* and the metaphorical expression of emotions as fluids.

Traditionally, Homeric drugs were thought to function within an ideology of demonic possession commonly ascribed to pre-rational¹⁹ medicine.²⁰ Yet, Smith argues persuasively for a revision of this traditional schema: madness and disease thought of as divine visitation or punishment do not involve possession by a hostile spirit, but rather are imagined as a physical or psychological disturbance caused by any number of natural substances. Thus, therapy is devoid of

¹⁶ *Epidemics*, III.11 and 15, and *On Regimen*, 4.78.

¹⁷ *Il.*, 16.685-91.

¹⁸ *Sacred Disease*, 18.

¹⁹ For the problematic nature of a "pre-rational" or "pre-scientific" mentality, see Lloyd (1990).

²⁰ Ackerknecht (1973), 20-1, assumed that the Homeric drugs "drive out evil spirits from vessels or intestines or lungs or the bladder or nose" and that the Homeric *pharmakon* is "still a magic substance (in the sense of remedy as well as of poison)." While Ackerknecht understood the curious ambivalence surrounding the word *pharmakon*, he missed the mark in postulating that drugs drove out evil spirits.

exorcism but can and does include the apotropaic measures and prayers to the gods for help and relief.²¹ In the *Iliad* and *Odyssey*, then, drugs do not operate wholly within a magico-religious sphere but actually do perform some "rational" functions.

II.4 *Pharmakon*

The word *pharmakon*²² (=drug) appears in these epic texts shrouded in an ambivalence which is often cleared by a descriptive adjective.²³ Standing alone, Homer's 26 instances of *pharmakon* display a wide semantic variance: "drug", "charm", and "poison" provide some renderings of this curious word with a foreign etymology²⁴. Touwaide remarks that in general a *pharmakon* connotes a "sostanza introdotta nel corpo per modificarne lo stato,"²⁵ whose modality of action is qualified with an attached adjective. The eight adjectives divide *pharmakon* into variations of effects, ranging from a beneficial remedy to a deadly poison. When Circe casts a spell over Odysseus' men with a *pharmakon oulomenon*, the effects are checked subsequently with a *pharmakon allo*.²⁶ In both cases, the *pharmakon* acquires its quality from the specificity of a qualifying adjective.

²¹ Smith (1965), 409: Substantiating this claim is the absence of any exorcism vocabulary. Lucian describes exorcism with ἀπελάνειν, ἔξορκίζειν, and ἐκβάλλειν, which are not found anywhere earlier.

²² The word *pharmakon* appears in the context of drug therapeutics in medicine as well as in the ritual context of a scapegoat. Greek magicians tried to purify an allegedly possessed person with incantations and sacrifice, and bury the refuse in the soil. This practice later develops into the *pharmakon* of the fifth century ritual practice, where a member of a community is ritually externalized from the *polis* to represent the removal of *miasma*, or pollution. An Assyrian incantation priest would produce an effigy of "all bad things" from dust and blood, put them in a pot, and carry it away to be buried in the wilderness. This pot in Greek is called a φαρμακίη. The concept of a substitute, a *pharmakon*, or *puhu*, is central to Mesopotamian magic, I think, might be related to the notion of a *pharmakon* as drug. The drug, as the Pseudo-Aristotelean *Problems* maintains, eliminates pathogenic material; it is a substitute for this disease-causing material in the organism. See Burkert (1983), 115-20.

²³ Grmek (1989), 34: "The Homeric word *pharmakon* is a middle term between our concepts of poison and medicine." Touwaide (1993), 349: "Dei *pharmaka*, in realtà, si parla già nell'*Iliade* e nell'*Odisea*, dove il termine è usato per designare prodotti sia benefici sia dannosi." Scarborough (1991), 139.

²⁴ Chantraine: "φαρμακον est isolé en grec, au point qu'on a pensé à un terme emprunté." The 26 instances of *pharmakon* span both the *Iliad* and *Odyssey*, with a concentration in *Odyssey* X.

²⁵ Touwaide (1993): "substance that is introduced into the body to modify its condition."

²⁶ *Od.* X.391-94. Circe is the first woman in Western myth to be represented as a skilled sorceress, manipulating the poisons and remedies which dominated folklore. Pliny (*HN* XXV.5) ascribes the science of herbs and magical remedies to women, especially the prototypical Circe (*in primis Italia Circe dis etiam adscripta*). As Scarborough (1991), 165n18, notes, the mythology surrounding Circe degenerated over centuries to the point where Circe was capable of killing merely by touch (*Ael. On Animals* I.54). Pliny's comments echo the typical

The semantic spectrum of the word *pharmakon* is evidenced by its various uses in the *Iliad* and *Odyssey* as an evil, deadly substance. A *pharmakon* could be designaed as κακόν ("evil")²⁷, λυγρόν ("baneful")²⁸, or οὐλόμενον ("harmful")²⁹, or even the more deadly ἀνδροφόνον ("murderous")³⁰ and θυμοφθόρον ("life-destroying")³¹. Snakes were venomous not because of an inherent poisonous quality but because they consumed evil *pharmaka*.³² These evil variations of *pharmaka* suggest that this word originated within an original magico-religious tradition.

The Homeric epics also offer a large variety of beneficial *pharmaka*, likened to the remedies of the Hippocratics. The ἐσθλά ("good")³³ and ἥπια ("soothing")³⁴ *pharmaka*, while not paralleled by any category of Hippocratic pharmaceuticals³⁵, can assuradely be considered therapeutic, and at least intentionally harmful. These beneficial drugs function not in the any internal, purgative, capacity, but rather as external salves applied on battle wounds which occupy a central position in the *Iliad*.

vantage point of the "enlightened" first century: *Durat tamen tradita persuasio in magna parte vulgi veneficiis et herbis id cogi eamque unam feminarum scientiam praevalere.*

²⁷ *Il.*, XXII, 94; *Od.*, X, 213.

²⁸ *Od.*, IV, 230; X, 236.

²⁹ *Od.*, X, 394.

³⁰ *Od.*, I, 261.

³¹ *Od.*, II, 329.

³² *Il.*, XXII, 94.

³³ *Od.*, IV, 227f., 230.

³⁴ *Il.*, IV, 218; XI, 515, 830.

³⁵ See my chapter VI on categories of Hippocratic drugs for further comparison. Hippocratic and later medicine defined various actions of drugs through categories. Thus, a διουρητικόν φάρμακον is a diuretic drug. Galen's categories numbered in the 100's.

Therapeutic Drugs	Non-therapeutic Drugs
φάρμακον	φάρμακον
ἥπια	κακά
ὀδυνήφατα	ἀνδροφόνον
ἀκέσματα	θυμοφθόρα
νηπενθές	λυγρά
ἄχολον	οὐλόμενον
μητιόεντα	
ἔσθλα	
ἄλλο	

The *Odyssey* does offer some evidence for the use of drugs and their origin and clearly indicates that an ongoing inquiry into healing and harmful substances, although rather muffled, was taking place. The *Odyssey* speaks of a drug which quiets "all pains and sorrows" and which comes from Egypt where a multitude of both good and evil *pharmaka* originate.³⁶ Aside from the possible origin of these drugs, this is the first reference in Western pharmacology for the mixture of various substances to form a compound drug (μεμιγμένα).

II.5 Wound Treatment

Descriptions of the treatments of wounds are far from commonplace in the *Iliad* and *Odyssey*, yet offer an instance where drug therapy, albeit crude, can be studied. The author of the *Iliad* describes with remarkable anatomical precision, and not without some delight, a great number of wounds visited on the heroes, and, like the prodigious deeds of the warriors, the wounds themselves are not necessarily realistic.³⁷ Daremberg and Frölich have studied the

³⁶ *Od.*, IV, 220f. This plant has been identified as the opium poppy (*Papaver somniferum L.*).

³⁷ Grmek (1989), 27, maintains that the anatomical knowledge in the *Iliad* is quite advanced (due in particular, he claims, to the opportunity battle wounds offered to examine internal anatomy), in contrast to Sigerist (1961), 25, who claims that "the anatomical and physiological knowledge of the time was extremely limited." See Smith (1966) for support of Grmek's position. Smith argues that Homeric physiology mildly exhibits some of the humoral pathology of Hippocratic medicine, especially the implicit understanding of an internal fluid/humoral system. Although a humoral pathology *per se* is not articulated or even implicitly suggested, verbal clues point toward an understanding of the body which is based upon a system of fluids.

numerous instances of wounds in the epics and catalogued them according to weapon, anatomical region, and treatment. Their statistical conclusions, however, must be limited to the detection of tendencies in the poet's thinking, which paints an incomplete picture contemporary medicine.³⁸ The *Iliad* calls the break in skin continuity a ἔλκος, a term adopted by the Hippocratic physicians who retained its dual meaning as wound and ulcer. A wound was usually bandaged with wool after the weapon was extracted from the warrior's flesh and the surface washed:

Καὶ τὸ μὲν ἐκ χειρὸς ἔρυσεν μέγαθυμος Ἀγήνωρ,
αὐτὴν δὲ ξυνέδησεν ἐϋστρεφεῖ οἴῳ ἀώτῳ,
σφενδόνη, ἣν ἄρα οἱ θεράπων ἔχε ποιμένι λαῶν.

This then the great souled Agenor drew forth from his hand
and he bound his hand with strip of twisted sheep's wool,
in a sling which his servant carried for him, the shepherd of the people.
Il., XIII, 598-600

While bandaging was not always mentioned as part of the treatment protocol, this should not be taken as an indication of its infrequency in therapy: bandaging was so commonplace that it was not even mentioned. Drugs were often employed as salves upon the wound, but no mention is made on the contents or effectiveness of these pharmaceuticals. The best description of wound therapy with drugs comes in book XI of the *Iliad* (806f.) where Eurypylus' wound is healed by ἥπια φάρμακα, ἐσθλά ("soothing drugs, excellent ones", 830). The method of administration of the drug is also detailed; the φάρμακα are applied as an ointment (πάσσε), an external topical application. Patroclus excises the arrow from Eurypylus' thigh, washes it with warm water, and applies a bitter root which is said to be pain relieving:

ἔνθα μιν ἐκτανύσας ἐκ μηροῦ τάμνε μαχαίρῃ
ὄξυ βέλος περιπευκές, ἀπ' αὐτοῦ δ' αἶμα μελαινόν
νίζ' ὕδατι λιαρῷ, ἐπὶ δὲ ρίζαν βάλε πικρὴν
χερσὶ διατρίψας, ὀδυνήφατον, ἣ οἱ ἀπάσας
ἔσχ' ὀδύνας. τὸ μὲν ἔλκος ἐτέρσετο, παύσατο δ'
αἶμα.

There, Patroclus stretch him out, and with a knife he
cut from his thigh the sharp-piercing arrow, and washed
the black blood from the wound with warm water, and put on

³⁸ Grmek (1989), 27f., where the original statistical results of Daremberg are reproduced. The words of Damenberg and Frölich have not been superseded.

the wound a sharp root, after grinding it up with his hands³⁹, a root which relieves pains, which took away all his pains; the wound dried and the hemorage ceased.

Il., XI, 844-848

While this description has been heralded as a fine example of archaic wound treatment, it is also important for pharmacology. While the identification⁴⁰ of the plant is near impossible, the preparation (grinding) and modality of action foreshadow Hippocratic pharmacologic treatment of wounds. The modality of action of the drug is described by the verbs in the final two clauses: the drug is an analgesiac (ὀδυνήφατον), hemostatic (παύσατο δ' αἷμα), and drying agent (τὸ μὲν ἔλκος ἐτέρσετο).⁴¹

II.6 Μῶλυ (Moly)

The Homeric μῶλυ has received much attention for its similarity to the opium poppy (*Papaver somniferum L.*), which has enjoyed a long history in drug lore.⁴² Odysseus is given this strange plant with a black root and a flower like milk to protect against the wiles of Circe. The herb is described as difficult for mortals to dig up and called by the gods μῶλυ. Little is mentioned on the method of administration and the modality of action of the drug, but undoubtedly its nature contains a mixture of magic and medical. Interestingly, Odysseus says that Hermes "showed the nature of the drug to me" (μοι φύσιν αὐτοῦ ἔδειξε, 303). Two levels of meaning surround the term *physis*, one of which indicates the plant's appearance, the other its "nature," or the sum of all its natural attributes.⁴³ Lloyd emphasizes the revolutionary concept possibly adumbrated here.⁴⁴

³⁹ Murray, in the Loeb edition, translates: "and upon it[the wound] cast a bitter root, when he had rubbed it between his hands." I differ in my translation, suggesting that "grinding" would be more consistent with this word's later use in the preparation of drugs.

⁴⁰ That is, the Linnean binomial classification of the plant (i.e., the scientific name).

⁴¹ Cf. the Hippocratic categories: analgesiac: δίδοναι ὅπερ ἐν τῇ πλευριτιδί του πλευρεῦ της ὀδυνης ἐν τῇ Φαρμακιδί γεγραπται (*Affections*, 9); drying agent: ξηραίνοντι τινι φαρμακῶ (*Places in Man*, 12); hemostatic: στυπτικοῖσιν (*Aphorisms*, 7.37). Although the formal designations of these categories differ, the concepts still remain. Both the Hippocratics and the archaic Greeks attributed certain powers to drugs, of which hemostatic, drying, and analgesic are present here. More interesting is the attribution of several physiological functions to one drug substance, a tendency witnessed in Hippocratic pharmacology.

⁴² *Od.*, X, 300f. See Scarborough (1991), 139, for a similar discussion. The plant called μῶλυ cannot be identified.

⁴³ See Scarborough (1991), 139, who quotes Holwerda, *ΦΥΣΙΣ* (Groningen, 1955), 63.

⁴⁴ Lloyd (1979), 31 and notes.

The notion that every physical object conforms to a universal rule which is manifest in certain regularities was a characteristic of the inquiry concerning nature which followed the archaic age. This interesting use of *physis* in the *Odyssey* could be an early manifestation of this new ideology, or simply a reference to the plant's general appearance.⁴⁵ While μῶλον has attracted a significant amount of attention, both ancient and modern, the relevance of this plant to the study of archaic pharmacology is minimal.

II.7 Conclusion

The two Homeric epics present a world where drugs are used for the treatment of wounds and pain. Explicit theoretical assumptions of how drugs work are not offered, nor is it possible to surmise an archaic concept of pharmacokinetics for the data. These richly poetic and descriptive epics do not appeal to theoretical discussions. Nevertheless, drugs did have a place in therapy. The attribution of certain physiological actions to drugs is present in Homeric medicine. It is reasonable to assert that a continued inquiry into drugs was taking place in the archaic age of Greece which preceded the Hippocratic physicians. Hippocratic medicine did not emerge from a vacuum, but was just part of a long-going interest in therapeutic medicines.

⁴⁵ Lloyd (1991), 31, believes that this instance of *physis* refers to the plant's general "appearance."

CHAPTER III:

Early Hippocratic Pharmacology



III.1 Introduction	19
III.2 Adoption of Folk Medicine in the <i>Materia Medica</i> Early Hippocratic Pharmacology	21
III.3 Early Hippocratic Pharmacology and the <i>Cnidai Gnomai</i>	29
III.4 <i>Anonymus Londinensis</i> and Early Physiology: <i>Perissomata</i>	37
III.5 Relationship between Egyptian Medicine and Early-Hippocratic Medicine	40
III.6 <i>On Diseases</i> II.12-75 and its Relationship to Early-Hippocratic Pharmacology	42

III.1 Introduction

The period at which early Hippocratic physicians began to establish a systematized theoretical foundation for the use of drugs during the late sixth and early fifth century BC marks a watershed in Western medicine. As will be shown, their use of drugs did not emerge *de novo*, but relied on the large amount of orally transmitted folklore surrounding medicinal uses of plants already present in Greek society for centuries. This establishment of a “rational” pharmacology which explains the function of drugs did not marginalize traditional drug lore; folk medicine’s use of plants and herbs continued alongside the development of Hippocratic pharmacology.

This pharmacology had its conceptual foundations in nosology. Unlike folk medicine, which operates with no discernible theoretical assumptions and whose massive pharmacopoeia is quite arbitrarily applied in treatment, early-Hippocratic medicine provided a conceptual framework for the use of drugs in their therapeutics. A drug was used because it fit into a theoretical schema, not because it was a local tradition. This is truly a revolutionary accomplishment in the history of medicine.

The chief problems in investigating the origins of Hippocratic pharmacology lie in the scarcity of available data. Traditional beliefs about drug properties and their use in medicine were orally transmitted, a part of a family's medical cabinet so to speak, and left almost no trace for the literary archaeologist to dig up. Unlike the Homeric epics, these beliefs were not committed to written form, much less were homogenous enough for anyone to do so.⁴⁶ Fortunately, remnants of these traditional remedies can be resurrected from non-medical Classical texts, especially the Athenian playwrights and Theophrastus.⁴⁷ Chapter 2 began this investigation by looking at drug use in the Homeric epics where the first clear idea of a drug can be discerned. The Roman medical writer Celsus notes that the archaic Greeks "only treated wounds with the knife and with drugs."⁴⁸ Poets writing before the turn of the fifth century provide evidence for the use of certain remedies whose properties and place in healing is connected with folk medicine. Fifth-century Athenian playwrights have left references to a surviving "common knowledge" about certain plants and herbs. This evidence emphasizes that such drug lore was accepted simultaneously with Hippocratic "rational" pharmacology. Theophrastus, although writing much later than the traditional authors of the Corpus Hippocraticum, also provides a reasonable assessment of the folk knowledge of drugs. These literary references to folk remedies provide the data for a modest reconstruction of traditional pharmacopoeia. There is also very little written evidence about *early* Hippocratic medicine. Yet, references in later Corpus texts as well as statements in the *Papyrus*

⁴⁶ This statement, of course, requires an important qualification: no extant work of such a compilation of folk remedies exists until Theophrastus' *Inquiry into Plants* in the third century and Dioscorides' *Materia Medica* in the second century, both of which were not simply a systematic recording of folk tradition but included also interpretation, criticism, and addition.

⁴⁷ Theophrastus of Eresus (c. 370-288 BC) was the first great Greek botanist to undertake a systematic classification of medicinal plants based on accounts from varying sources. Folk medicine, Hippocratic treatises, and pure mythology provide the data for Theophrastus' first such herbal pharmacy. See III.2 below and Scarborough (1978), Scarborough (1987b), Scarborough (1991), and Lloyd (1983), 112ff.

⁴⁸ Celsus, *Proem.*, 3: *sed vulneribus tantummodo ferro et medicamentis mediri solitos esse proposuit.*

Anonymus Londinensis, Galen's *Commentaries on Epidemics IV*, and various Egyptian medical papyri serve as evidence for this important period of Hippocratic medicine.

In what follows, early Hippocratic medicine will be shown to possess definite theoretical assumptions about the functions of drugs. From a large traditional pharmacopoeia, transmitted orally for centuries, early Hippocratic medicine decided to use only a modest number of purges, eliminating hundreds of other physiological active substances. This choice is guided by the conception of disease as an intestinal residue which must be eliminated for health. While medical historians have customarily deemed such purgation therapy of these early Hippocratic physicians "primitive,"⁴⁹ Quite the contrary, I contend that the carefully reasoned choice of only purges shows that theoretical assumptions were at work. These early physicians possessed a pharmacology!

III.2: Adoption of Folk Medicine in the *Materia Medica* of Early Hippocratic Pharmacology

By the completion of the Hippocratic Corpus in the mid-fourth century, Hippocratic medicine had been well established in its motives, aims, and methods of rational inquiry. Unfortunately, the origins of its therapeutic practices are nowhere discussed in detail, albeit a number of criticisms on the inadequacy of earlier predecessors; nor does the Corpus Hippocraticum acknowledge the source of its vast array of drugs. Yet, the establishment of medicine as a natural science in Greece during the fifth century BC unquestionably depended on

⁴⁹ Lonie (1977), 236, is representative of the traditional view. In discussing early Hippocratic medicine, Lonie comments that "internal medicine hardly exists at all; where it does exist it is confined to a few simple purgative remedies, administered presumably by "leeches," who preceded the fully rational "physicians" of the later fifth century." See also Parker (1981), 215, who remarks that there is "nothing advanced about purgative drugs." Most medical histories would agree, except Mansfeld (1980), who argues for an enlightened empirical attitude and questions the "primitiveness" of early-Hippocratic medicine.

the important transition from folk methods of healing to the new “rational” medicine. This transitional period in ancient medicine, and for that matter in Greek science in general, is marked by the interplay between, on the one hand, the assimilation of traditional ideas, beliefs, and practices, and, on the other hand, their critical analysis, exhibition, and rejection of these traditional practices.

Stannard’s important work on Hippocratic pharmacology judiciously emphasized, on the one hand, the important role of traditional remedies as a source for the Hippocratic pharmacopoeia and, on the other, the particular reluctance on the part of the Corpus authors to acknowledge this accommodation of traditional ideas into Hippocratic medicine.⁵⁰ Geoffrey Lloyd has especially noted the tension fundamental to emerging ancient science between the products of scientific investigation and the prevailing traditional ideology.⁵¹ An interesting element among the Corpus authors, as Lloyd points out, is their utter silence and avoidance of the entire issue of indebtedness; they fundamentally ignore the contribution folk medicine made to their therapeutic methods and pharmacopoeia. Instead of crediting folk beliefs, most Hippocratic authors paint a picture similar to that in *Ancient Medicine*: “The discovery was a great one, implying much investigation and art.”⁵² Celsus, however, astutely recognizes that Hippocratic medicine devised a pharmacology based on a pre-existing pharmacopoeia:

After medications had already been discovered, they [the ancients] began to discuss the reasons for these; the art of medicine was not invented following upon reason, but after the discover of the remedy, the reason for it was sought.⁵³

⁵⁰ While Stannard (1961) has been marginalized by such encyclopedic works as Goltz (1974) and controversial opinions like Harig (1980), his still remains a sober introduction into Hippocratic pharmacology.

⁵¹ Lloyd (1983).

⁵² *Ancient Medicine*, 4: ἐπεὶ τό γε εὕρημα μέγα τε καὶ πολλῆς σκέψιος τε καὶ τέχνης.

⁵³ Celsus, *Proem.*, 36: *Repertis deinde iam remediis, homines de rationibus eorum disserere coepisse; nec post rationem medicinam esse inventam, sed post inventam medicinam rationem esse quaesitam.*

Some Hippocratic physicians, however, were aware of the indebtedness to folk medicine, or at least to *its own* source, as the author of *Affections* notes:

About medications that are drunk or applied to wounds, it is worth learning from everyone; for people do not discover these by reasoning but by chance, and experts no more than laymen.⁵⁴

Drug therapy before Hippocratic medicine relied on a long tradition of endogenous plants and the lore surrounding their use rather than on borrowed recipes from the Near East or Egypt.⁵⁵ Unfortunately, this hypothesis is impossible to prove because folk medicine is orally transmitted lore. Traces of this traditional drug lore in classical literature, however, can substantiate its existence and provide a reasonable assessment of its diversity. It was this local stock of remedies that became the source for Hippocratic *materia medica*.⁵⁶

Traces of folk medicine and drug lore which appear throughout Classical literature suggest the existence of a “common knowledge” about certain drugs. Theophrastus cites Musaeus as a pre-Homeric composer of poems specifically on the healing properties of plants.⁵⁷ Hesiod and Musaeus are also mentioned as authorities on the magical power of τριπόλιον (probably *Aster tripolium* L., the sea aster or sea starwort).⁵⁸ Pindar (518-438 BC) mentions the traditional medical treatments of Asklepios consisting of incantations, surgery, soothing drinks or

⁵⁴ *Affections*, 45: τὰ φάρμακα, ὅσα ποτὰ καὶ ὅσα πρὸς τὰ τραύματα προσφέρεται, μανθάνειν ἄξιον παρὰ παντὸς. Οὐ γὰρ ἀπὸ γνώμης ταῦτα εὐρίσκουσιν οἱ ἄνθρωποι, ἀλλὰ μάλλον ἢ οἱ ἰδιῶται.

⁵⁵ Anthropologists have struggled with the question of how plants with medicinal qualities became separated from the half-million species which are inert or harmful. Ackerknecht (1942) suggested a way similar to that by which animals know instinctively which plants to eat, rejecting primitive experimentation. Clune (1976), however, disagrees, positing a form of experimentation similar to that in Peru and among Indians in Ecuador. Theophrastus, *Inquiry* IX.20.3, provides an explanation for the discovery of the purgative properties of the wild carrot (*thapsia*): primitive people noticed that native cattle (from Attica) do not touch it (*thapsia*), but foreign cattle feed on it and get diarrhea. A judicious answer to how folk medicine gained knowledge of its pharmacopoeia has not been adequately provided.

⁵⁶ Riddle (1992I), 38.

⁵⁷ Theophrastus, *Inquiry*, IX.19.2. Unfortunately, this poem is not extant and no other authors provide a clue to its existence.

⁵⁸ *Ibid.*

potions, and amuletic drugs.⁵⁹ The Athenian playwrights often allude to herbs and botanical preparations; these references assume that a fifth century Athenian audience would be familiar with a select stock of folk remedies. The *Rhizotomoi* of Sophocles, for example, pictures Medea “cutting poisonous herbs with her face turned away lest she perish from the strength of their noxious aromas, then pouring the herbs’ juice into bronze jars, the herbs themselves being cut with bronze sickles.”⁶⁰ Macrobius quotes two passages from the *Rhizotomoi* describing the juice of the herb as “whitely clouded and oozing from the cutting.”⁶¹ Perhaps the audience sitting through Sophocles’ *Rhizotomoi* would nod in agreement at the dangers Medea voices. Aristophanes’ *Lysistrata* and *Peace* also make allusions to this “common knowledge.” In the *Peace*, κυκῶνα is suggested as a remedy for “too much fruit” (ὀπώρα), in other words, it was effective at preventing pregnancies. Scarborough notes that this pennyroyal infusion has a long folk history as a contraceptive and abortifacient among midwives.⁶²

Theophrastus of Eresus⁶³, the first Greek botanist and gatherer of herbal lore, who composed his *Inquiry into Plants* in the Peripatetic tradition during the fourth century BC, offers evidence for the great diversity and large amount of folk drugs. His work is a goldmine for

⁵⁹ Pindar, *Pythian* III.51-53.

⁶⁰ Reference to this lost Sophoclean play comes through Macrobius’ *Saturnalia*. To demonstrate Vergil’s competence as a rhetorician, Macrobius (fl. 430 AD) shows Vergil’s command of Greek literature, arguing, in one example, that Dido in *Aeneid*, IV.513-14 is fashioned after Medea in Sophocles’ *Rhizotomoi*: “Herbs she had gathered, cut by moonlight with a bronze knife/poisonous herbs all rank with juices of black venom” (*falcibus et messae ad lunam quaeruntur aënis/pubentes herbae nigri cum lacte veneni*).

⁶¹ Macrobius, *Saturnalia*, V.19.10. This passage describes the typical danger in harvesting herbs which Theophrastus discusses. Scarborough (1991) believes the root Medea is picking is the θαψία (*thapsia garganica* L, the so-called deadly carrot), with its black-barked root and white interior (the sap is milky), considered a member of the “deadly class” of roots (Theophrastus, *Inquiry*, IX.8.3) simply because it was so common as a wild plant in Attica and particularly dangerous to wild animals (Theophrastus, *Inquiry*, IX.20.3).

⁶² Recall the *Homeric Hymn to Demeter*, 209, where the goddess willingly drinks a potion (κυκεῶν) made by mixing meal, water, and pennyroyal (γλήχων, sometimes βλήχων). Here, pennyroyal carries a magical quality relating to fertility.

⁶³ Scholarship on Theophrastus is not large. See Scarborough (1978), Preus (1986), and Lloyd (1983), 120ff.

modern botanists who are trying to identify the hundreds of plants used by the Hippocratics. Particularly interesting for the physician is the ninth book of the *Inquiry* where Theophrastus grapples with the definition and enumeration of herbal remedies. In contrast to the Hippocratics, whose treatises mention no hint of local drug lore and associated magico-religious prescriptions, Theophrastus lists many stories surrounding the herbs he discusses. Unlike the Hippocratics, who merely pass over many of the local traditions reflecting folk medicine's use of plants, Theophrastus is systematic and self-conscious in his approach to the inquiry, naming sources, sometimes providing a critique on alternative accounts, and readily pointing out contradictions between them. Evidence for most of the information in *Inquiry*, IX comes from a semi-professional class of herbalists, the ῥιζοτόμοι, "root-cutters," and the φαρμακοπῶλαι, "drug-sellers." During the fifth century, these herbalists took over much of the complex background of folk medicine that had circulated orally for centuries. The *Inquiry*, then, provides a relatively accurate picture of local lore surrounding plants contemporary with the later Hippocratic works. Since folk tradition remains static over long periods of time, Theophrastus' work also documents folk knowledge about drugs which was current during the emergence of Hippocratic medicine in the late sixth to early fifth century BC.⁶⁴

A few examples from *Inquiry*, IX illustrate traditional folk remedies. Theophrastus shows no hesitancy in expounding the popular opinion that in cutting the plant called θαψία, one should stand windward and also anoint oneself with oil -- for one's body will swell up if one stands to leeward. The eyes are in danger if one gathers the wild rose while standing leeward. Although

⁶⁴ This hypothesis is problematic because it does not take into consideration the effect Hippocratic medicine exerted on folk tradition. Intuitively, a system of medicine such as the Hippocratics' would suppress local lore, but not completely eliminate it (notice the allusions to this lore in the Athenian playwrights of the late fifth century). No suitable evidence, however, is available to prove or refute this hypothesis.

Theophrastus is hesitant and cautious in believing all these stories, he does say that “even fabulous stories (τά μυθώδη) are not composed without some reason.”⁶⁵ While κυκλάμινος is a common ingredient in a wide variety of gynecological prescriptions in *Diseases of Women I and II*, *Superfetations*, and *On the Nature of Women*, only Theophrastus records its use as an amulet (περίαπτον) to promote delivery. So far as our Hippocratic texts go, we would never have known about these pieces of botanical information.⁶⁶

In sum, Theophrastus’ *Inquiry*, IX along with scattered references in literature support the existence of a large number of medicinal remedies and an associated lore which was orally transmitted for centuries. The emerging Hippocratic physicians incorporated numerous drugs from this stock into their *materia medica*.

The representative primitive physician was the *iatromantis*, a “physician-seer” who blended the qualities of a prophet and physician based on the quintessential *iatromantis*, the god Apollo. These *iatromantes* could be distinguished by four typical features: (1) they usually came from afar; (2) they wandered through different countries; (3) they were seers and purifiers of diseases; and (4) they endured long absences.⁶⁷ His prophetic skill is required mainly for the diagnosis, while his acumen in healing directs his purifications.⁶⁸ Calchis in *Iliad*, 1 is a prime example of an *iatromantis* who, after identifying the etiology of plague as the anger of Apollo over Chryseis’ abduction, instructs the Greeks in purifying restitutions. At the interface between

⁶⁵ *Inquiry*, IX.18.2.

⁶⁶ For further evidence, see Lloyd (1983), 130ff. Unequivocally, Theophrastus brings to light many traditional beliefs which are not recorded in any Hippocratic works.

⁶⁷ Kudlien (1968) outlines early Greek primitive medicine beginning with the *iatromantis*.

⁶⁸ Parker (1981). The *iatromantis* grew obsolete with the emergence of Hippocratic physicians. His social providence as a healer-seer became fragmented; his occupation as a healer was assumed by the physicians and his position as a seer by the purifiers. This latter group includes those fifth and fourth century individuals who employed magico-religious techniques of healing and who were severely castigated by the author of *On the Sacred Disease* (who refers to them as μάγοι, καθάρται, ἀγύρται, and ἀλαζόντες). These purifiers became heirs to a small portion of the divided patrimony of the *iatromantis*, namely the purifications.

the *iatromantis* and the *iatros* are Melampus and Empedocles, two individuals who are important for the legendary beginnings of pharmacology. Melampus, the purifier beloved of Apollo, used cathartic procedures of a magico-religious character, but was also credited with the first medical treatment based on purgatives.⁶⁹ He treated the daughters of Proitus with a plant -- the notorious black hellebore -- thus purging the maidens of their madness. While Melampus' treatment might resemble Hippocratic drug treatment, there is still a strong element of religious purification involved. As Parker notes, the elimination of evils of various kinds -- purification -- was always a part of the *iatromantis*' repertoire however "rational" his therapy appeared.⁷⁰

It is clearly recognized that Hippocratic medicine is in many ways a continuation of traditional practices and beliefs, not merely in the occasional imaginary aliment (e.g., the wandering womb) but also in the large number of forms of treatment.⁷¹ The central importance of *katharsis*⁷² is most interesting. As Lloyd emphasizes, the notion of being "clean" spans the natural and moral order, and the Greek terms for purification and cleansing span both spheres as well.⁷³ Medicine adopted the natural sense of purification as a washing-away of the *materia peccans*. Hippocratic treatments resemble the methods of the purifier, especially in the processes of fumigation, cataplasms, and vapor baths. The term for drug, *pharmakon*, itself carries some interesting extra-medical concepts. In ritual purification, anything that was left over must be disposed of; in Greece, a pot called a *pharmake* would be made available for "those who purify the cities."⁷⁴ The term *katharsis* was used by early-Hippocratic physicians (as well as later

⁶⁹ Kudlien (1968), 307-8.

⁷⁰ Parker (1983), 210.

⁷¹ Kudlein (1968), Parker (1983), 207-234, Burkert (1992), 41-88, Lloyd (1979), 45-59.

⁷² *Katharsis* has no Indo-European etymology, but ties in with a Semitic root in the sphere of purification: *qatar*, to fumigate. See Burkert (1992), 64.

⁷³ Lloyd (1979), 44.

⁷⁴ Burkert (1992), 62.

doctors) of naturally, or iatrogenic, evacuations from the body, but it too could refer to ritual purification of after moral pollution.⁷⁵ Hellebore, the quintessential purgative drug, still maintains its ambivalent character as a drug/cure of evil in Theophrastus' *Inquiry*, who says that "people use it [hellebore] to purify their houses and their flocks, chanting some kind of charm over it, and for a great number of other jobs."⁷⁶ In contrast to the early Hippocratic physicians, as will be shown, the iatromantis employed drugs without any discernible theoretical assumptions. Instead, deep-rooted popular conceptions founded in the sphere of religious *catharsis* were perpetuated. The reason for a drug's effectiveness was associated not with its natural quality (as later Hippocratic pharmacology would contest, its *dynamis*) but rather with its relationship to purgatives traditionally used in cleaning the body of pollution.

In sum, the Hippocratic physicians were undoubtedly the heirs to a large number of natural remedies perpetuated through folk medicine. Likewise, the sphere of religious *katharsis* offered not only a vocabulary, but many practices which these early physicians incorporated. As will be shown, though, these early Hippocratic physicians differed remarkably from their iatromantic counterparts: their use of drugs was based on firmly established theoretical assumptions about disease within the body. Surprisingly, though, when we ask why some plant substances were used at all, or why certain ones were chosen over another, a clear answer would, in some cases, have to include a reference to folklore surrounding them.⁷⁷

⁷⁵ In the case of Melampus, who was recognized as curing illness through purification, the therapy by black hellebore takes on a double-meaning: the daughters of Proetus have transgressed a ritual, causing them to become "mad." This madness, though, is also a disease, a *nosos*, which Melampus cures with the evacuative drug.

⁷⁶ Theophrastus, *Inquiry*, 9.10.4.

⁷⁷ Lloyd (1983), 132, astutely recognizes the important indebtedness of Hippocratic pharmacology to popular folk tradition. While the *Corpus Hippocraticum* makes no mention of this heritage, and polemically vituperate any magico-religious procedures or beliefs, it might persist in its use of a remedy with no organic action and seek to define its use within a contrived theoretical explanation, when actually its origin and use stem from traditional medicine. Ingrained popular assumptions, claims Lloyd, are responsible for many of the Hippocratic pharmacological procedures.

III.3: Early Hippocratic Pharmacology and the *Cnidai Gnomai*

The author of *On Regimen in Acute Diseases* castigates the old Cnidian doctors for using too few remedies and limiting themselves to purges:

And not only on this account do I censure them, but because the remedies they used were few in number; for most of their prescriptions, except in the case of acute diseases, were to administer purges, and to give to drink, at the proper season, whey and milk.⁷⁸

This is the only surviving reference in the entire Corpus Hippocraticum to the *Cnidai Gnomai*.

The author of *On Regimen in Acute Diseases* continues:

It must be admitted, though, that those who later revised [these texts] proceeded more in keeping with the medical profession as concerns what has to be administered in each case. What the ancients wrote on regimen is not worth mentioning either. They left it out of consideration, despite its importance.⁷⁹

As this text has been classically interpreted, members of the Coan school are criticizing the doctrines of the Cnidians. Wesley Smith in the early 1970's reexamined the evidence which had led previous scholars believe that Coan and Canadian "medical schools" flourished in the fifth and fourth centuries BC and found the term "school" to be an anachronistic designation for these centers of medicine.⁸⁰ Similarly, there is no ground to accept the claim that in this instance, a Coan is criticizing a Cnidian.⁸¹ First, no stringent argument confirms that the author of *On Regimen in Acute Diseases* is a member of the Coan school, and, even if he is considered a Coan, there is no evidence to suggest what a "school" was like during the decades around 400 BC.

⁷⁸ *On Regimen in Acute Diseases*, 2: καὶ οὐ μόνον διὰ τοῦτο οὐκ ἐπαινέω, ἀλλ' ὅτι καὶ ὀλίγοισι τὸν ἀριθμὸν τοῖσιν ἄκεσιν ἐχρέοντο. τὰ γὰρ πλείστα αὐτοῖσιν εἶρηται, πλὴν τῶν ὀξειῶν νούσων, φάρμακα ἐλαττήρια διδόναι καὶ ὄρον καὶ γάλα τὴν ὥρην πιπίσκειν.

⁷⁹ *On Regimen in Acute Diseases*, 3: οἱ μέντοι ὕστερον ἐπιδιασκευάσαντες ἰητρικώτερον δὴ τι ἐπῆλθον περισσοματὰ τῶν προσοιστέων ἐκάστοισιν. Ἀτὰρ οὐδὲ περισσοματὰ διαίτης οἱ ἀρχαῖοι συνέγραψαν οὐδὲν ἄξιον λόγου. Καὶ τοι μέγα τοῦτο παρήκαν.

⁸⁰ Smith (1973).

⁸¹ This line of argument would lead to the conclusion that the Cnidians possessed only a small pharmacopeia and used no dietetic treatment, while the Coans (of whom Hippocrates is said to be a member) engaged in rich pharmaceutical and dietetic therapeutics. Such a polemic might have originated in the association of Hippocrates with the Coan "school." As the "father" of ancient medicine, the physician *par excellence*, Hippocrates' "school" would naturally be more correct in its therapeutic methods.

Secondly, the *Cnidai Gnomai* might not be exclusively Cnidian. Indeed, the material in them might be common to all physicians in the fifth century, and not doctrinally specific to a group of Cnidian physicians.⁸² While the *Cnidai Gnomai* can provide no evidence for the recognition of distinct “medical schools,” it does appear to be a fairly early text which pre-dates all treatises in the Corpus Hippocraticum and which can provide clues to early Hippocratic medicine. The author of *On Regimen in Acute Diseases* castigates the ancient physicians, whom he believes composed the *Cnidai Gnomai*, for their primitive therapeutics as was typical of most polemic treatises in the Corpus which believed that medicine was continually manifesting progress.⁸³ From this information provided by the author of *On Regimen in Acute Diseases*, we may conclude the following: (1) the *Cnidai Gnomai* was an ancient medical text predating most, if not all, Corpus works; (2) the ancient physicians (chronology unspecified) applied a small number of remedies relative to the author’s number of prescriptions, most of which included evacuative drugs and whey and milk; (3) the *Cnidai Gnomai* contained (a) a description of “what the patients are suffering from in each of the diseases,” (b) a description of “how some of the diseases end,” (c) and “a discussion about the methods of treatment in each case”⁸⁴; and (4) the ancient physicians employed little dietetic treatment.

Since a glimpse of early Hippocratic pharmacology might be gleaned from the *Cnidai Gnomai*, further information about this ancient, lost treatise is necessary. In his commentary on the Hippocratic tract *Epidemics VI* (*In Hippocraticum Epidemium VI Commentarium*), Galen

⁸² The author of *On Regimen in Acute Diseases* speaks of οἱ συγγράψαντες τὰς Κνιδίας καλεομένας γνώμας, which could suggest that the ascription of the work to the Knidians was disputable (reading καλεομένας with a certain hesitancy). See Langholf (1990), 16, n.14, and ff.

⁸³ Surprisingly, though, a certain esteem and respect seems to pervade these author’s words of over-emphasized disdain.

⁸⁴ See Langholf (1990), 22-3, who quotes Grensemann and Jouanna for (3) above.

mentions that “pemphix is used also in the *Cnidai Gnomai*, which they attribute to Euryphon the physician.”⁸⁵ Following this is the only direct quotation from the *Cnidai Gnomai*, and it has no parallel in the Corpus:⁸⁶

‘He urinates small amounts at a time, and a pemphix (bubble?) like olive oil stands on the surface, pale like a spider’s web.’⁸⁷

Galen then comments on this passage quoted from the *Cnidai Gnomai*:

they seem to mean by pemphix not the whole pustule, but only its margin, which resembles a spider’s web.⁸⁸

Why, after attributing this treatise to Euryphon, does Galen then speak of “they” (οἱ)? Neither I nor Wesley Smith know. Nevertheless, this small quotation from the lost work easily refutes the statement in *On Regimen in Acute Diseases* which claims that “even a non-physician could write [this treatise] if he skillfully asked the patients what they are suffering.”⁸⁹ The observation which Galen quotes “could only be described and used successfully if both the author and the reader very closely examined the urine themselves. Another fragment of the *Cnidai Gnomai* quoted in Rufus of Ephesus confirms that the author of *On Regimen in Acute Diseases* definitely over-emphasized his polemic against these early Hippocratic physicians.⁹⁰ In sum, (1) both fragments offer significant proof that the *Cnidai Gnomai* were much more professional than the author of *On Regimen in Acute Diseases* is willing to admit; and (2) Euryphon might be associated with the composition or editing of the *Cnidai Gnomai*.

⁸⁵ Galen, *In Hp. Epid. VI comm.* (CMG 5.10.2.2), 54: εἴρηται γε μὴν ἡ πέμφιξ κὰν ταῖς Κνιδίαις γνώμαϊς, ἃς εἰς Εὐρυφῶντα τὸν [καὶ] ἰατρὸν ἀναφέρουσι...

⁸⁶ Smith (1973), 577.

⁸⁷ Galen, *In Hp. Epid. VI comm.* (CMG 5.10.2.2), 54.

⁸⁸ Galen, *In Hp. Epid. VI comm.* (CMG 5.10.2.2), 54: εἰκόασι γοῦν οὗτοι πέμφιγα καλεῖν οὐχ ὅλην τὴν φλύκταιναν, ἀλλὰ μόνον τὸ περιγράφον αὐτὴν ἔξωθεν ἀραχνίω παραπλήσιον.

⁸⁹ *On Regimen in Acute Diseases*, 1.

⁹⁰ Langholf (1990), 19-20, quotes Rufus of Ephesus passage.

Another quotation by Galen is traditionally believed to be a quotation from the lost *Cnidai Gnomai*. The basis for this assertion lies in Galen's mention of the physician Euryphon: "Euryphon calls such fevers 'livid' writing thus..." In an earlier quotation, Euryphon is mentioned as the author of the *Cnidai Gnomai*. Extrapolating from this earlier statement, then, scholars have identified this Euryphon as the author of *the Cnidai Gnomai*. Assuming that (1) the Euryphon discussed in these separate passages is the same person; and (2) Euryphon wrote nothing other than the *Cnidai Gnomai*, this statement, which Galen ascribes to Euryphon, can be identified as part of his larger composition, the *Cnidai Gnomai*. A passage in *On Diseases II*, which is ascribed to Hippocrates, is surprisingly similar to the one Galen ascribes to Euryphon⁹¹ :

Euryphon (livid disease)

Livid fever possesses him, and shivering (*brugmos*) from time to time. There is pain in the head. Pain possess the intestines and he vomits bile. When the pain possesses him he cannot see, because he is weighted down. The stomach becomes dry, the whole skin livid, the lips as though he has been eating blackberries. The whites of his eyes are livid, and he stares like a man being choked. When this is less severe he alters frequently.

On Diseases II.68

Livid fever: a dry fever possesses him and shivering (*phrix*) from time to time. There is pain in the head. Pain possesses the intestines and he vomits bile. When the pain possesses him he cannot see, but is weighed down. The stomach becomes dry and the skin and lips livid, the white of the eyes livid, and he stares like a man being choked. Sometimes his skin changes and becomes pale instead of livid.

⁹¹ Galen, *In Hp. Epid. VI comm.*, p.55.10-56.8.

As Langholf notes, from this striking similarity and information which Galen gives, scholars have argued as follows:

- (1) since, according to Galen, there is a tradition that Euryphon, a physician from Cnidos, had written the *Cnidai Gnomai*, and since some of the features mentioned in *On Regimen in Acute Diseases*' polemic can be found in Euryphon's 'livid disease,' this latter text is part of the *Cnidai Gnomai*;
- (2) since this latter text is similar to *On Diseases* II.68, this section of the Hippocratic treatise is derived from the *Cnidai Gnomai*;
- (3) since chs. 12-75 of *On Diseases* II resemble ch. 68, all of *On Diseases* II is derived from *Cnidai Gnomai*.⁹²

This nicely delineated argument upon which the likes of Grensemann and Jouanna based their scholarship falters under other evidence in Galen's writings.⁹³ Indeed, Galen asserts that some people (unnamed) attributed the composition of the *Cnidai Gnomai* to Euryphon, yet Galen also credits Euryphon with having written many other works, namely treatises of the Corpus Hippocraticum: *On Regimen* and *On Affections*. Furthermore, Smith observes that in Galen's mind Euryphon's medicine was no different than Hippocrates'.⁹⁴ Thus, a critical assumption -- that Euryphon wrote only one treatise, the *Cnidai Gnomai* -- cannot be substantiated.

⁹² Langholf (1990), 22.

⁹³ Langholf (1990), 22.

⁹⁴ Smith (1973), 581, and 582: "The modern myth of Euryphon's stupendous, comprehensive, and orderly *Cnidian Opinions* [*Cnidai Gnomai*] explains nothing and misinterprets what little Galen knew."

The above evidence and arguments allow us to substantiate some important claims which will prove useful in reconstructing early Hippocratic pharmacology. Avoiding any mention of “medical schools” and eschewing the myth that places Euryphon as the author of *the Cnidai Gnomai*, we will focus instead on any claim to early Hippocratic medicine, that is, any mention of “ancient medicine” (pre-Corpus Hippocraticum):⁹⁵

(1) There is no compelling reason to doubt the author of *On Regimen in Acute Diseases*’ general claim that the ancients “applied only a small number of remedies. In most cases...they prescribed evacuative drugs and, as drinks, whey and milk according to the season.”⁹⁶ While the author over-emphasized his polemic in the latter claim, his general observation of ancient medical therapeutics as consisting of little dietetic treatment and only a few evacuative remedies does not yield to any polemic distortions.

(2) References to Euryphon should not be used to substantiate the unreasonable claim that he was the author of the *Cnidai Gnomai*, since this requires ignoring contradictions in the evidence offered by Galen. Instead references to “Euryphon” should be held in the same light as those to “Hippocrates.” Whether or not Euryphon wrote the

⁹⁵ Interestingly, the myopic view that led scholars to formulate the notion of competing “medical schools” and to relentlessly search for the author of *the Cnidai Gnomai* was a part of a larger movement to define the texts which were truly authored by Hippocrates -- essentially, the Hippocratic Question. Scholars like Lonie and Grensemann were influenced by the intense period of Quellenforschung in Classical scholarship that began in the late nineteenth century and which was fueled by Hermann Diel’s reconstruction, in *Doxigraphici Graeci* (1879), of the line of transmission of doxographical information about philosophers. Max Wellman suggested in 1910 that where the Cnidian works coincided, Euryphon would be the source. Many centuries saw the build-up of such scholarship which is only now being seriously questioned. In this case, methodological concerns, especially those advocated by Lloyd, become more important.

⁹⁶ *On Regimen in Acute Diseases*, 1.

Cnidai Gnomai is insignificant; what is important, though, is his relationship with ancient, early-Hippocratic medicine.⁹⁷ A comparison with the name “Hippocrates” is useful.

When the collection or collections of medical treatises began to be the subject of commentaries during the Hellenistic period, the name of a famous physician, “Hippocrates,” was ascribed to many of these works. What association these early collections had with the name Hippocrates cannot be determined. Already in the middle of the third century, Bacchius’s commentary points to the extreme heterogeneity in these works, suggesting that the Alexandrians’ attempts to uphold Hippocrates as the author of these medical collections are based more in the romantic notion of having a famous individual responsible for a collection of writings.⁹⁸ *Anonymus Londinensis* describes many different physiological systems and ascribes these to numerous individuals, which adds only more evidence that Hippocrates was not the only author, if even a contributor, to the Corpus Hippocraticum. Edelstein pointed out just how little is actually known about “Hippocrates, concluding that “Hippocrates” was an early physician whose works have been lost, since reports of his method and doctrine cannot be connected with any work extant in the Corpus Hippocraticum. Later antiquity, facing the same problem, contrived the name “Hippocrates” as the author of these treatises of the Corpus.⁹⁹

⁹⁷ Grensemann, quoted in Langholf (1990), 24, suggests that Euryphon was born around 500 BC. The testimonies in Grensemann’s collection of fragments, however, are ambiguous.

⁹⁸ Lloyd (1975), 178. The belief that Hippocrates was the genuine author of the Corpus, or for that matter, certain extant works of the Corpus, originates from Alexandrian scholars who attributed a name to a widely heterogeneous collection of medical writings. This mistake, as Lloyd comments, has fueled interest in the Hippocratic Question: which works of the Corpus are genuinely authored by Hippocrates. Unfortunately, the underlying assumption of this inquiry (i.e., that Hippocrates wrote any of the works) is unsupported at the moment.

⁹⁹ Smith (1973), 570.

Similarly, a tradition of ascribing early-Hippocratic medicine to a certain “Euryphon” might have been popular in antiquity, even though the collection of early medical texts was actually a highly heterogeneous group authored (or edited) by many physicians. *On Regimen in Acute Diseases* supports this claim. The author begins by alluding to the first composers (οἱ συγγράψαντες) of the *Cnidai Gnomai*, whose inadequacies he thenceforth criticizes. He then remarks that “those who later edited it [*Cnidai Gnomai*, first edition] made it more scientific.”¹⁰⁰ Reference to composers (οἱ συγγράψαντες) and editors (οἱ ὕστερον ἐπιδιασκευάζοντες) of the *Cnidai Gnomai* suggest that the attribution of this text to Euryphon alone found in Galen’s *Commentary on Epidemics IV* is questionable and probably a result of a tendency beginning in the Hellenistic age of attributing a text to a prominent individual.¹⁰¹

A modest amount of evidence can also place Euryphon in the realm of pre-Hippocratic, or at least early-Hippocratic, medicine. Again, Galen’s reference to Euryphon as the author of a statement on the “livid disease” forms the foundation of this argument.¹⁰² The similarity between this passage, which Galen quotes and ascribes to Euryphon, and the passage on “livid disease” in *On Diseases II.68* is remarkable. Furthermore, *On Diseases II.68* has been proven to resemble a lost text which must have

¹⁰⁰ *On Regimen in Acute Diseases 2*: οἱ ὕστερον ἐπιδιασκευάζοντες ἡτηρικώτερον δὴ τι ἐπῆλθον.

¹⁰¹ Lonie (1965), 2, uses Galen’s gloss on the word ἐπιδιασκευάζειν to show that the *Cnidai Gnomai* “were improved not by the sort of marginal addition of which we can see the traces clearly enough in other Hippocratic works, and which were perhaps made by individual owners of the text, but by a substantial remodeling, undertaken under the school’s authority, to produce a new work which superseded rather than expanded the old” (Italics mine). Lonie’s assertion that the plural editorship represents a “school’s” effort misses the mark. Nevertheless, Lonie astutely recognizes that not one, but many individuals were responsible both for the original composition (οἱ συγγράψαντες) and for the revision (οἱ ὕστερον ἐπιδιασκευάζοντες).

¹⁰² See 32 *supra* for Euryphon’s “livid disease” passage quoted by Galen.

served as a source of several nosological treatises of the Corpus. Basing their arguments on internal evidence and comparison with other Corpus Hippocraticum texts, Jouanna and Grensemann proved that (1) a common literary model directly or indirectly underlies parts of the nosological treatises, and (2) *On Diseases* II.12-75 comes closest to this inferred model.¹⁰³ Assuming that *On Diseases* II.68 is a part of the oldest Corpus text, and that a passage which Galen ascribes to Euryphon bears striking resemblance to *On Diseases* II.68, there is a strong probability that a reference to Euryphon is indeed a reference to an individual who was important in early-Hippocratic medicine. Euryphon, in other words, is to the early Hippocratic texts what Hippocrates is to the Corpus Hippocraticum itself.

III.4: *Anonymus Londinensis* and Early Physiology: *Perissomata*

The papyrus *Anonymus Londinensis*¹⁰⁴ contains important statements about physiological and etiological systems which are ascribed to a number of ancient authorities. An understanding of early-Hippocratic physiology would be helpful in reconstructing an early pharmacology, since the actions of drugs are usually based within beliefs about how the body functions and how disease affects the state of health. In the second section of *Anonymus*, the causes of disease are reduced to two classes:

- (1) residues (περισσώματα) from food, the cause adopted by authorities from Euryphon to Aegimius;

¹⁰³ Langholf (1990), 25, who quotes Jouanna and Grensemann.

¹⁰⁴ This papyrus, edited and translated by W.H.S. Jones (1947), is probably of the second century AD, and is, according to the experts Kenyon and Diels, a copy, made for private use, of an earlier work. The early date of this text is confirmed by the absence of Galen's name from the authorities mentioned. The text falls into three distinct sections: I-IV, 25: definitions; IV,26-XXI,9: the etiology of diseases according to various authorities; XXI,9-XXXIX,32: the development of physiology after 300 BC from Herophilus to Alexander Philaethes.

(2) disturbances in the equilibrium of the elements composing the body, the cause adopted by all other authorities.

Most important for this study are references to Euryphon, who was shown earlier to be a representative of early-Hippocratic medicine. *Anonymus* attributes an etiological system based on *perissomata* to Euryphon:

Euryphon of Cnidos, for example, thinks that diseases are caused in the following manner. "When the stomach does not discharge the nutriment that has been taken, residues are produced, which then rise to the regions around the head and cause diseases. When, however, the stomach is empty and clean, digestion taken place as it should; otherwise, what I have said occurs."¹⁰⁵

The term *perissoma* does not occur in the *Corpus Hippocraticum*. Defined by Aristotle as τὸ τῆς τροφῆς ὑπόλειμμα (residue of food), it is translated by LSJ as "that which is over and above, esp. that which remains after the digestion of food."¹⁰⁶ Essentially, disease is explained as a malfunction of the normal digestive process. Aristotle associates the idea of *sepsis* with the upper stomach, and *pepsis* with the lower stomach. *Pepsis* is related to both the normal physiological activity of putrefaction as well as its pathologic counterpart. *Perissomata* result from the abnormal physiological conditions in which normally putrefying material becomes pathogenic. Even though Aristotle's ideas postdate Euryphon, they provide important clues to understanding these physiological concepts. Steuer suggests that the double aspect of putrefaction, acting favorably in setting digestion in motion and unfavorably as a *materia peccans* whenever it accumulates, "is

¹⁰⁵ *Anonymus Londinensis*, IV.31-40.

¹⁰⁶ Steuer (1959) offers a complete study of this term and relates it to the Egyptian concept of *whdw*. I will only mention what is necessary to understand this concept in relation to the etiological system ascribed by Euryphon.

characteristic of the older Cnidian school."¹⁰⁷ While his assignment of this physiology to a medical "school" is obsolete, his more general premise is more reasonable -- that this concept is associated with a nosology that predates that of the *Corpus* (he assumes this to be the *Cnidai Gnomai*, a product of the Cnidian "school"). Early humoral theory is actually an extension of this concept of putrefaction: bile and phlegm, not the traditional humors which are themselves pathogenic when their equilibrium is upset, become pathogenic after putrefication.¹⁰⁸ Following the lead of Steuer, since Euryphon is consistently associated with early-Hippocratic medicine, the physiological system attributed to Euryphon in *Anonymus* most likely represents an early Hippocratic physiological system.

This physiological system marvelously agrees with the early Cnidian therapeutic practice attested by the author of *On Regimen in Acute Diseases*, 1ff. for the first edition of the *Cnidai Gnomai*. The earliest composers of the *Cnidai Gnomai*, the author remarks, used very few remedies (ὀλίγοισι τὸν ἀριθμὸν τοῖσιν ἀκέσιν ἐχρέοντο), restricting themselves to mainly purgatives (φάρμακα ἐλατήρια) and to what were thought to be cleansing substances (milk and whey). It has not been sufficiently appreciated that this severe limitation to a few remedies, which the author of *On Regimen in Acute Diseases* claims to be the distinguishing mark between the first and second editions of the *Cnidai Gnomai*, is, in the face of the cornucopia of traditional folk pharmacopoeia, an absolutely

¹⁰⁷ Steuer (1959), 19. Unfortunately, Steuer wrote his ideas during the period of scholarship which sought to attribute certain texts and beliefs to ancient medical "schools." His remarks, however, can be appreciated for elucidating the antiquity of this characteristic ambiguity surrounding *perissomata*.

¹⁰⁸ Cf. *Internal Affections*, 41: "When the bile, having become putrefied, mixes with the blood in the veins and in the joints, and when it rests there, it give rise especially in the articulations to swellings which settle there." "Ὄκόταν ἡ χολὴ σαπέῖσα μιγῆ τῷ αἵματι ἀνὰ τὰς φλέβας καὶ ἄρθρα, καὶ ὀκόταν στῆ, οἴδημα ἀνίσταται μάλιστα μὲν ἐν τοῖσιν ἄρθροισι καὶ καταστηρίζεται. Cf. also *Internal Affections*, 49.

revolutionary event¹⁰⁹! This constitutes a great leap in medicine and, specifically, pharmacology. This salient restriction to a few remedies, of a purgative and cleansing nature, is the result of a well-pondered choice. The large compendium of folk remedies was limited by a theoretical presupposition; namely, the pathogenic material which accumulated in the digestive system (*perissomata*) must be eliminated. For this, purgatives (φάρμακα ἐλατήρια) are appropriate; all other traditional remedies are useless and therefore eliminated.

The choice of only a few remedies is based on the theoretical presupposition of a physiological system which considers disease the result of the accumulation of pathogenic *perissomata*. The associated pharmacology, then, is aimed at eliminating this residue. Such a selection and such a method can only be explained by a fundamental change in attitude and the resulting new physiological system, which, however commonplace, is a magnificent invention.¹¹⁰

III.5 Relationship between Egyptian Medicine and Early-Hippocratic Medicine

Herodotus calls the Egyptians the healthiest people on earth, second only to the Libyans. The reason, Herodotus relates, is because they systematically practice purgation,

¹⁰⁹ Lonie (1965) thinks that the use of purgatives is a “primitive method” and suggests that dietetic treatment, which comes later, is more theoretical. Lonie argues that the introduction of an etiology (in his opinion, one of bile and phlegm) can hardly “have involved a complete revolution in the methods of therapy: the results would have been disastrous.” Contrary to Lonie, I argue that the etiological system based on accumulating digestive residues is directly responsible for the restriction of traditional remedies to simply purgatives. I agree with Lonie that this purgative pharmacology might have been disastrous; the author of *On Regimen in Acute Diseases* actually points out that the early Cnidian medications did not work.

¹¹⁰ See also Mansfeld (1980) for an magnificent argument in favor of early theoretical systems.

believing that all diseases arise from the food they eat.¹¹¹ The role of purgatives in Egyptian therapeutics can be linked in a number of medical papyri to an etiological system that envisions disease arising from foodstuffs. The *Papyrus Edwin Smith* contains many references to *whdw*, a term which Steuer has shown to represent a basic etiological principle or *materia peccans* adherent to the fecal content of the bowel.¹¹² Absorbed, this destructive material causes deadly coagulation and destruction of the blood as well as suppurative conditions, both leading to the eventual putrefaction and corruption of the body.¹¹³ This concept seems to have evolved from Egyptian religious notions and interpretations of the process of mummification. The Egyptian physician envisioned the *whdw* passing into the blood-vascular system (*mtw*), where, upon mixing with blood, it was transformed into pus (*ryt*). The passage of *whdw* from the feces into the blood stream is associated with the idea of “rising” that produced heat and alternations in the pulse rate.¹¹⁴ Egyptian pharmacology based its therapeutics on this etiology, introducing purges to remove the *whdw* from the bowel and bloodletting to remove this *materia peccans* from the vascular system.¹¹⁵ In later stages of the disease (i.e., contamination of the blood with *whdw* and subsequent transformation into pus), topical ointments were used to draw out the pus through the skin.

¹¹¹ Herodotus, *Histories*, II.77.2: “They purged themselves for three days straight every month, vigorously pursuing their health with emetics and enemas, believing that all diseases arise from foods eaten.” (Συρμαίζουσι τρεῖς ἡμέρας ἐπεξῆς μηνός ἐκάστου ἐμέτοισι θηράμενοι τὴν ὑγίην καὶ κλύσμασι, νομίζοντες ἀπὸ τῶν τρεφόντων σιτίων πάσας τὰς νούσας τοῖσι ἀνθρώποισι γίνεται.)

¹¹² Steuer (1959). See also Majno (1991) and Majno (1975), 129-30.

¹¹³ Steuer (1959), 3. Egypt abounds in the suppurative conditions which this etiological principle of *whdw* explains.

¹¹⁴ Cf. the Hippocratic concept of “fluxion” which generated a fever. See Steuer (1959), 4-5.

¹¹⁵ Steuer (1963) notes that the Ancient Egyptian conception of the role played by putrefaction in the etiology of diseases gave rise to a “coherent rationale of therapy.” Steuer fails to contrast other, more random therapeutic methods with these which are soundly based on theoretical assumptions.

The major link between Egyptian and early-Hippocratic medicine is the notion that a fecal-transported *materia peccans* rises into regions of the body causing disease.¹¹⁶ Euryphon's etiology attested in *Anonymus* betrays a striking similarity to this Egyptian etiology. *Perissomata*, failing to be excreted normally, rise in the body and inflict suppurative diseases. Similar therapeutic protocols are initiated. An early Hippocratic physician would administer mainly purges and substances which have a diuretic effect; the Egyptian would do likewise. There is abundant evidence that Egyptian medicine was widely known and influential¹¹⁷, yet no conclusive link between these two etiologies can be offered except for this overly-broad comparison. Nevertheless, Egyptologists and medical historians have traditionally recognized theoretical considerations behind the Egyptian uses of purgatives, yet have failed to do so with early Hippocratic medicine.

III.6 *On Diseases* II.12-75 and its Relationship to Early-Hippocratic Pharmacology

Scholars have proven that *On Diseases* II.12-75 resembles a lost text which must have served as a source of several nosological treatises within the *Corpus Hippocraticum*.¹¹⁸ Although some have suggested that this lost text must have been the *Cnidai Gnomai*, there is no evidence for this proposition. The works of Jouanna and Grensemann have been monumental in establishing that *On Diseases* II.12-75 comes closest to this early nosological source. This conclusion is inevitable when parallel

¹¹⁶ Steuer (1963), 5, comments, "...the contribution of Ancient Egypt...was very great, not only through the transmission of empirical knowledge on the use of drugs or in the mechanics of handling injuries but, more importantly, in originating certain theoretical concepts which gave coherency to a mode of therapy, thus making it possible to develop a consistent regimen in the treatment of internal disease."

¹¹⁷ Sigerist (1951b), 356ff.

¹¹⁸ See Langholf (1990), 24-26, for sources.

passages of Corpus texts are compared, and common heritage text is distinguished from the later inserted additions. As Langholf notes, this is probably the greatest contribution to Hippocratic scholarship this century.¹¹⁹

As noted above, the author of *On Regimen in Acute Diseases* criticized the ancient physicians for the small number of remedies they applied, mostly purges, and whey and milk when in season.¹²⁰ It was further argued that this salient restriction to just a few remedies reflects a well-pondered choice based upon a physiology which understood disease as intestinal residues; therapy would inevitably include purges which could remove this pathogenic residue and return the body to health. Theoretical assumptions, then, were at work in directing the early Hippocratic physicians to choose only a few purges for their drug therapy.

Surprisingly, the therapeutic formula in *On Regimen in Acute Diseases* -- only a few purges, and whey and milk when in season -- is seen quite frequently in *On Diseases* II.12-75:¹²¹

First, clean out the patient's head, and then give him a medication that cleans downwards; if it is the right season, have him drink whey for seven days; if he is too weak, for fewer.¹²²

Have the patient drink a medication to act downwards, afterwards ass's milk or whey, or some juice.¹²³

Have the patient drink medications, first those that act downwards, then ones that act upwards; also clean out his head...in season, have the patient drink ass's milk or whey, and also whichever medication you think he most needs.¹²⁴

¹¹⁹ Langholf (1990), 25.

¹²⁰ See 29 *supra* for text.

¹²¹ Similar therapeutic formula occur in *On Diseases* II.12,13,38,40,48,50,51,55,66-68,70,72-74.

¹²² *On Diseases* II.12: καθήρας αὐτοῦ τὴν κεφαλὴν πρότερον οἱ φάρμακον δοῦς κάτω καθαρόν. Ἦν ὥρῃ ἢ τοῦ ἔτεος, ἔπειτα ὁπὸν μεταπίσαι ἐπτά ἡμέρας, ἢν δ' Ἀσθενὴς ἢ, ἐλάσσονας.

¹²³ *On Diseases* II.40: φάρμακον πίσαι κάτω, καὶ μεταπίσαι γάλα ὄνου ἢ ὀρόν ἢ τῶν χυλῶν τινά.

¹²⁴ *On Diseases* II.66: τοῦτον φάρμακα πιπίσκειν, πρῶτον μὲν κάτω, ἔπειτα ἄνω. Καὶ τὴν κεφαλὴν καθαίρειν...καὶ τὴν ὥρην ὄνου γάλα ἢ ὀρόν πιπίσκων, φάρμακον προπίσαι, ὁποτέρου ἂν σοι δοκῆ μάλλον δεῖσθαι.

Of the 226 total prescriptions in *On Diseases* II.12-75, 75 of them are purges and 17 are suggestions for milk or whey when in season. In striking contrast to other treatises, where purgative treatment accounts for less than 10% of all drug therapy, 33% of drug therapy in *On Diseases* II.12-75 is purgative in nature.

This disproportionate amount of purges as well as the parallelism of ch. 68 with Euryphon's "livid disease" as attested by Galen¹²⁵ strongly favors the hypothesis that *On Diseases* II.12-75 is not only an early nosological text, but that a significant amount of the drug treatment in this treatise is derived from early Hippocratic pharmacology. Nevertheless, a brief survey of *On Diseases* II.12-75 will show that there are a significant number of chapters which recommend a rather elaborate therapeutic programme, and which run counter to the description of early Hippocratic therapy in *On Regimen in Acute Diseases*. Jouanna and Grensemann tried to solve this discrepancy by postulating that *On Diseases* II.12-75 contains material from different stages of scientific development; namely, that chapters resembling the paradigm of *On Regimen in Acute Diseases* remain close to early Hippocratic medicine, while the more elaborate chapters are vestiges of revision mentioned in *On Regimen in Acute Diseases*.¹²⁶

While Jouanna and Grensemann conclude that *On Diseases* II.12-75 displays a prominent scientific, mainly nosologic, development, they fail to notice a remarkable pharmacological evolution. A progression from folk medicine and early-Hippocratic pharmacology, whose theoretical assumptions about drug function were derived from a

¹²⁵ See 32 *supra* for text.

¹²⁶ *On Regimen in Acute Diseases*, 1: "The authors of the work entitled *Cnidian Sentences*..." (Οἱ συγγράψαντες τὰς Κνιδίας καλομένης γνώμας...) and 2: "However, the later revisers..." (οἱ μέντοι ὕστερον ἐπιδιασκευάσαντες...). See 36, n.101 *supra* for discussion.

physiological system based on *perissomata*, to a newer pharmacology is clearly discernible in these chapters. Three distinct formulae of prescriptions are evident, each representing a different set of theoretical presuppositions on drug therapy. In the first, there is an elaborate and quite confusing list of ingredients in which no intended physiological function (e.g., purge, diuretic, etc.) is specified nor any discernible links with a nosological theory. In the second, the formula resembles the purge, milk, and whey of early-Hippocratic pharmacology and accords with a physiological system requiring only purges. Finally, there is a prescription which is remarkably concise and describes a drug according to an intended physiological effect. A much more complicated nosology accommodates this last prescription.

Upon further examination, the prescriptions of elaborate proportion resemble remedies of folk medicine which are prominent in the gynecological treatises.¹²⁷ Prescriptions of this format are intrusions of folk medicine into Hippocratic medicine. Some might be recent additions to the text by the author, while others may be more established remedies. Nonetheless, these drug prescriptions represent the oldest level of pharmacology in *On Diseases* II.12-75, stratum A.

The second type of prescription resembles the formula stated by the author of *On Regimen in Acute Diseases* and is characteristic of early-Hippocratic pharmacology, most notably, the strict restriction to only purges. This and similar passages in *On Diseases* II.12-75 actually represent a vestige of early Hippocratic pharmacology transgressing the

¹²⁷ Grensemann has identified compositional layers within the gynecological texts. His five "gynecological viewpoints", which he labeled A1, A2, B, C, and D, to indicate a chronological progression extending from the middle decades of the fifth century down into the middle decades of the fourth century. See Hanson (1991), 75-76.

boundaries of physiological systems. The nosology based on *perissomata* has been replaced by one of bile and phlegm as bodily components and pathogenic material. The former theory is no longer compatible with the newer; likewise, the older pharmacology which was based on purges is not translatable to the new physiological doctrines except on the most basic level of “cleaning.” This pharmacology can be considered the next level in *On Diseases* II.12-75, stratum B.

Finally, the prescription which describes a drug by a concise category which defines its specific function (e.g., cholagogue, expectorant, etc.) marks a new level of pharmacological thinking, stratum C. Where *perissomata* required elimination in early Hippocratic medicine, bodily humors need equilibration for Hippocratic medicine proper. These new drugs, essentially categories, have no place within the early-Hippocratic physiological system; a cholagogue will do nothing, for example, for a mean *perissomata*.

Examples of these three strata illustrate their striking variance:

A. If the head ulcerates, burn wine lees, make these into a paste, add finely ground acorn shell, and mix in an equal amount of soda; smear the patient with this, and have him bathe in hot water. Let him anoint his head with ground bayberry, galls, myrrh, frankincense, flower of silver, lard, and bay oil: mix these together, and smear them on.¹²⁸

B. First, clean out the patient’s head, and then give him a medication that cleans downwards; if it is the right season, have him drink whey for seven days; if he is too weak, for fewer.¹²⁹

C. Have the patient drink a medication that will clean bile downwards.¹³⁰

¹²⁸ *On Diseases* II.13: ἦν δὲ ἡ κεφαλὴ ἐλκῶται, τρύγα κατακαίων οἰνηρὴν, σμήγμα ποιέων, σύμμισγε τῆς βαλάνου τὸ ἔκλεμμα λεῖον τρίβων, λίτρον συμμίσγων ἴσον, ἀποσμήξας τούτοισι, λούσθω θερμῷ. Ἐριέσθω δὲ τὴν κεφαλὴν, δαφνίδας τρίψας καὶ κηκίδας καὶ σμύρναν καὶ λιβανωτὸν καὶ ἀργούρου ἄνθος καὶ ὕειον ἀλειφα καὶ δάφνινον ἔλαιον. Ταῦτα μίξας χρίειν.

¹²⁹ *On Diseases* II.12: καθήρας αὐτοῦ τὴν κεφαλὴν πρότερον οἱ φάρμακον δοῦς κάτω καθαρὸν. Ἦν ὥρη ἢ τοῦ ἔτεος, ἔπειτα ὁπὸν μεταπίσαι ἐπτά ἡμέρας, ἦν δ’ Ἀσθενὴς ἢ, ἐλάσσονας.

¹³⁰ *On Diseases* II.38: φάρμακον πίσαι κάτω, ὑφ’ οὗ χολὴν καθαρεῖται.

That at least two different pharmacologies are at work here is unquestionable.¹³¹ An interesting set of conclusions can be drawn from these three passages above and applied to the entire treatise:

- (1) Prescription A represents the intrusion of traditional drug lore into this Hippocratic tract.
- (2) Prescription B is a surviving remnant of early-Hippocratic pharmacology.
- (3) Prescription C differs from A and B, since it does not fit with a physiological system based on *perissomata* nor are specific ingredients listed by the author; this prescription represents a newer pharmacology.

In sum, *On Diseases* II.12-75 is the Corpus text closest to the original nosological source, and thus, for our purposes, closest to early Hippocratic medicine. Three different types of drug prescription formulae operate within this one treatise: one representing folk medicine, another early-Hippocratic medicine which includes mainly purges, milk, and whey; another representing categorical designations of drugs which do not contain an elaborate ingredient description nor are purges. This one text, as has been shown, gives evidence for a progression of pharmacology within this one treatise.



¹³¹ Folk medicine, by definition, is non-theoretical; a pharmacology itself demands a conceptual framework which folk medicine presumably does not have.

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CHAPTER IV:

Theory of Drug Use in the Corpus Hippocraticum



IV.1 Introduction	48
IV.2 Scholarship by Dierbach, Stannard, Scarborough, and Harig	51
IV.3 Explicit Theoretical Statements in the Corpus Hippocraticum	57
IV.3.1 <i>On Affection</i>	58
IV.3.2 <i>Ancient Medicine</i>	63
IV.3.3 <i>On Regimen II</i>	64
IV.3.4 <i>Places in Man</i>	65
IV.3.5 <i>Nature of Man</i>	69
IV.3.6 <i>On Diseases I, III</i>	70
IV.4 Conclusions	71

IV.1 Introduction

The study of pharmacology within the Corpus Hippocraticum has mainly been confined to the identification of drugs employed within therapeutic texts and the elucidation of their pharmacological properties.¹³² Little scholarly effort has been expended in establishing how the Hippocratic physicians believed their drugs worked, in other words, their underlying theoretical assumptions.¹³³ These assumptions can be rediscovered (1) by examining statements by Corpus authors with regard to a drug's mechanism or (2) by reconstructing from prescriptions, categories, and disease contexts a

¹³² Dierbach (1824), who pioneered scholarship in Hippocratic pharmacology, was interested in the identification of plants used by the Hippocratic physicians. Riddle and Scarborough, in various publications, have extended this line of scholarship with the aid of analytical chemistry in order to determine the efficacy of certain Corpus drugs. Stannard (1961), 499ff., notes that most scholarship in Hippocratic pharmacology has focused on the identification of the large compendium of botanicals in the Corpus Hippocraticum, and notes the problematic nature of such investigations.

¹³³ The importance of the theory behind the therapeutic use of drugs in the Corpus Hippocraticum has only recently been recognized in scholarship, mainly by Harig (1980), Scarborough (1984), Stannard (1961), and Goltz (1974).

rationale for drug use.¹³⁴ The following will examine those statements which are made directly by the authors of treatises that explain a theory of drug function and use.

Unfortunately, no systematic or complete description of how drugs work can be found in any of the Hippocratic texts much less a unified pharmacological theory.¹³⁵ Nevertheless, studies by Scarborough, Harig, and Stannard searched for a global pharmacological theory, only to be hindered by the intrinsic heterogeneity among treatises. While some general pharmacological principles can be discerned among the Corpus authors, generalization ignores a crucial ingredient of Hippocratic medicine: its striking heterogeneity, competitiveness, and ingenuity. This diversity in ideas, evident in the numerous physiologies proposed among Corpus texts¹³⁶, stems from the agonal spirit at the heart of Greek science which compels its members to continually engage in inquisitiveness and formulation of new doctrine.¹³⁷ Therefore, in contrast to these previous studies which tended to generalize, the following will examine each treatise

¹³⁴ The method referred to is founded on the assumption that all data is "theory-laden." The prescriptions within the Corpus Hippocraticum are not random therapeutic suggestions by the authors, but rather are dependent upon a rationale which implicitly or explicitly designates which drug is to be used. This rationale is the theoretical explanation for a drug's use. These theoretical assumptions, while not themselves enumerated, can be built up from an analysis of the prescriptions themselves. The Hippocratic texts provide the investigator with the first instance where a large amount of prescriptions can be gathered for study in this way. See chapter 6 on drug categories for an example of this method of discovering pharmacological theory.

¹³⁵ Harig (1980), 225, maintains that there is far from a unified pharmacological theory in the Corpus. A unified Hippocratic pharmacological theory, for that matter, should not be expected because the authors themselves do not form a unified group of physicians who subscribe to a similar physiological theory.

¹³⁶ Historically, the Galenic four humoral theory has been assumed to be the dominant physiological system for all Hippocratic physicians. Unfortunately, this assumption has no support in the Corpus texts, which display a heterogeneity characteristic of remarks in *Papyrus Anonymus Londinensis*.

¹³⁷ Some have considered this agonal spirit the catalyst for the progression and increased rationalization of Greek science and have argued that the science of other cultures, primarily because theirs does not sustain this sort of anti-dogmatic attitude, is static, old, and not "modern." Far from true, these beliefs only indicate the sustained Hellenophilic biases that bespottle historical inquiries. Within Greek culture, this spirit is truly novel, and results from, as well as promotes a more self-conscious attitude in rational inquiries.

individually for any explicit statements about pharmacology in an attempt to clarify some variations among treatise authors.

IV.2 Scholarship by Dierbach, Stannard Scarborough, and Harig

(1) The first major work published on Hippocratic pharmacology was that of **Dierbach** in 1824. His expertise in pharmacology and botany availed him of the tools for such a study. He described 261 drugs within the *Corpus Hippocraticum*, most of which came from plants.¹³⁸ Notwithstanding his huge contribution to the knowledge and identification of plants in the *Corpus* texts, Dierbach makes little reference to any pharmacological theory, suggesting only that the Theory of Affinities¹³⁹ regulates some of the prescriptions.

(2) **Stannard's** contribution to Hippocratic pharmacology addresses the theoretical framework in which drugs were used. Stannard notes that Hippocratic medicine involves the treatment of symptoms; rarely are drugs prescribed for an identifiable clinical entity. The therapeutic prescriptions in various works are a product of theory, not random choice. Hippocratic etiology, physiology, and pathology can be quantifiably discussed in terms of the twin theories of Hippocratic medicine, the theory of humors and the theory of the four elements¹⁴⁰, in which the body is viewed as a composite of four humors -- blood, phlegm, black bile, and yellow bile. Health is maintained by a relative equilibrium among these fluids; a depletion or excess in one of these essential constituents results in disease. The pathogenesis of disease is seen in terms

¹³⁸ Dierbach (1824), preface, divides his inquiry into sections of drugs: water; nutritional substances (animal and vegetable); slimy, sweet, oily, and greasy materials; astringent materials; "sharp" materials (vegetable and mineral) (e.g., onion, hellebore, mustard, etc.); aromatic materials and oily ethers; resins and balsamic materials; narcotic materials; sulfur, air, earths, stones, and salts; metals; and an appendix of an assortment of uncatalogable substances.

¹³⁹ In the Theory of Affinities, substances attract those things which are most akin to themselves.

¹⁴⁰ Stannard (1961), 515, remarks that these theories "probably had their origin in pre-Socratic natural science of the fifth century. We find, for example, traces of these theories in Empedocles, Alcmaeon, and other early writers."

of a theory which will be the basis for therapy. Stannard cites an account of epilepsy in *On the Sacred Disease*, 8 as an example:

The disease attacks the phlegmatic but not the bilious or choleric. Its origin begins in the embryo while it is still in the womb, for like the other parts, the brain too is purged and has its impurities expelled before birth. In this purging, if the action be thorough and regulated, and if there flow away neither more nor less than is proper, the infant has a perfectly healthy head. But if the flux from all the brain be too abundant, and a great melting take place, he will have as he grows a diseased head, and one full of noise...

The object of therapy, in Stannard's view, will be to reestablish the equilibrium of humors; the excess of phlegm must be dealt with.

Drugs within this schema are traditionally associated with properties based on the theories of elements and qualities. *Thymos* (*Thymbra capitata* L.), for example, is hot and dry.¹⁴¹ The necessary connection between these elemental and qualitative descriptions of drugs and humoral theory lies in the association of each of the humors with a particular two-set description in terms of qualities and elements. Thus, phlegm is thought to partake equally of the cold and the moist; a phlegmatic person, then, is characterized by the predominance of cold and moist humors in the body. Stannard correlates the properties of drugs based on the theories of elements and qualities with disease as an imbalance of humoral fluids through the medical precept of *contraria contrariis curantur*, opposites are cured by opposites.¹⁴² In the above example, any drug which will restore the humoral equilibrium must be warm and dry in order to counteract the overabundance of phlegm which is cold and moist. Stannard concludes by stating three levels at which drug therapy is justified: (1) establishment of balance of humors; (2) establishment of the proper relation

¹⁴¹ *On Regimen*, 54.

¹⁴² Stannard (1961), 516, maintains that this doctrine is stated in various ways in the Hippocratic writings, citing specifically *Nature of Man* 9 and *On Regimen* 40.

of the four elements -- the hot, dry, cold, and moist; and (3) the availability of "specific" drugs.¹⁴³

Unfortunately, Stannard's generalization misses the mark for many treatises which, in the polemic spirit of the entire Corpus, diverge from this schema. Particularly, the doctrine of *contraria contrariis curantur*, which Stannard claims as the basis for the use of certain drugs, is not universal: *Places in Man*, 42: "Pains are alleviated by opposites; another mode: a disease arises from the same things by which it is cured." The author suggests three modes (*topoi*) of drug therapeutics: (1) by contraries (consistent with Stannard); (2) by similars; and (3) by both similars and contraries. Gynecological coprotherapy (use of excrement as drug) also does not conform to the doctrine of *contraria contrariis curantur*.¹⁴⁴ Hippocratic pharmacology is not a static, universal doctrine that permeates the Corpus Hippocraticum; rather, it is a loose array of various doctrines proposed by authors whose concepts of disease and therapy radically differ.

(3) **Scarborough**, like Stannard, offers a generalization of Hippocratic pharmacology. Scarborough notes the revolutionary nature of these theoretical assumptions, maintaining that "Greek physicians had added something new with a curious

¹⁴³ Presumably, by this last point Stannard is referring to the availability of a certain drug in the city or local in which the physician is working. The Hippocratics dealt with this situation regularly, as demonstrated in the many prescriptions which offer alternative drugs for a specific therapy. This would allow physicians practicing throughout Greece to use these treatises as therapeutic guides since they are not specific to one region of the country. Similarly, in the Middle Ages, books called *Quid Pro Quo*'s (something in exchange for something else) were published to aid physicians in locating an appropriate alternative to a certain unavailable drug.

¹⁴⁴ See *Barren Women*, 245: "If a pregnant woman menstruates, take dry donkey dung and red ochre (*miltos*), lightly pounded hard shell of the cuttle fish (*sepia*); tie in a cloth and insert." See also von Staden (1992) who emphasizes this prescription's connection with folk lore and ancient uterine magic. In Greek ritual, pollution can be eliminated in one of two ways: (1) by something exceptionally "good," which will actually force the "bad" out, or (2) by something "even worse" than the original pollution. On the Greek pollution scale, feces rank near the top. Thus, in coprotherapy, the disease's entity will be forced out by the more polluted feces.

insight and clarity: a theory of how drugs worked.”¹⁴⁵ In Scarborough’s view, Hippocratic pharmacology employs a far greater sophistication in contrast to the pseudo-Aristotelian *Problems*. The assumptions underlying the use of drugs is based upon the theories of elements¹⁴⁶ and qualities¹⁴⁷ as well as the theory of humors.¹⁴⁸ While the *krasis* (balance) of the elements and qualities was important, specific emphasis was placed in equilibrating the humors. Scarborough therefore claims that Hippocratic pharmacology engenders a “dual theory”. Each drug was considered to have specific properties in terms of the dual theory. Once a disease had been diagnosed, therapy would depend on the restoration of the balance of humors, elements, and qualities. For example, *On Regimen* II.54 describes *thumos* as hot and dry. Thus, an individual diagnosed with a phlegmatic illness in which wet and cold humors are in excess requires a medication which is able to restore proper equilibrium: specifically, a dry and cold medication. *Thumos* would be the “drug of choice” in this case, as Scarborough notes. Implied in Scarborough’s description of Hippocratic pharmacology is the doctrine of *contraria contrariis curantur*. In the previous example, the excess is curtailed by administration of a drug having the opposite properties as the malady.

(4) While Scarborough essentially reiterates Stannard’s generalization of the theoretical assumptions of Hippocratic pharmacology, **Harig** offers a novel examination of Hippocratic pharmacology. Harig recognizes the inconsistent pharmacological theory, but

¹⁴⁵ Scarborough (1983), 308. I hesitate to accept Scarborough’s claim that Hippocratic pharmacology had “clarity.” Anything but a clear formulation of ideas characterizes this heterogeneous set of theoretical assumptions.

¹⁴⁶ Elements: water, fire, earth, and air.

¹⁴⁷ Qualities: hot, cold, wet, dry.

¹⁴⁸ Scarborough (1983), 314, judiciously points out that “there is certainly no agreement about the number of humors, but humors *per se* were almost continually evoked.”

observes that the doctrines of *contraria contrariis* and *similia similibus* are repeatedly evoked in therapy.¹⁴⁹ Although Harig notes the generalizations of Stannard and Scarborough, he suggests that a close analysis of Hippocratic pharmacology can provide evidence for a progression in theoretical knowledge as follows.

In some books of the Corpus Hippocraticum, drugs¹⁵⁰ are given “primary qualities” (Primärqualitäten): hot¹⁵¹, cold¹⁵², dry¹⁵³, wet¹⁵⁴. Mainly, these books include *On Regimen in Acute Diseases*, *On Ulcers*, *Epidemics VI*, *On Diseases III*, *On Regimen*, *On Affections*, and *Places in Man*. Harig notes that all these were composed within a relatively short span, roughly between 420 and 380 BC.¹⁵⁵ This attribution of specific primary qualities to drugs is a trend which contrasts with that in the previous period, and significantly coincides with the establishment of the four-fold schema of the humors by Polybos in *Nature of Man* around 400 BC. Harig attributes primary qualities to 74 *simplicia*, most of which are described in either *On Affections* or in *On Regimen*. Harig judiciously notes relevant contradictions which must be dealt with; no Procrustean reasoning enters his arguments. *Basilikon*, for example, is dry in *Regimen*, but moist and cold in *Affections*. While usually only one primary quality is attributed to these *simplicia*, *basilikon* has exceptionally two.¹⁵⁶

¹⁴⁹ Harig (1980), 224.

¹⁵⁰ Harig calls them *simplicia* to distinguish them from *composita* (compound drugs).

¹⁵¹ *Places in Man*, 12: “To a person experiencing pain, make a lukewarm drug which is by nature warm...” (Τῷ ὑπὸ τῆς ὀδύνης ἔχομένῳ φάρμακον θερμὸν φύσει χλιαρὸν ποιήσαντα...). See also *Fistulas*, 7, 10; *Places in Man*, 17, 22, 25.

¹⁵² *On Diseases III*, 17; *Places in Man*, 27, 29; *Fistulas*, 10; *Diseases of Women II*, 143, 144, 174a.

¹⁵³ *Ulcers*, 13, 17; *Diseases of Women I*, 104; *Epidemics V*, 26; *Places in Man*, 12, 13.

¹⁵⁴ *Ulcers*, 16, 17; *Places in Man*, 13, 12, 32.

¹⁵⁵ Harig (1980), 227.

¹⁵⁶ Harig (1980), 232, suggests a rationale for this seemingly random attribution of two qualities. In *On Regimen II*, a four-fold schema is offered in which two primary qualities are associated with a

The crux of Harig's work, though, lies in his suggestion of a progression in pharmacological theory based on the attribution of "secondary qualities" (Sekundärqualitäten) in certain texts. The author of *Ancient Medicine* raises an issue about the concept of primary qualities of a drug:

I for my part am at a loss to understand how those who hold the new theory, leading the Art from the old way to base it on a postulate, treat their patients according to the postulate; for they have not discovered, I suppose, an absolute hot or cold or dry or moist participating in no other form. But they use, I suppose, the same foods and drinks that we all use, adding to one the quality of being hot, to another of being cold, to another of being dry, and to another of being moist, since it would be futile to order an invalid to take "some heat," as he would at once ask, "What hot thing?" So inevitable nonsense is uttered or refuge is taken in one of these familiar things. But if there really be one hot thing that is astringent, another that is hot and insipid, and another that is hot and flatulence-producing -- for there are many other hot things possessing other and opposite powers -- it will certainly make a difference whether there be administer the hot and the astringent, or the hot and insipid, or what is both cold and astringent -- for there is such a thing. I am convinced that each member of these two pairs produces exactly the opposite result of that produced by the other, not only in man, but in a vessel of leather or of wood, and in many other things which have not the perceptive powers of man. For it is not heat which has the great power, but astringency and insipidity and the other things I mentioned, both in man and external to him, eaten or drunk or applied as ointment or plaster.

(*Ancient Medicine*. 15, underline

mine)

Harig suggests that the author of this treatise was living amidst a very lively debate concerning the theoretical foundations of pharmacology. The author of *Ancient Medicine* notes that drugs which are classified as hot can simultaneously function as astringents or flatulants, and the original classification of drugs by qualities and elements lacks specificity. Harig notes that the difficulty this author is groping with is resolved by the attribution of "secondary qualities" to drugs by the author of *On Regimen II*, who claims:

The power of various foods and drinks, both what they are by nature and what by art, you should come to know. Those who have undertaken to speak in general about sweet, or fat, or salt things, or about the power of any other such thing, are mistaken.¹⁵⁷ The same power does not belong to

humor. Thus, the attribution of two qualities to a drug fits with this doctrine. Yet, *Regimen I.3* describes the body as composed of fire and water, a two-fold schema in which drugs are only described by one quality. Unfortunately, I am unable to substantiate Harig's claim of a four-fold schema in *On Regimen II*. He does not quote a statement by the author which confirms his assertion.

¹⁵⁷ I differ from Jones (1931), 307(Loeb), who translates ὅσοι μὲν κατὰ παντὸς ἐπεχείρησαν εἰπεῖν περισσοματὰ τῶν γλυκεῶν ἢ λιπαρῶν ἢ ἀλμυρῶν ἢ περισσοματὰ ἄλλου τινὸς τῶν τοιούτων τῆς

all sweet things, not to all fat things, nor to all particulars of any other class. It is the same with all of the kinds; some are astringent or laxative; some diuretic; there are some that are neither. It is the same with things which are heating and with all other things, one has one power, another, another. Since therefore it is impossible to set forth these things in general, I will show what power each has in particular.

(*On Regimen* II.39)

The author of *On Regimen* II is understood to be replying to the questions formulated by the author of *Ancient Medicine*. The criticism of the doctrine of “primary qualities” has led to the formulation of “secondary qualities”. While it is debatable which qualities of a drug should be considered “secondary” versus “primary,”¹⁵⁸ the drive toward increased specificity is revolutionary and marks a watershed in Hippocratic pharmacology. Hippocratic pharmacological theory, according to Harig, was not a unified, static set of assumptions, but rather a conglomeration of fluctuating views on how drugs function.

IV.3 Explicit Theoretical Statements in the Corpus Hippocraticum

These four studies comprise the only scholarship on the theoretical assumptions of Hippocratic pharmacology. Unfortunately, they all suffer from a crude generalization which distracts them from what might be a more important trend in Hippocratic medicine, and in Greek science of the fifth and fourth centuries in general¹⁵⁹: the development of a critical and self-conscious approach which led to the habit of critical scrutiny and radical innovation in the establishment of a theoretical framework for a set of empirical data. Whereas these studies sought to elucidate theoretical assumptions of drug therapy by

δυνάμιος, οὐκ ὀρθῶς γινώσκουσιν as: “Those who have undertaken to treat in general either of sweet, or fat, or salt things, or about the power of any other such thing, are mistaken” (underline mine).

¹⁵⁸ Harig (1980), 234, mentions that the organoleptic (sinnlich) properties of plants were considered “secondary” by Galen.

¹⁵⁹ Lloyd (1986) offers an excellent synopsis of this “revolution in wisdom,” as he terms it. This trend parallels a pattern in the development of the political and social sphere of the fifth century BC. As Lloyd (1979), 258, comments, “First there is the possibility of radical innovation, second the openness of access to the forum of debate, third the habit of scrutiny, and fourth the expectation of justification -- of giving an account -- and the premium set on rational methods of doing so” that made the fifth century a *locus amoenus* for the development of Greek rational medicine.

consolidating doctrines from various texts, searching for congruencies, and excluding anomalies, I will not attempt to generalize, realizing that Hippocratic pharmacology is, by nature, a heterogeneous set of doctrines in competition with each other. Undoubtedly, there are similarities; yet, to dwell on these is to ignore an important aspect of Hippocratic pharmacology: the concept of change in pharmacological theory.

Although I too shall attempt to offer some generalizations of Hippocratic pharmacological theory in line with Stannard and Scarborough, I propose to go beyond this myopic view by considering what each author contributes to drug theory. In what follows, the primary evidence will be various statements of treatise authors which deal with drugs and their use.¹⁶⁰ Often, a highly variegated and seemingly unrelated set of aphoristic statements will constitute the evidence. The task will be to describe, from these statements, what the author was contributing to Hippocratic pharmacology. In the end, although similarities will be noted, the many variations among these texts will be highlighted.

IV.3.1 *On Affections*

The Hippocratic treatise *On Affections* offers the most comprehensive statements about drug theory. In contrast to other texts, which provide little information about the origin of Hippocratic drug therapy, the author of *On Affections* acknowledges the indebtedness to folk tradition: "People do not discover these [drugs applied to wounds] by

¹⁶⁰ This method, as discussed above, differs from the examination of pharmacological theory taken up later in this work. While this method is targeted for an intratextual analysis of pharmaceutical theory and will clarify differences in these conceptions of drug mechanisms, the method employed later will reconstruct a pharmacological theory from a stock of data on prescriptions and their related diseases. By nature, the latter method will tend to be more generalizing. The main difference, however, lies in the form of the evidence: the method here will utilize explicit statements by authors about drug theory, while the latter method tries to reconstruct what an authors would have said about such theories. The poor stock of explicit statements necessitates both methods of analysis.

reasoning (ἀπὸ γνώμης) but by chance (ἀπὸ τύχης), and experts (χειροτέχναι) no more than laymen (ἰδιῶται).”¹⁶¹ The author remarks that whatever is discovered in medicine by reasoning (γνώμη) should be learned from those who are knowledgeable in the Art, whereas information about medications which are drunk or applied to wounds can be received from folk tradition.¹⁶²

The author of *On Affections* presents a very systematic pharmacological theory. He is an advocate of drug treatment, claiming that all medications, with the exception of cholagogues and phlegmagogues, are safe (ἀκίνδυνά) as long as they are administered as prescribed.¹⁶³ Two types of drugs seem to be distinguished: (1) those which evacuate (cleaning drugs) and (2) those which exert their effect though cooling, moistening, warming, drying, collecting, or dispersing. The author describes how drugs function as follows:

In cleaning, employ medications according to the following principle: when patients are bilious, give medications that clean out bile; when they are phlegmatic, give medications that clean out phlegm; [when they are melancholic, give medications that clean out dark bile; when they suffer from dropsy, give medications that clean out water.]¹⁶⁴ Medicinal drinks that are not given to clean out bile or phlegm must, when they enter the body, exercise their faculty by cooling, warming, drying, moistening, collecting, or dispersing. A drug that induces sleep must provide the body with calm.

(*On Affections*, 36)

¹⁶¹ *On Affections*, 45

¹⁶² In *On Affections*, 45, the two areas from which the Hippocratic physicians derived information are discussed: (1) the common stock of folk medicine; and (2) the nosological, pathological, and physiological doctrines which originated with the Hippocratic physicians and/or pre-Socratic philosophy. The first part of this section deals with folk tradition and attributes Hippocratic *materia medica* to this traditional stratum; the second part applies to those doctrines which the Hippocratic physicians themselves developed.

¹⁶³ *On Affections*, 33. This caveat against the dangers of phlegmagogues and cholagogues has a parallel later where the action of these evacuants is separated from all others in the discussion of the modalities of action of drugs.

¹⁶⁴ As noted by Potter (1988) and Artelt (1937), these two sentences are problematic. Both delete this section because it contains the sole reference to a four-fold humoral theory (in addition to phlegm and bile, dark bile and water are mentioned) in contradiction to the two-fold humoral system presented in chs. 1 and 37, and otherwise strictly followed.

The author clearly defines a modality of action for drugs by stating the mechanism by which they exert their effects.

The modality of action of the first group of drugs is consistent with the author's physiological system which attributes the cause of all diseases to phlegm and bile.¹⁶⁵ By suggesting that phlegmagogues should be administered to those who are phlegmatic (φλεγματώδεις), the author is subscribing to the doctrine of *contraria contrariis curantur*, curing by opposites.¹⁶⁶ Furthermore, this first group of drugs are evacuants with an inherent specificity for either of the two humoral components of the body. The author recognizes that not all cleansing drugs produce visible manifestations of their effects: "Some medications clean through the bladder, while others do not clean in any visible (φανερὸν) way."¹⁶⁷ The nosological doctrine postulated in *On Affections* correlates an excess of a humor with disease, and thus, the modality of this first group of drugs is the evacuation of this excessive pathogenic humoral component.

The author distinguishes the second group of drugs from the first by their different modality of action: cooling (ψύχοντα), warming (θερμαίνοντα), drying (ξηραίνοντα), moistening (ὕγραίνοντα), collecting (συνάγοντα), and dispersing (διαχέοντα) agents¹⁶⁸. Except for the last two, these categories of drugs correspond closely with the Empedoclean Theory of Elements and Qualities. Not only is the *krasis* of humors important, but the *krasis* of elements and qualities is similarly vital to the restoration of

¹⁶⁵ *On Affections*, 1 and 37, where the author unequivocally perceives diseases as arising from either bile or phlegm or both. Nowhere in this treatise is this assertion contradicted, except in *On Affections*, 36, for which both Potter and Artelt provide textual emendations (see n.164 *supra*).

¹⁶⁶ See also the criticism of the doctrine of *similia similibus curantur* in the discussion of healing wounds in *Affections*, 38: "Such plasters are of benefit only as long as they are colder than the wound; when they are warmer or equally warm, they do harm."

¹⁶⁷ *On Affections*, 20.

¹⁶⁸ *On Affections*, 36.

health. The mechanism of these drugs, then, is the restoration of elemental and qualitative equilibrium.¹⁶⁹ Again, the doctrine of *contraria contrariis curantur* is operative.

The author of *On Affections* explains one case in which the medications administered are not helpful, remarking that “what is administered is overcome (κρατέεται) by the magnitude of the disease (ὕπὸ μεγέθους τῆς νόσου).”¹⁷⁰ This image of a disease or medication overcoming (κρατέειν) or being victorious has parallels with Alcmaeon’s nosology in which health is viewed as a balance (*isonomia*) between two opposing powers; disease is seen as rule (*monarchia*) by one element.¹⁷¹ The politico-military imagery of conquering and monarchy is dominant throughout Hippocratic medicine, and here applied to pharmacology.

On Affections is only one of few treatises which describes methods for ascertaining the inherent qualities of drugs (e.g., which drugs function as cooling agents).¹⁷² The author remarks that each food (and presumably, each drug too) “has some faculty by which it helps or hurts.”¹⁷³ More importantly, though, is the author’s acceptance that some faculties are more apparent (φανερώτερα) than others. The author suggests beginning an inquiry with foods or drugs which have a visible and known modality, and then proceeding to those which are more difficult to characterize. Important here is the concept that each food (and drug) has a specific faculty which, through proper

¹⁶⁹ The doctrine of *contraria contrariis* and the mechanisms of the second class of drugs are clearly discernible in general therapeutic guidelines the author offers. One example will suffice: cold substances (ψυχρά) clean inflammations which are thought to be hot.

¹⁷⁰ *On Affections*, 20

¹⁷¹ Longrigg (1993), 52, who quotes the fragment of Alcmaeon found in Aëtius.

¹⁷² *On Affections*, 47 actually discusses the methods by which the faculties of foods (τῶν σιτίων) can be discovered. Although the author does not suggest that this method elucidates the qualities of drugs too, it is not unreasonable to surmise that the author would subscribe to a similar method when defining the characteristics of drugs.

¹⁷³ *On Affections*, 47.

research, may be elucidated. Also important is the realization by this author that some physiological mechanisms are not visible and that not all drugs display their innate qualities visibly.

On Affections also offers an interesting therapeutic protocol:

When you come to a patient, you must question him thoroughly about what he is suffering, in consequence of what, for how many days, whether his cavity has passed anything, and what regimen he is following. Consider first whether the disease has arisen from bile or from phlegm or from both, and have full confidence that it must be because of these, either one or both of them. Then, see whether the patient has need of moisture or dryness, or whether one part of the body needs dryness and another moisture. Finally, determine whether you must treat the disease upwards or downwards or via the bladder, and whether the disease is increasing, diminishing, ending, or changing into some other disease.

(*On Affections*, 37)

In addition to this protocol for therapeutics, the author of *On Affections* often makes reference to the *Book on Drugs*, a lost Hippocratic treatise.¹⁷⁴ This lost text appears to have contained lists of drugs arranged by category which physicians would consult in ordering a prescription.¹⁷⁵

In sum, *On Affections* provides the most numerous explicit references to pharmacological theory of any extant Corpus text. Aside from the general doctrine of *contraria contrariis curantur* and the importance of the theories of elements, qualities, and humors (bile and phlegm) in pharmacological theory, *On Affections* emphasizes some

¹⁷⁴ *On Affections* has various names for this lost text: Φαρμάκοις, Φαρμακίτιδι. Potter (1988) translates this "Medication Book."

¹⁷⁵ From the authors references to this lost text, it is clear that the drugs were arranged by category (i.e., "secondary quality" of Harig, = function). E.g., *On Affections*, 18: "...give medicinal drinks (φάρμακα ποτά) that will make the fever change or remit; administer these as described in the *Medications Book* (ἐν τοῖς Φαρμάκοις)"; *On Affections*, 9: "...administer the remedy recorded in the *Medication Book* (ἐν τῇ Φαρμακίτιδι) for pleuritic pain"; *Affections*, 28: "...also give him diuretic medications as recorded in the *Medication Book* (ἐν τῇ Φαρμακίτιδι) as stopping pain." From these few examples, it should be clear that drugs were organized by category (or function). According to Harig's chronological scheme, then, *Affections* as well as the *Medication Book* would have to *postdate Ancient Medicine* in the same way as he suggests *Regimen II* does.

unique ideas: (1) folk tradition is a major source of Hippocratic *materia medica*; (2) not all medications produce visible effects; (3) a compendium of drug products arranged by categories (or physiological function) existed under the name of *Pharmakitis*.

IV.3.2 *Ancient Medicine*

Unlike *Affections* which yielded a plethora of pharmacological-related statements, *Ancient Medicine* has little to offer albeit a polemic against a certain set of dominant assumptions about drugs. The importance of this text should not be diminished by this insufficiency. In contrast to other Corpus books, *Ancient Medicine* appears to be a carefully constructed work completed around 430-400 BC.¹⁷⁶ Harig notes a statement in *Ancient Medicine* where the author castigates those who only characterize drugs by a four-fold quality scheme (i.e., hot, cold, wet, dry), explaining that this remark by the author reflects the contemporary debate about “primary” and “secondary” qualities of drugs of which the author was a part.¹⁷⁷ To recapitulate, the author remarks that characterizing drugs as “hot” or “cold” does not wholly account for their observed physiological action. What is needed is a description based upon a drug’s function. Thus, a drug which is “hot” can be “hot and insipid” or “hot and astringent”; the modality of action of the drug is based not so much upon the Empedoclean quality but rather on the functional description.¹⁷⁸

¹⁷⁶ Jones (1946), 39, nicely summarizes information on this treatise, providing a short summary of the author’s views: (1) he holds same theory of health as Alcmaeon of Croton, namely, a harmonious blend, or equal balancing, of an indefinite number of simple opposites; (2) he believes disease results from any disturbance to this harmony; (3) he stresses the importance of observation and accurate reasoning. Most notably, the author of *Ancient Medicine* rejects hypotheses (ὑποθέσεις) as a basis for medical science.

¹⁷⁷ Harig (1980) and 55ff. *supra* discussing *Ancient Medicine*, 15 (see 56 *supra* for text).

¹⁷⁸ Harig (1980). The distinction between “primary qualities” and “secondary qualities” is not explicitly found in the Corpus. By “primary qualities,” Harig is referring to the Empedoclean qualities

Harig utilized this statement in *Ancient Medicine* to argue for a progression in pharmacological thinking from treatises such as *On Affections*, *On Diseases III*, etc., where only the Empedoclean qualities of hot, cold, wet, and dry -- the "primary qualities" -- describe drugs, to *On Regimen II*. *Ancient Medicine* is the intermediary step before the complete acceptance of the doctrine of "secondary qualities" in *On Regimen II*. Harig suggests that the author of *Ancient Medicine* posed a theoretical question, and the author of *Regimen II* answered it by positing the doctrine of "secondary qualities." Although it would be rash to assume that *Ancient Medicine's* comment compelled *On Regimen's* author to firmly establish the doctrine of "secondary qualities," it can be stated with certainty that *Ancient Medicine* is criticizing one doctrine of pharmacology as too imprecise. Here, then, we have the competitive spirit of Hippocratic medicine clearly manifest: one author disagrees with the dominant theoretical assumptions about how drugs function. This treatise is one of many catalysts in the continuous formulation of new doctrine.

IV.3.3 *On Regimen II*

On Regimen II, like *Ancient Medicine*, does not offer many statements on the theory of drug use. Yet, the author of this treatise does emphatically criticize the traditional method of describing drugs; ascribing only "primary qualities," as Harig calls them, to drugs is not specific enough for this author.¹⁷⁹ The power (δύναμις) of various drugs can be described according to nature (κατὰ φύσιν) or art (διὰ τέχνης), which might indicate that drugs sometimes have an appearance (nature) contrary to function (art).

of hot, cold, wet, and dry; Harig finds the "secondary qualities" harder to define, but suggests that they are the functions which the drugs exert (e.g., diuretic, astringent, etc.). See 55ff. *supra*.

¹⁷⁹ For Harig's argument, see 54 *supra*.

Nevertheless, the author claims that substances which have similar elemental or qualitative compositions (e.g., all sweet substances) do not have the same powers; they act differently on the body. Instead, drugs must be defined not only according to the theory of elements and qualities, but also with respect to their physiological function (e.g., as diuretics, laxatives, etc.).¹⁸⁰ The remainder of the treatise employs this doctrine of “primary” and “secondary” qualities in describing the respective powers (*dunameis*) of drugs and foods.¹⁸¹ The importance of this treatise, then, lies in its anti-dogmatic stance and its formulation of new physiological and pharmacological doctrine.

IV.3.4 *Places in Man*

Places in Man contains numerous references to theoretical assumptions which the author holds about drug therapy. The author defines a drug as “any substance which causes a change in the physiological *status quo*.”¹⁸² Such a definition of a drug cannot be found anywhere else in the Corpus. This revolutionary statement sets a drug (*pharmakon*) apart from other substances according to its physiological effect. The broad category allows all drugs to be included, while excluding foods, which do not disturb or change the body, but rather maintains homeostasis. Following this, though, the author obfuscates his definition by claiming that foods are likewise able to cause change:

It is possible, if you wish, to cause change with a drug. If you do not wish to use a drug, you can cause change with food.

¹⁸⁰ Chapter V discusses Hippocratic drug categories which are equivalent to a drug’s physiological function (e.g., diuretic, laxative, etc.)

¹⁸¹ The distinction between a food and a drug in these treatises is disputable. Foods are sometimes red flagged by some reference to gruel, diet, etc., as in *On Regimen* II, 45: “Beans afford an astringent and flatulent nourishment (τροφήμον).” Conversely, some descriptions are less clear, as in *On Regimen* II, 53: “Honey unmixed warms and dries; mixed with water it moistens, sends to stool those of bilious temperament, but binds those who are phlegmatic.”

¹⁸² *Places in Man*, 45: πάντα φάρμακα εἰσι τὰ μετακινέοντα τὸ παρεόν.

(*Places in Man*, 45)

This author also remarks that “every drug has its opposite,”¹⁸³ recalling the striking presence of a polarity which Lloyd considers a prominent feature of fifth and fourth century thought.¹⁸⁴

Places in Man enumerates three different therapeutic doctrines:

Pains are alleviated by opposites (τοῖσιν ὑπεναντίοισιν); this is peculiar to each disease; for those who are warm by nature, when they become ill because of coldness, are cured by warmth; another mode (τρόπος): a disease arises from the same things by which is it cured; another mode: a fever in inflammation, on the one hand, originates and is cured by the same things, and on the other hand, originates and is cured by opposite things.

(*Places in Man*, 42)

While Scarborough, Harig, and Stannard have discovered the doctrines of *contraria contrariis* and *similia similibus* functioning in Hippocratic pharmacology¹⁸⁵, the author of *Places in Man* explicitly states three different therapeutic schemas: (1) *similia similibus curantur*, (2) *contraria contrariis curantur*, (3) a combination of (1) and (2).¹⁸⁶ The author concludes his discussion of these modes (τρόποι) of healing by suggesting that “if these things [above doctrines] held in all cases, then it could be stated that on the one hand some things can be cured by opposites to that which occasioned them, and vice versa.”¹⁸⁷

The author of *Places in Man* suggests a very detailed therapeutic protocol in the administration of drugs:

For diseases which one is unfamiliar with, do not give a strong drug to drink; if the patient is strong and the disease weak, be bold and use a stronger drug; on the other hand, if the disease is strong and the patient weak, use weak drugs.

(*Places in Man*, 34)

¹⁸³ *Places in Man*, 41.

¹⁸⁴ Lloyd (1966).

¹⁸⁵ See above for summary of Stannard's, Scarborough's, and Harig's contributions.

¹⁸⁶ See also *Places in Man*, 41: “When a person is pallid and swollen, and if some drug is given which makes then thin, they at once become relaxed,” which supports *contraria contrariis curantur*.

¹⁸⁷ *Places in Man*, 42.

It is not necessary to give strong drugs to a person with a mild illness, which will cause weakness with just a small dosage; instead, use strong drugs against diseases which are by nature strong, and against the weak diseases, use no drugs; nor should one modify (μεταποιεῦντα) a drug, but instead use each according to its nature (κατὰ φύσιν).

(*Places in Man*, 45)

The author is clearly advocating prudence in the administration of a therapeutic program. The condition of the patient is crucial. Drugs themselves are considered strong agents of change which require the patient to be healthy enough to withstand their violent action. The two passages, though, bare one striking discrepancy: while the first authorizes the use of weak drugs for patients who have delicate constitutions, the second advises no drug therapy for such patients.¹⁸⁸ The strange admonition against “modifying a drug” advocates the use of *simplicia* in contrast to compound drugs. While other authors might consider compound drugs more effective because of an additive property at work, the author of *Places in Man* regards the creating of compound drugs an adulteration of the *simplicia* which compose it.

Places in Man enters into a long theoretical discussion about purges in which the author warns against their equivocal properties:

First, purgatives (ὑπεκχωρητικά) do not always cause purgation of the stomach...and sometimes they act opposite, like anti-diarrhetics (στασίμοις)...In constipation of the cavity: purgative drugs by nature cause constipation in the cavity. If you employ purges, the pathogenic material is loosened and becomes wet, and when an enema is applied, the person returns to health; similarly, constipating drugs prepare the way for purgative drugs, and vice versa.

(*Places in Man*, 41)

Amidst this confusion lies some attractive theoretical assumptions. The author seems to be postulating that purges displace pathogenic matter in the body and prepare it for

¹⁸⁸ Unfortunately, *Places in Man* contains a number of such discrepancies. Similarly, repeated statements appear throughout, suggesting that *Places in Man* is a conglomeration of various texts or aphoristic statements.

evacuation through bowel movement.¹⁸⁹ Purgative drugs are also not very specific; their actions sometimes run counter to their intended physiological function. *Places in Man*, 45 elaborates on this lack of certainty in therapy: purges are not always purges; things which should be opposite are not always opposite. The doctrine of opposites leads the author to postulate that constipating drugs prepare the way for purges. As for the location of the purgation,

Purge the area nearest to where the disease thrives, since there is where the nearest exit is available for each disease.

(*Places in Man*, 45)

Finally, the author's discussion about purges closes with a variegated and complex passage:

Purges are slippery and imbued with the quality of cutting and attenuated in warm places; the stomach is warm; most salty substances possess these qualities...purges thin and warm the body; they are also acidic and inflammatory. All cooling agents which are in the stomach are purges too; they are both cool and wet. Whenever they are not purges, they warm the stomach.

(*Places in Man*, 45)

These confusing passages do yield some information about purges, namely that they are wet and work in dissolving (cutting) pathogenic substances.

The author notes that if a large amount of water is given to a patient who has been vomiting, the substance which occasioned the vomiting is expelled.¹⁹⁰ This observation -- that vomiting is stopped by vomiting -- explains how hellebore maintained its place as an emetic for so long. Hellebore, the disastrously poisonous plant (*Veratrum L.*), undoubtedly kills; but before doing so, it has a few side effects, including nausea and vomiting. As Majno notes, "the saving grace of hellebore was that it caused vomiting so fast that the patient stood a chance of getting rid of it before absorbing a lethal dose."¹⁹¹

¹⁸⁹ Cf. *Places in Man*, 30: "Purge down so that that which holds the disease can be pulled down" (ἄμα κάτω ὑπεξάγειν, ὡς τὸ νοῦσον παρέχον τοῦτο κατασπασθῆ).

¹⁹⁰ *Places in Man*, 42.

¹⁹¹ Majno (1975), 189.

Unfortunately, *Places in Man* appears more an amalgamated collection of theoretical aphorisms than a systematically constructed theoretical discussion on drug function.

IV.3.5 *Nature of Man*

Nature of Man bares striking resemblance in its polished prose-style to *Ancient Medicine*, yet is not as coherent a treatise. The main interest of *Nature of Man* lies in the Empedoclean doctrine contained in the first eight chapters. While the four humors of this author are not the elements of Empedocles, they are analogues and perform analogous functions. The author of *Nature of Man* establishes evidence¹⁹² for his four-humor physiology based on the action of drugs:

From the following evidence, you may know that these elements are not all one, but that each of them has its own power (δύναμιν) and its own nature (φύσιν). If you were to give a man a medicine which withdraws phlegm, he will vomit you phlegm; if you give him one which withdraws bile, he will vomit you bile; Similarly too black bile is purged away if you give a medicine which withdraws black bile.

(*Nature of Man*, 5)

The author implicitly acknowledges each drug's function and employs these in proving that the body is actually composed of four components. The author suggests that those who believe that the body is composed of one substance derived their theory from improper observation after drug therapy. The author's opponents examine the remnants after excessive purging (ὑπερκαθάρσει) and posit the only one substance they see as the sole component of the body. This misinterpretation forces the author to explain the situation of excessive purging:

Yet first, nobody in excessive purgings has vomited bile alone when he died. But when a man drinks a drug which withdraws bile, he first vomits bile, then phlegm also. Afterwards under

¹⁹² *Nature of Man*, 2: "I will also bring evidence" (καὶ τεκμήρια παρέξω).

stress men vomit after these black bile, and finally also pure blood. The same happens to those who drink a drug which withdraws phlegm.

(*Nature of Man*, 6)

The fundamental error of his opponents was their lack of understanding of purgation.

The author of *Nature of Man*, still attempting to support his four-humoral theory, postulates a modality of action for the drugs he just discussed:

For when a drug (φάρμακον) enters the body, it first withdraws that constituent of the body which is most akin to itself by nature, and then it draws and purges the other constituents.

(*Nature of Man*, 6)

The *pharmakon* discussed specifically denotes the purges spoken of in the former passage.¹⁹³ The author supports this modality of action through an analogy with growing plants, which draw up from the ground nutriments most similar to their constitution.

The author of *Nature of Man* suggests that drug therapy should be modified to suit various external conditions:

As I have already said, make changes in drugging (ἐν τῇ φαρμακείῃ) or in regimen to suit the several conditions of age, season, physique, and disease.

(*Nature of Man*, 9)

Although *Nature of Man* provides some statements about the theoretical assumptions of pharmacology, the style of the treatise directs these towards polemic ends.

IV.3.6 *On Diseases I, On Diseases III*

The authors of these two treatises offer little in the way of explicit statements about their theoretical assumptions of drug function. *On Diseases I*.8 acknowledges that many good results in therapy occur by luck:

Physicians achieve the following good results in their therapy by luck (ἐπιτυχίῃ): by giving a medication to clean upwards, they clean both upwards and downwards to good effect. By giving a woman a medication meant to clean downwards of bile or phlegm, they have caused the absent menses to break forth...

¹⁹³ The vocabulary supports this assertion: ἄγει, ἔλκει.

Likewise, physicians can bring about bad things through misfortune:

They bring about the following bad results through misfortune: by giving a medication meant to lean upwards of bile or phlegm to a patient who had previously no obvious pain in the chest, they have caused a vessel in his chest to rupture from the vomiting, and a new disease to arise. When they had given a drug that acts upward to a pregnant woman, the lower cavity, being evacuated, has made the fetus miscarry.

The author of *On Diseases I* was acutely aware of the dangers of these medications.

Surprisingly, all the drugs which the author warns against are discussed in other treatises as being similarly dangerous.¹⁹⁴ The author of *On Diseases I* also offers a suggestion on proper protocol for administering drugs:

It is not correct to not recognize which medication (φάρμακον) is required by a patient that needs one.

(*On Diseases I.6*)

Finally, the author of *On Diseases III* recognizes the importance of pharmaceutical therapy in assisting nature with the restoration of health. Drugs, surgery, and regimen were always understood within the context of the natural processes of the body; all external aid was given to *supplement* nature.¹⁹⁵ As so often followed, but rarely mentioned, this statement characterizes Hippocratic pharmacology is general:

Now, if the patient begins to expectorate spontaneously (αὐτοματόν), assist him (τιμωρέειν) with medications.

(*On Diseases III, 16*)

IV.4 Conclusions

¹⁹⁴ Cf. *On Affections*, 36, 59 *supra*; *Places in Man*, 41, 67 *supra*; and *Places in Man*, 45, 68 *supra*.

¹⁹⁵ This is marvelously modern! Although Hippocratic medicine had no concept of the complex immune system and its function in maintaining health, it did understand that nature would tend toward health; any therapy, then, would only aid nature.

This overview of the theoretical assumptions about drug function illustrate that there was certainly varied ideas circulating among the Corpus authors. Although the pharmacological framework of most authors includes either the doctrine of *similia similibus* or *contraria contrariis* as well as the common goal of reestablishing an imbalance, a generalization any further loses sight of the rich heterogeneity which results from a universal trend in progression and the formulation of new doctrine.

These Hippocratic physicians were not in the place to understand any biochemical mechanisms of drugs much less even a broad understanding of the body, but what they did have was something more powerful and dangerous: the sight of the mind (*gnomes opsei*). Their proposed mechanisms of drug action were derived straight from their highly speculative physiological systems, providing a neat, yet overly-simplistic framework in which to understand the body and its therapy in illness.

The competitive nature of Hippocratic medicine, partly due to its insecure position within the contemporary medical community as well as its affiliation with the more universal anti-dogmatic trend in scientific inquiry of the fifth century, fostered the growth of numerous pharmacologies. While "progression" might be thought too value laden to describe the changes in pharmacology, this description actually fits well, since the changes taking place, although not destined towards a correct understanding, were the result of careful consideration of former doctrine and the establishment of new doctrine with an intent to explain what was problematic for a former theory.



CHAPTER V:

Hippocratic Drug Categories



V.1 Introduction	73
V.2 Major Drug Categories	81
V.2.1 Purge	81
V.2.2 Cholagogue	89
V.2.3 Phlegmagogue	91
V.2.4 Diuretic	92
V.2.5 Cooling agent	94
V.2.6 Drying agent	96
V.2.7 Expectorant	97
V.2.8 Analgesic	99
V.2.9 Warming agent	101
V.3 Classification schema (and tables VI.1,2,3)	103

V.1 Introduction

The Hippocratic physicians of the fifth century BC were involved in self-conscious investigations which were driven by their insecure positions in the social hierarchy. Unlike their counterparts in other centuries and cultures, Greek doctors were faced with an openly competitive situation of great intensity which obliged them to vie with other healers within the Greek medical community. Their success, and the success of medicine in general, depended upon their ability to offer medical treatment as well as to support various claims about their methods. The revolutions taking place in the methods of communication, specifically the increase in literacy and the publication of manuscripts for personal use, fostered a heuristic spirit that encouraged innovation, discovery, synthesis, and formulation of new doctrine.

The process of systematic empirical observation is nowhere more apparent than in the *Epidemics*, where personal observations are recorded in a notebook style which was

without context except the observer's private and unexpressed sense of what was important. The *Epidemics* provide abundant evidence that many Hippocratic physicians were both interested in and capable of making detailed empirical observations. Miller and others suggest that literacy and its product -- the capacity for private writing and record keeping -- were directed towards invention, *inventio*.¹⁹⁶ Miller contends that in these medical histories, the physician was acting not *qua* physician, but *qua* scientist. The immediate aim of this data collection was probably not to improve diagnosis or to archive medical treatments, but rather to provide data to substantiate medical theory, in particular, to corroborate the physician's own beliefs about disease and therapy and elevate his position within the agonistic medical community.

The *Epidemics* have been traditionally regarded as the finest examples of data collection within the Corpus and have been implicated in the formulation of new doctrine through careful retrospective examination, systematization, and classification of empirically derived data. Unfortunately, the *Epidemics* record little therapeutic measures and thus were probably not the texts which Hippocratic physicians used to formulate new therapeutical doctrine. Little scholarly effort has been expended in examining other Corpus texts for this trend toward invention which resulted from the improved means of communication during the fifth and fourth centuries BC.

Evidence for a progression of pharmacological theory has been presented before. Specifically, the salient restriction of a great number of folk remedies to only purges based on a nosological doctrine reflects a progression in pharmacological ideas. Similarly, within the Corpus itself, pharmacology did not remain static. The transition to new physiological

¹⁹⁶ Miller (1990), 25.

and nosological doctrines incited new theoretical assumptions about pharmacology. *On Diseases* II.12-75 exhibits three pharmacological strata which represent three different sets of assumptions on how drugs function and correspond to three disparate physiologies.¹⁹⁷ More importantly, though, within one nosological doctrine one can find good evidence for a progression in pharmacological ideas. The authors of *Ancient Medicine* and *On Regimen* II, for example, contend that drug classification by "primary qualities" does provide adequate specificity and, as a result, submit a scheme based on "secondary qualities" to resolve this inadequacy.¹⁹⁸

The catalyst for this innovation in pharmacological doctrine is an array of social, political, and economic factors which were present during fifth century Greece. To single out any one force is to exaggerate its degree of influence.¹⁹⁹ Yet, Havelock²⁰⁰ has been instrumental in stimulating respect for the importance of the growth of literacy during this period of radical innovativeness, and Goody²⁰¹ has demonstrated quite well the resulting changes in thought patterns and social structure from the renovations in the means of communication, most notably the rise in literacy and the increase in publication of manuscripts.²⁰²

¹⁹⁷ This does not require three different physiological doctrines to be operating within one text. Rather, it more plausibly suggests that the two older strata are vestiges of previous pharmacological doctrines.

¹⁹⁸ It must be noted that the authors themselves do not opt for a classification scheme based on "secondary qualities." This category is an explicit creation of Harig who used it to describe the new scheme suggested by these authors.

¹⁹⁹ Lloyd (1979) emphasizes the importance of not subscribing to one overarching factor to mediate these revolutionary features of Hippocratic medicine and science in general.

²⁰⁰ Havelock (1982).

²⁰¹ Goody (1977).

²⁰² Reynolds (1974), 1ff. notes that the multiplication and circulation of copies of books was probably extremely limited. He conjectures that the first "mass produced" publications included the writings of the Ionian philosophers and historians or those of the sophists. I contend that the medical writings could also be included in this list, since publications such as *Pharmakitis* (*Book on Drugs*) would

The "literate revolution" in fifth century Greece allowed a generally more reflective and perhaps a more critical analysis of empirical data. As Lonie notes, "the doctors were among the first to see certain advantages in prose writing and to make systematic use of it in their craft."²⁰³ These fifth century physicians did not just record the data of a non-literate craft, but used writing as a means to improvement. Writing is more than a code whose contents define a orality, but a precious tool which opens up certain avenues unavailable to the non-literate, as well as closes off others.²⁰⁴ When recorded in writing, innovations achieve recognition as such and tend to be cumulative; the old is not simply displaced by the new, but incorporated into it. The increasing literacy during this period was an important contributory factor in catalyzing the progression of pharmacological thinking.

Writing, in and of itself, almost prompts people to make lists.²⁰⁵ One feature of the written list is that it is amenable to modification and elaboration. The Greek disease lists provide ample evidence in support of this hypothesis. Diseases are listed in order, *a capite ad calcem*, divided into subgroups, and within each disease description, information is provided in a distinct schema: descriptive phrase, symptoms, cause, prognosis, and treatment. Therapies are often expanded to include alternatives.²⁰⁶ These lists of diseases

be an essential, if not helpful, component to medical practice. The increase in book trade, Reynolds notes, made personal libraries possible.

²⁰³ Lonie (1983).

²⁰⁴ Ong (1982), 91, notes that the structure of the Greek language is quite different from a system like the Semitic in which the omission of vowels from writing was commonplace. The Greek inclusion of vowels, Ong suggests, might have been an accidental but critically important advantage in Greek writing. Ong cites Kerckhove who maintains that a completely phonetic alphabet (like the Greek) favors left-hemisphere brain activity, and thus, on neurophysiological grounds, fosters abstract, analytic thought.

²⁰⁵ Lonie (1983), 152.

²⁰⁶ Lonie (1983), 150-51, calls attention to the lists of diseases and remedies found in Assyrian cuneiform tablets and the Egyptian medical papyri, and stresses the importance of their social background in understanding their purpose. Both of these medical communities were scribal; medicine was recorded

are not mere records of objective reality, but reflect objective choices on, for example, what symptoms to include, which drug ingredients to list, etc. Subtle distinctions between various diseases are also easily enumerated, for example, by subtle variations or sequences of symptoms. These lists reflect, moreover, the choice of the author of the specific treatise.

The most important ramification of the use of writing, though, is its innate capacity, even propensity, to undergo critical scrutiny, testing, albeit unrefined, and modification. The author of *On Regimen in Acute Diseases* give evidence for just this sort of revision process that is postulated to occur because of writing and literacy. In castigating the authors of the *Cnidai Gnomai*, the author remarks that they “made mistakes when they tried to set down clearly the number of diseases.”²⁰⁷ Their intent was to give an accurate and clear (*sapha*) account in writing. More important, though, is the following statement which refers to the editors or revisers of this work who made improvements to the original:

However, the later revisers have showed rather more scientific insight in their discussion of the remedies employed in each instance.²⁰⁸

Finally, the importance of writing is emphasized by this author:

It seems to me that matters which in spite of their importance are not generally known to physicians deserve to be written down.²⁰⁹

by men who were set apart from the other members of their society and, in particular, from the medical practitioners themselves. The value of writing in these cultures was administrative. Thus, with these cross-cultural comparisons, we are not liable to wrongly accept the premise the doctors “naturally” compile descriptive lists of diseases.

²⁰⁷ *On Regimen in Acute Diseases*, 3: τοὺς δ' ἀριθμοὺς ἐκάστου τῶν νοσημάτων σάφα ἐθέλοντες φράζειν οὐκ ὀρθῶς ἔγραψαν.

²⁰⁸ *On Regimen in Acute Diseases*, 3: οἱ μέντοι ὕστερον ἐπιδιασκευάζοντες ἰητρικώτερον δὴ τι ἐπῆλθον περισσοματὰ τῶν προσοιστέων ἐκάστοισιν.

²⁰⁹ *On Regimen in Acute Diseases*, 7: Δοκεῖ δέ μοι ἄξια γραφῆς εἶναι, ὅποσα τε ἀκαταμάθητὰ ἔστιν τοῖς ἰητροῖς ἐπίκαιρα ἐόντα εἰδέναι...

The facility of writing, then, became a very important tool in the advancement of medical knowledge. Not only did literacy and writing facilitate the spread of ideas, but also provoked improvement and addition in the craft of medicine.

The method by which writing came to be such an important tool in the dissemination and progression of medical information involves its symbolic way of giving the events of the past continuous visual presence. Exact recall in a non-literate sphere become subordinated to critical scrutiny in a literate environment. The written text promotes the perception of general patterns and the elucidation of a theoretical framework to fit the empirical data. Most importantly, literacy and the scrutiny of texts encourages ordering of items, by any number of schemes, including by category. Goody notes that "the existence of boundaries, external and internal, brings greater visibility to categories, at the same time making them more abstract."²¹⁰ This is not as easily, nor as quickly possible in a non-literate system, since continuous reexamination of data is necessary to derive such generalizations in a short span of time. Writing accelerates events of nature, and thereby facilitates "apprehension of general patterns and periodicities."²¹¹ As Lloyd remarks, "it is not the case that that the writers conducted their observations merely to confirm *rules they had already formulated in detail*. Rather those detailed rules are, in the main, generalizations which they arrived at on the basis of their particular observations including, no doubt, many others besides those recorded in the case-histories as we have them."²¹²

²¹⁰ Goody (1977), 81.

²¹¹ Miller (1990), 31.

²¹² Lloyd (1979), 155.

Scholars have not noted the importance of this “literate revolution” on pharmacology. Most scholarship considers Hippocratic pharmacology static, and thus has neglected the possible effects literacy might have had on the field. Yet, as argued above, a progression in pharmacological ideas is prominent in much of the Corpus. This new view, then, permits a consideration of the catalyst for such an innovative movement.

While many factors have contributed to the progression in pharmacological ideas, the use of writing as a tool for innovation and discovery must be singled out in the creation of distinct drug categories which describe a physiological function. The large folk pharmacopoeia which the early Hippocratic physicians limited to only purges had no classification scheme. While early Hippocratic medicine only used purges and thus only one category, later Hippocratic physicians invented new drugs to correspond to their physiological doctrines. Phlegmagogues, cholagogues, diuretics, and other categories were created to form the logical therapeutic armamentarium of these physicians. The author of *On Affections* makes reference to a lost Corpus text, *Pharmakitis*, and suggests consulting this reference work for information on drugs:

Give things recorded in the *Book on Drugs* as stopping pain.²¹³

Give also diuretic medications recorded in the *Book on Drugs* as stopping pain.²¹⁴

As these references indicate, *Pharmakitis* was presumably arranged by drug category, included prescription ingredients, and most likely provided alternatives (the plural in both passages above suggests the possibility of numerous drug entries under a category heading). Furthermore, the arrangement of categories might be subdivided even further to

²¹³ *On Affections*, 27: δίδονται ἃ γέγραπται ἐν τοῖς Φαρμάκοισι παύοντα τῆς ὀδυνῆς.

²¹⁴ *On Affections* 28: δίδονται δὲ καὶ τῶν διουρητικῶν φαρμάκων, ἃ γέγραπται ἐν τῇ Φαρμακίτιδι παύοντα τῆς ὀδυνῆς.

include, for example, a subcategories under one general category. Thus, the category for diuretic drugs might have not only universal diuretics, but also a subclassification into analgesics.²¹⁵ This dual classification -- or more appropriately a subcategorization -- scheme betrays a process of critical observation of written and observed data, its systematization, and subsequent publication in *Pharmakitis*.

The categorization of drugs by the Hippocratic physicians, then, is not a process common to all medical practitioners, but rather a direct result of salient features of the "scientific revolution" of fifth century BC Greece, most importantly, the use of writing and increase in literacy. These factors catalyzed a process of generalization and categorization which resulted in a highly specific categorical system of drugs. This final scheme, of course, did not emerge *de novo*, but evolved in various steps discernible throughout the Corpus.

The following will examine categories which describe a drug's function in the Corpus Hippocraticum. The category names will be examined along with the method of classification. Some categories, for instance, are designated with substantives (e.g., διουρητικον φαρμακον) while others are contained in a verb (e.g., ξηραινειν). Representative passages from various treatises will be offered to illustrate how these categories were used in prescriptions of drug therapy. A category's frequency throughout the Corpus will be noted in order to determine which authors adopted this function of drugs in their pharmacology. Any theoretical assumptions which explain how a drug

²¹⁵ *On Affections*, 28: "Give diuretic drugs as recorded in the *Book on Drugs* as stopping pain."

functions will be examined as well. Finally, an attempt will be made to establish the consistency of these categories; comparing the various prescriptions among treatises will determine their universality. Finally, Galen's corresponding category will be discussed along with any remnant in modern pharmacology. The 31 total drug categories within the Corpus will not all be discussed in detail, since data on many are limited to a few remarks in one or two treatises which do not yield a detailed analysis. These remaining categories will be listed with references.

V.2 Major Drug Categories

V.2.1 Purgatives

Indication

The largest category of drugs by far are the purges.²¹⁶ Various nouns, substantives, and verbs designate this category of drug which is understood, most generally, as a cleansing, or cathartic, agent:

ὑπεκχωρητικά ²¹⁷	<i>Places in Man</i> , 41
διαχωρητικά	<i>On Regimen</i> II.53
διαχωρει ²¹⁸	<i>On Regimen</i> II.54
ὑποχωρειν	<i>On Diseases</i> III.15
καθαρτηρια φαρμακα	<i>Places in Man</i> , 13
καθαρτεον	<i>Places in Man</i> , 23
καθαρον φαρμακον	<i>On Diseases</i> II.12
καθηραι	<i>On Affections</i> , 2
καθαιρει	<i>On Affections</i> , 19
περικαθηρα	<i>On Diseases</i> III.10
ὑποκαθαρισιν	<i>On Internal Affections</i> , 7

²¹⁶ These are also referred to as "evacuants."

²¹⁷ Herein, substantives are listed without a noun; this indicated that in the original passage, the substantive form rather than an adjective modifying a noun was used.

²¹⁸ Herein, verbs will be left in their form from context; infinitives, usually acting as imperatives, will also be left in their original form.

φαρμακον *On Regem in Acute Diseases*, 24
 ἐλατήριο φαρμακον²¹⁹ *Epidemics* 5.1.18

Often, the word φαρμακον alone designates this category. While *pharmakon* itself, in the general sense, means “drug,” early Hippocratic pharmacology used this word exclusively to mean purge.²²⁰ “This being the case, give a medication, but only on the ninth day.” Here, *pharmakon* can reasonably be considered a purge since it falls within a chapter that resembles early Hippocratic drug therapy which consisted exclusively of purgatives. Unfortunately *pharmakon* cannot universally be considered a purge outside of early Hippocratic pharmacological texts, and context must provide the meaning for the term. In *On Regimen in Acute Diseases*, 24, for example, the author uses the word *pharmakon* alone²²¹. The term is undoubtedly a purgative since the previous passage discusses the use of black hellebore, the purgative *par excellence*.²²²

The etymology of these purgative drug category names reflects their physiological functions. *Pharmakon* has an uncertain foreign etymology, derived from the same root as φέρειν (= to carry). This word’s link with the sphere of purification is illustrated by the practice of cleansing a city, where a pot in which pollution is discarded was called a φάρμακη.²²³ Similarly, the term διαχωρητικον is derived from διαχωρειν = “to pass

²¹⁹ Cf. *On Regimen in Acute Diseases*, 2, where the author notes that the ancient physicians (early Hippocratic doctors) employed only purges (φάρμακα ἐλατήρια). This statement confirms that later mentions of the formula actually describe a purge.

²²⁰ As discussed in chapter III, early Hippocratic pharmacology based its pharmacology on its physiological theory which understood disease as a result of intestinal residues, *perissomata*. As the author of *On Regimen in Acute Diseases* notes, purges were used to eliminate these pathogenic residues. Although the author of *On Regimen in Acute Diseases* calls these purges φάρμακα ἐλατήρια, yet evidence from the oldest stratum of *On Diseases* II.12-75 (stratum A) suggests that these purges were simply designated by φάρμακον.

²²¹ “Immediately after he has taken a purge...” (ὅταν πῆ τὸ φάρμακον).

²²² *On Regimen in Acute Diseases*, 23.

²²³ Note also the name of the scapegoat in Greek ritual: φάρμακος. See also Burkert (1985), 84.

through.”²²⁴ All derivatives of καθαιρειν have no Indo-European root, but rather links with the Semitic word for fumigate (*qatar*).²²⁵ These etymologies reflect this category’s action: the purification of the body, mainly through evacuation of fecal matter.

This large class of purgative drugs is subdivided into smaller categories which designate, among other things, location and direction of purge, material purged, and sometimes strength of purge.²²⁶ Purgation can occur up (ανω)²²⁷ or down (κατω)²²⁸. This direction is crucially important; administering a medication destined for the wrong direction can be fatal:

Drink a drug which produces downward purgation, not upward, lest it cause vomiting.

(*Places in Man*, 12)

Often, the material to be purged is included in the prescription. A purge not only functions generally, but more specifically as an purge of phlegm, bile, water, pus, menses, and wounds:²²⁹

(bile)	διαχωρητικὸν κάτω χολωδέων ²³⁰	downward purge of bilious matters
phlegm	καθῆραι τὴν κεφαλὴν φλέγμα ²³¹	purge the head of phlegm
	φάρμακα...κάτω ὑφ’ ὧν ὕδωρ	purge downward of water and
	ἢ φλέγμα καθαίρεται ²³²	
	τοὺς ἐμπύους καθαίρειν τὴν κεφαλὴν ²³³	purge the head of pus
	καθαίρει τὰ ἔλκεα ²³⁴	purge the wound

²²⁴ *LSJ*. Derivatives of this verb all relate to the intestine or its fecal matter (e.g., διαχωρημα = excrement).

²²⁵ Burkert (1992), 62.

²²⁶ Goltz (1974), 169, notes that *Diseases of Women II* qualifies the drug classification *kathartikon* seven ways. Goltz includes in this qualifiers all of mine.

²²⁷ E.g., *Places in Man*, 43.

²²⁸ E.g., *On Affections*, 19.

²²⁹ While the former four constitute bodily humors or derivatives thereof, the last is a mucosal lesion. Hippocratic medicine considered wounds (ἔλκεα) diseases themselves. Purging of the wound would remove the disease. See Majno (1975), 176-87.

²³⁰ *On Regimen in Acute Diseases*, 53.

²³¹ *On Affections*, 2.

²³² *On Affections*, 19.

²³³ *Places in Man*, 18.

καθαρήριον ἐπιμηνίων καὶ λοχείων²³⁵ purge the menses and the lochial flow

The anatomical region which the purge is affecting is also specified in some instances. Mainly, location is either the stomach (κοιλίη)²³⁶ or the head (κεφαλή)²³⁷. Modulation of the strength of the purge can affect its location; a strong purgative usually acts on a large, undifferentiated anatomical region (e.g., head or stomach), while a milder form is more localized in its action:

Drugs which purge the head (τὰ φάρμακα τὰ τῆς κεφαλῆς καθαρτήρια) and which are strong (ἰσχυρά) purge the whole (ὅλης) head. Those which are not strong (ἀσθενέα) purge around the eyes and nose.

(*Places in Man*, 13)

The strength of the purgative is seldom mentioned in the Corpus texts, with the exception of *Places in Man*, where magnitude is specified:

τοὺς ἐμπύους καθαίρειν τὴν κεφαλὴν not strong	purge the head with drugs that are
μὴ ἰσχυροῖσι φαρμάκοισιν ²³⁸	
ἔπειτα φαρμάκῳ ἰσχυρηρίῳ χρῆσθαι ²³⁹	then [purge] with a strong drug
τούτῳ τὴν κεφαλὴν καθαρτέον ἀσθενεῖ φαρμάκῳ ²⁴⁰	purge the head with a weak drug
τὴν κάτω κοιλίην... ὑποκινέειν ²⁴¹	purge the head downward gently
τό κατακορῆς φάρμακον ²⁴²	a strong purgative
ἐλατήριον... ἰσχυρότερον ²⁴³	a stronger purge

²³⁴ *On Wounds*, 12.

²³⁵ *Nature of Women*, 32.

²³⁶ *On Diseases* II.12

²³⁷ *On Affections*, 2

²³⁸ *Places in Man*, 18.

²³⁹ *Places in Man*, 20. Preceding this statement, the author suggests that in order to relieve pain in the stomach, one should purge it with either a purgative or a juice.

²⁴⁰ *Places in Man*, 23.

²⁴¹ *On Diseases* III.15. Potter translates ὑποκινέειν as "move gently."

²⁴² *Epidemics*, 5.1.15.

²⁴³ *Epidemics*, 5.1.18

Purgatives, then, can be described more precisely by indicating (1) the anatomical region at which the purge is directed; (2) the material being purged; (3) the direction of the purge; and (4) the strength of the purge.

Mode of Administration

Purgatives are usually administered orally, yet references to pills, enemas, suppositories, lozenges, and cataplasms are easily found. When the purgative is to be given orally, the patient is either instructed to “drink a drug” or the drug itself is called “oral”:

φάρμακον πίσαι ²⁴⁴	drink a purge
φάρμακον πιπίσκοντα ²⁴⁵	an oral purge

While oral administration of purgatives dominates most Corpus treatises, pills are especially prevalent in *Epidemics*:

ταῦτα λεῖα τρίψας, κατάποτα ξυστρέψας, δίδου. Κάτω ὕδωρ καθαίρει. ²⁴⁶	grinding all these thin, form them into pills and give; they purge water
καθιράμενος διὰ καταπότου ²⁴⁷	having purged with a pill
ἐλατήριον κατάποτον ²⁴⁸	a purgative pill

Lozenges²⁴⁹, enemas²⁵⁰, and cataplasms²⁵¹ are modes of administration seen much less frequently.

²⁴⁴ *Places in Man*, 12.

²⁴⁵ *Places in Man*, 23.

²⁴⁶ *On Regimen in Acute Diseases* (Appendix), 70 (37L).

²⁴⁷ *Epidemics*, 5.1.16.

²⁴⁸ *Epidemics*, 5.1.18.

²⁴⁹ *On Regimen in Acute Diseases* (Appendix), 3 (2L): “clean upwards with a lozenge” (ἐκλεικτῶ ἀνακάθαιρε).

²⁵⁰ *On Regimen in Acute Diseases* (Appendix), 17(8L): “evacuate the cavity at the beginning with an enema” (κοιλίην δὲ ὑπαγε κατ’ Ἀρχᾶς κλυσμῶ).

²⁵¹ *On Wounds*, 11. “Cataplasms” is the general chapter heading; “many also purge” follows close after a prescription. The assumption is that some cataplasms are purges. This agrees with the statement by the author that wounds should be purged. See 84 n.234 *supra*.

Purgatives as a “Supercategory”

The above list of functions for purgatives appears to overlap with a certain number of other Hippocratic categories. Namely, drugs which purge bile, phlegm, and water can be also be listed under the categories of cholagogues, Phlegmagogues, and diuretics, respectively. Two categories, then, seem to overlap in their description of the same drug function.

Some prescriptions of purgatives designate an expected physiological function which itself can be claimed as a category:

Both [black hellebore and peplium] stop pain -- as do most purgatives (ἄλλα συχνὰ τῶν ὑπελάτων).

(*On Regimen in Acute Diseases*,

23)

Decrease inflammation (ἀπισχνῆναι) by some other purgative drug (ὑποχωρητικῶν φαρμάκων).

(*Places in Man*, 13)

In *On Regimen in Acute Diseases*, 23, above, the purgative is functioning as an analgesic; although the drug is purgative by nature, pain is alleviated because of its administration. Similarly, the purgative in *Places in Man*, 13, exerts its physiological effect as an anti-inflammatory agent.

The functional overlap of purgatives and other drugs can be explained by postulating a “supercategory” of purgatives under which other drug categories are subsumed. Within this proposed schema, evidence of a progression in drug classification emerges. Prescriptions consisting of only purges with no mention of a resulting physiological function might be considered part of an early stratum of pharmacology. *On Diseases* II.40, for example, prescribes a downward purge.²⁵² An intermediary stratum

²⁵² “Have the patient drink a medication to act downwards” (φάρμακον πῖσαι κάτω).

can be postulated where a purge and its physiological function are documented. Within the same treatise, a prescription for a upward purge which will withdraw phlegm offers evidence of this intermediate stratum.²⁵³ Finally, a new focus on drug classification by physiological function would not include the purgative in the prescription..

Procedures, Theoretical Assumptions, and Illustrations

The theoretical assumptions held by various Corpus authors about the nature of purgatives are strikingly similar and suggest the possibility of a strand of unification in Hippocratic pharmacology. *Affections*, 59, claims that all purges are by nature succulent (ἔγχυλά) and warm (θερμά); a parallel claim is offered by the author of *Places in Man*, 45, who believes all purgatives are dry (ἰσχυναίνοντα) and warm.(θερμαίνουσι), among other qualities.²⁵⁴ The author of *Places in Man*, 45, elaborates on this theoretical schema; purgatives are also slippery (ὀλισθηρά), imbued with the power of wetting (τμηματώδεα), and become thin in warm environments (λεπτύνονται). Salty substances are correlated with these qualities.²⁵⁵

Purgatives are omnipresent in Hippocratic pharmacology. The earliest drug therapy was exclusively purges, as the remnants from the earliest stratum of *On Diseases* II.12-68 illustrate:

When mucus breaks out through the patient's nostrils, when he passes thick urine, and when his pain goes away,...[prescriptions] When forty days have expired -- for the disease generally subsides in that length of time -- first clean out the patient's head, and then give him a

²⁵³ *On Diseases* II.15: πρῶτον μὲν οἱ πιεῖν φάρμακον δοῦναι ἄνω, ὃ τι φλέγμα ἄξει ("Give an upward oral purgative drug which will draw phlegm [upward].")

²⁵⁴ This passage is particularly difficult to interpret. The elliptical nature of this complex passage prevent a clear translation.

²⁵⁵ The text seems then to suggest that purges are also (ἔτι) acidic and inflammatory, yet this would just confuse the qualities of the drug stated earlier. Again, the elliptical nature prevents adequate translation.

medication that cleans downwards; if it is the right season, have him drink whey for seven days; if he is too weak, though, for fewer.

(*On Diseases II.12*)

The goal of the purge treatment is to dislodge the mucus which is accumulating in the head. The close proximity of the two purges in this therapy cannot be adequately explained, except for a possible connection with early Hippocratic pharmacology.

If pain be under the diaphragm, and does not declare itself toward the collar-bone, soften the bowels with black hellebore or peplium, mixing with the black hellebore daucus, seseli, cumin, anise, or some other fragrant herb, and with the peplium juice of silphium. In fact, the blending of these constituents produces a harmonious compound. Black hellebore causes evacuations that are better and more favorable to the crisis than does peplium; but peplium breaks flatulence better than black hellebore. Both, however, stop pain, as do many other purges; but these are the best I know of, though purges given in the gruel help, if they are not too unpleasant owing to bitterness or other unpleasant taste, or owing to quantity, color, or some quality that arouses the patient's suspicion.

(*On Regimen in Acute Diseases*,

23)

Here, evidence for two drug categories emerges from this prescription of hellebore or peplium; while both are purgatives, they function in this disease as analgesics and softening agents. The symptom of the condition, pain under the diaphragm, suggests an etiology of an intestinal blockage, leading to the prescription of a purge to alleviate pain. Even more interesting are the ingredients themselves: black hellebore and peplium. The author suggests mixing these with other ingredients (presumably to hide the horrible taste) and notes that the mixture is in fact a "harmonious compound."²⁵⁶ Black hellebore is given preference, yet the author remarks in an unprecedented authorial voice, that he believes these two purges to be the best.

Among the ingredients of purgatives, black hellebore was especially popular. Black and white hellebore, although different species, both share a poisonous quality that causes

²⁵⁶ This might be considered a compound drug (μισγόμενα), although none of the other ingredients seem physiologically active.

irritation wherever applied.²⁵⁷ The Knidian berry was also a prominent purgative, especially in combination with hellebore.²⁵⁸ Among other ingredients, squirting cucumber²⁵⁹ was also popular in purgative treatment.

V.2.2 Cholagogue

Indication

Cholagogues are not as wide spread as purges in their therapeutic use. This category is specified by either (1) a relative clause qualifying a purgative, or (2) an adjective or substantive, as the examples illustrate:

φάρμακον πίσαι κάτω ὅ τι χολήν καθαίρει	<i>On Affections</i> , 32
χοληγαγὰ φάρμακα	<i>Places in Man</i> , 28
χοληγαγικὸν φάρμακον	<i>Places in Man</i> , 27
φαρμακον ἀνωθεν ἤγαγε χολωδεα	<i>Epidemics</i> 7.93

The etymologies of this drug classification corresponds with its expected physiological function: cleaning, or evacuating bile. Thus, this word is formed from the combination of the *ag-* stem (= lead) and the term for bile²⁶⁰, χολή.

In prescriptions, this category is not qualified by degree or location, except for a comment in *On Diseases* III.8, where the author suggests that the patient use “an enema which will draw bile down effectively (σφοδρα).”

Modes of Administration

Hippocratic physicians administered cholagogues orally²⁶¹ or by enema.²⁶²

²⁵⁷ Majno (1975), 189. The two species, black hellebore (Christmas rose, a *Ranunculacea*) and white hellebore (*Veratrum*, a *Liliacea*), could produce sneezing, evoke vomiting, and cause muscular cramps, diarrhea, and, if taken in large amounts, cause the heart to stop.

²⁵⁸ *Internal Affections*, 22: “Have the patient drink purge flax, hippapheos juice, or Knidian berry...”; 30: “Have the patient drink hellebore, and clean him downwards with Cnidian berry.”

²⁵⁹ *On Diseases* III.10: “Clean him thoroughly with fresh squirting cucumber juice.”

²⁶⁰ I have not investigated the etymology of bile yet.

Procedures, Theoretical Assumptions, and Illustrations

As the name of this category implies, a cholagogue includes all drugs which evacuate bile. This presupposes the concept of bile as a component of the body, yet does not require that the theory of four-humors be operative.²⁶³ A nosology based on intestinal *perissomata*, however, will not admit a cholagogue in its therapeutics; there is simply no bile to purge in such a system.²⁶⁴ As discussed earlier, the cholagogue most likely originated with a purge whose function within the new physiology of bile and phlegm was designated by a relative clause limiting the capacity of the general purge. *On Diseases* II.12-75 offers a glimpse of this transition period where the purge is qualified by a physiological function:

Give a medication that will clean upwards of phlegm and bile.²⁶⁵
(*On Diseases* II.13)

Give a medication which will draw phlegm upwards.²⁶⁶
(*On Diseases* II.15)

²⁶¹ *Places in Man*, 27: “Drink a cholagogue medication” (φάρμακον πίσαι χοληγαγικόν). Only the verb appears in designating the form of administration for the cholagogue.

²⁶² *On Diseases* III.8: “Use an enema that will draw down bile effectively” (ὑποκλύσαι ὅ τι χολὴν ἄξει σφόδρα).

²⁶³ See Longrigg (1993), 92. Humors originate in the dawn of Greek medicine and extend even to early Egyptian medicine. Phlegm, for example, is mentioned both in the *Ebers* and the *Edwin Smith Papyrus*, while bile is mentioned in the fragments of Archilochus and Hipponax. The four canonical humors which traditionally became associated with Hippocratic medicine should not be assumed as simply the accretion and differentiation of these earlier bodily fluids, namely bile and phlegm. As Lonie (1981), 60, remarks, the development and implementation of the four humoral system “marks a revolution in medical science, a new way of looking at the human body which was the result of philosophic development of the fifth century.” The four humor doctrine actually is an analogue of the Empedoclean four elements. As Empedocles’ elements play a role in the world at large, these four humors function within the microcosm of the human body. Yet, the bile and phlegm of this doctrine should not be equated with the bile and phlegm of earlier medicine. This presents an interesting problem: namely, are all phlegmagogues the same?

²⁶⁴ The small number of cholagogues and phlegmagogues in *On Diseases* II.12-75 reflects this treatise’s strong affinity with early Hippocratic nosology. The few instances of such drug classification, however, constitute good evidence for the second stratum (B) of Hippocratic pharmacology within this Corpus text.

²⁶⁵ φάρμακόν οἱ δοῦναι ὑφ’ οὗ φλέγμα καὶ χολὴν καθαρεῖται ἄνω.

²⁶⁶ φάρμακον δοῦναι ἄνω ὅ τι φλέγμα ἄξει.

Later treatises eliminate the functional descriptor, replacing it with a substantive category name.²⁶⁷ Oftentimes, the purgative prescription is subsumed in the new category description.

The author of *Nature of Man*, who proposes the four humor physiology, considers black bile to be the most difficult to evacuate.²⁶⁸ In excessive purgation, he notes that a cholagogue will first evacuate bile, then phlegm, black bile, and blood will follow if the drug is adequately strong. For *Nature of Man*, a drug which enters the body first withdraws the humor which is most similar to it, followed by the other humors.²⁶⁹

Unfortunately, no ingredients are given for any of the cholagogues in the Corpus.

V.2.3 Phlegmagogue

Indication

Unlike the cholagogues, no substantive category name exists for phlegmagogues; all are designated by either (1) a relative clause qualifying a purgative, or (2) a relative clause with a compound of ἄγειν (= lead):

φάρμακον ὃ τι φλέγμα ἄγει
καθῆραι τὴν κεφαλὴν

Nature of Man, 5
On Affections, 2

This category of drugs is not qualified, except for the Affection's instruction to use the "best" (ἀριστον) phlegmagogue.²⁷⁰

Modes of Application

²⁶⁷ Exceptions, of course, cannot be denied. Cf. *On Affections*, 32.

²⁶⁸ *Nature of Man*, 7.

²⁶⁹ *Nature of Man*, 6.

²⁷⁰ *On Affections*, 4.

The author of *On Affections* discusses oral²⁷¹ and chewed²⁷² medication, and gargles²⁷³ as methods of administering phlegmagogues yet most phlegmagogues are given orally.

Procedures, Theoretical Assumptions, and Illustrations

The phlegmagogue, like the cholagogue, requires a physiological system which includes bile and phlegm as essential components. A number of pharmacological strata can likewise be discerned in the prescriptions for phlegmagogues.²⁷⁴ The author of *On Affections* seems to attach a secondary function to a phlegmagogue: not only do they draw down phlegm, but they also relieve pain.²⁷⁵ Excessive purgation with a phlegmagogue will cause the patient to evacuate phlegm at first, but also yellow bile, black bile, and finally blood.²⁷⁶

V.2.4 Diuretics

Indication

The category of diuretic drugs is expansive throughout the Corpus and can be described in a variety of ways, namely by (1) a relative clause which qualifies a purgative drug, and (2) substantive, adjective, or verb:

διουρητικον

Epidemics, 5.17

²⁷¹ *On Affections*, 4: “Drink a medication that draws phlegm upwards” (φάρμακον πίσαι ἄνω ὅτι φλέγμα ἄγει).

²⁷² *On Affections*, 4: “Give the medications which are chewed” (διαμασητοῖσι).

²⁷³ *On Affections*, 4: “Give gargles” (ἀναγαργαρίστοις χρῆσθαι). Although a phlegmagogue is not mentioned here, the context strongly suggests that the intended function of the gargles is to draw away phlegm which is in abundance.

²⁷⁴ See V.2.2 *supra* for this argument which can equally be applied to a phlegmagogue.

²⁷⁵ *On Affections*, 7: “Give the patient a medication to remove phlegm and bile from the side, for if you do this, the pain will be mildest.”

²⁷⁶ *Nature of Man*, 6.

οὐρητικά	<i>On Affections</i> , 59
διουρητικοῖσι φάρμακοῖσι	<i>On Affections</i> , 20

Diuretics are qualified by degree as well as by secondary qualities. Often, diuretics overlap with other drug categories, especially analgesics:

Also give the diuretic medications (διουρητικῶν φαρμάκων) recorded in the *Book of Drugs* as stopping pain (παύοντα τῆς ὀδύνης).

(*On Affections*, 28)

As this passage from *On Affections* shows, diuretic drugs were a category in the *Book on Drugs*, a lost text on pharmacology which is postulated to have been arranged by drug category. The resulting degree of diuresis from these medications is sometimes noted.²⁷⁷

Modes of Administration

Most diuretics are administered orally²⁷⁸, though some can be taken by pill²⁷⁹.

Procedures, Theoretical Assumptions, and Illustrations

Various authors of *Corpus* treatises agree that diuretic drugs are by nature cold and dry.²⁸⁰ The author of *Places in Man* offers a modality of action for these drugs based on the theory of qualities and elements. Warm drugs are ingested, and in the stomach, undergo conversion to cool drugs, which are then able to cause diuresis because of their cool nature.²⁸¹ Substances which remain warm in the stomach are not capable of causing diuresis. This qualitative consistency is maintained throughout the *Corpus* with respect to diuretic drugs. Drugs which are administered in large amounts but which do not cause

²⁷⁷ *Epidemics*, 5.17: διουρητικὸν δριμύ (= harsh diuretic).

²⁷⁸ *On Diseases* II.12: "Drink diuretics" (πινέτω τὰ διουρητικά).

²⁷⁹ *On Regimen in Acute Diseases* (Appendix), 37: "Grinding up these things thin, form them into a pill; they are diuretic."

²⁸⁰ *On Affections*, 59: "Diuretics are cool (ψύχρα) and dry (ξηρά)." Cf. *On Diseases* III.7: "Give diuretics which are not warming."

²⁸¹ *Places in Man*, 45.

“filling” are also diuretic for the author of *Places in Man*. The consistency in these theoretical assumptions should not be taken as evidence for anything of a unified pharmacology.

V.2.5 Cooling Agents

Indication

The category of cooling agent can be applied to both foods and drugs, with the distinction at times quite ambivalent. Nevertheless, this category of medicines is designated by adjectives, substantives, and verb forms:

27	ψυχτικά	<i>On Regimen in Acute Diseases</i> (Appendix),
	ψυχιος	<i>Use of Liquids</i> , 5
	ψυχουσι φαρμακοισιν	<i>Places in Man</i> , 29
	ψυχτηριω φαρμακω	<i>Places in Man</i> , 27
	ἀπόθερμον	<i>Diseases of Women</i> , 44

The derivatives of ψυχειν characterize this class of drugs throughout the traditional works of the Corpus, while the term ἀπόθερμον is localized to the gynecological texts. The author of *On Diseases* III.17, describes cooling agents in a chapter entitled Ψυκτήρια as having various secondary qualities; sweet (γλυκέα) and astringent (στρυθνά) cooling agents are noted, but the author’s general admonition -- to individualize treatment among different patients -- insinuates that these drugs can have many other such qualities.

Mode of Administration

Most cooling agents are administered orally, as the author of *On Diseases* III suggests.²⁸²

²⁸² *On Diseases* III, 7: “Give cooling drinks...” (πάματα ψυχτικά); 17: “Give the following cooling agents to drink...” (ψυκτήρια...πίνειν).

Procedures, Theoretical Assumptions, and Illustrations

One author considers all drugs to function by either cooling, heating, drying, moistening, collecting, or dispersing, unless they are phlegmagogues or cholagogues.²⁸³ Unfortunately, the theoretical assumptions Corpus authors have on cooling agents are not entirely consistent. Undoubtedly, though, cooling agents are employed for a variety of clinical conditions, including arthritis, fever, wounds, a nosebleed, and for general aches and pains. The attribution of secondary functions to this class of drugs recalls the supercategory of purgative. The author of *On Diseases* III.17, notes that “they [cooling agents] have many effects” (πολλὰ δὲ ἀπεργάζεται). The author also claims that some cooling agents have no other function, and merely cool “as if someone were to pour cold water over a vessel of boiling water, or were to move the vessel itself into cold air.”²⁸⁴

Ingredients for prescriptions of cooling agents are scattered throughout the Corpus, but a large concentration is in the final chapter of *On Diseases* III. The components of 24 different cooling agents are enumerated in this valuable section. Two examples follow, one of which lists ingredients for a general cooling agent, while the other has the secondary functions of a diuretic and a cholagogue:

water (1 choes)	[boil until 1/2 remains; sieve] + add celery ²⁸⁵
barley, peeled (1 cotyle)	



pennyroyal (3 pinches)	
celery (6 pinches)	[boil] ²⁸⁶
wine	

²⁸³ *On Affections*, 36.

²⁸⁴ *On Diseases* III, 17.

²⁸⁵ *On Diseases* III, 17.G.

²⁸⁶ *On Diseases* III, 17.G. This preparation is also a diuretic (οὐρέεται) and a cholagogue (διὰ τῆς κοιλίης χολήν ἄγει).

water

The prescriptions contain a number of common ingredients, including celery and wine.

The preparation process invariably includes boiling, following by cooling.

V.2.6 Drying Agents

Drying agents are prominent in many therapeutical treatises of the Corpus. Similar to cooling agents, they are designated by adjective, noun, and verb form:

ξηραινοντα φαρμακα	<i>On Affections</i> , 36
ξηραινης	<i>On Affections</i> , 43
ξηρω	<i>Epidemics</i> , 6.13

Unlike the cooling agents, prescriptions of drying agents are qualified by locations, including the stomach (κοιλια)²⁸⁷, the lung (πλεύμονα),²⁸⁸ and wounds²⁸⁹ as sites of drying.

Modes of Administration

Drying agents can be applied externally with a sponge to an affected area²⁹⁰, incorporated into a cataplasm²⁹¹, or drunk to act on the stomach. Although the last mode of administration is not specified, it is reasonable to postulate that a drying agent aimed at the stomach would have only one available path to that region²⁹², except through the skin.

²⁸⁷ *On Internal Affections*, 23.

²⁸⁸ *On Diseases III*, 10

²⁸⁹ *On Wounds*, 1.

²⁹⁰ *Places in Man*, 12: “Fill a sponge with a drying drug...” (σπογγιάν δεύων ξηραίνοντί τινα φαρμάκω).

²⁹¹ *On Wounds*, 12.

²⁹² *On Affections*, 25: “Dry out this patient’s upper regions by having him drink (πιπίσκων) hellebore.” This passage, though, does not prescribe a drying agent, per se, but rather a drink of hellebore and a head purge which will dry the upper regions. This is another instance of a “supercategory.” See 86 *supra*.

Procedures, Theoretical Assumptions, and Illustrations

A remark by the polemic author of *Nature of Man*, 6, suggests a possible modality of action for these drying drugs: “For when a drug enters the body, it withdraws (ἄγει) that constituent of the body that is most akin to itself.” These drying drugs, then, prescribed presumably for individuals with an overly wet body constitution, might act by absorbing excess internal moisture. This modality is corroborated by a statement in *Places in Man*: “Use drugs which draw the wetness to themselves.”²⁹³ Secondary functions are ascribed to many of these drying agents, as well. Not only do these pharmaceuticals promote drying, they also act by inducing expectoration²⁹⁴ and preventing suppuration.²⁹⁵

Although no chapter is devoted to the enumeration of ingredients for these drying agents, numerous prescriptions are scattered throughout the Corpus. The author of *On Affections*, 25, suggests drying out the “upper regions” of a patient with hellebore. *On Diseases* III.10, instructs the preparation of the following compound drug:

hyssop, Cicilian	
sulfur	[burn + draw through pipe into nostril]
asphalt	

V.2.7 Expectorants

Indication

Expectorants are a very small, limited category of drugs which are only found in *Places in Man*, *On Regimen in Acute Diseases*, and *On Diseases* III. This category is

²⁹³ *Places in Man*, 32: καὶ φαρμάκοισι χρῆσθαι, ὅσσα ἐφ' ἑωυτὰ τὸ ὑγρὸν ἔλκουσι.

²⁹⁴ *On Diseases* III, 10: “Induce expectoration as soon as possible and dry up the lung: [Prescription].”

²⁹⁵ *On Wounds*, 1: “An enHEME which is a bit drying which prevents suppuration .”

designated by (1) the use of a substantive, adjective, or verb form of ἀγειν or (2) the more refined and specific substantive ἐπαναχρεμπτηριον:

τῶν ἀναγοντῶν φαρμακῶν	<i>On Diseases III, 15</i>
φαρμακα της ἀναγωγης	<i>On Diseases III, 15</i>
φαρμακον ἐπαναχρεμπτηριον	<i>Places in Man, 17</i>
φαρμακον...ποιευντα ἀναχρεμψιν	<i>Places in Man, 26</i>

The expectorants are often qualified by an indication of their strength:

πτυαλον ἀναγωγον μετριως ²⁹⁶	mildly expectorant
ἰσχυροτατοισι ἐπαναχρεμπτοισι φαρμακοις ²⁹⁷	most active expectorants

Modes of Administration

Expectorants are usually taken orally²⁹⁸, with the exception of a few infusion²⁹⁹.

Procedures, Theoretical Assumptions, and Illustrations

Expectorants are much different from other categories which have some connection with the humors, qualities, or elements. Hippocratic pharmacology was grounded in the physiological system which explains how the body functions and becomes diseased. Expectoration, however, is not able to cool or warm, draw out bile or phlegm. An expectorant for the Hippocratic physicians, it seems, was intended to promote coughing, which would aid in the removal of phlegm, pus, bile, etc. which had become lodged in the lung.

²⁹⁶ *On Regimen in Acute Diseases*, 52.

²⁹⁷ *Places in Man*, 17.

²⁹⁸ *On Affections*, 9: φάρμακα πότα.

²⁹⁹ *Places in Man*, 18: ἐγχύτοισι φαρμάκοισι.

Expectorants have a wide variety of secondary functions. Many are analgesics, drying agents, and purgatives. Authors of various treatises enumerate many prescriptions for these drugs, yet unfortunately do not discuss their qualities.

V.2.8 Analgesics

Indication

Analgesic medications appear through the Corpus in the context of relieving general or localized pain. Typically, the drug category is designated by (1) a relative clause that indicates that the drug removes pains (derivatives of *παυεῖν* are the verbs of choice) or (2) the word drug (*pharmakon*) qualified by a genitive indicating the symptom being alleviated (typically, *φάρμακον τῆς ὀδύνης* is common):³⁰⁰

φάρμακον τῆς ὀδύνης	<i>Places in Man</i> , 26
διδόναι δὲ καὶ τῶν διουρητικῶν φαρμάκων,	
ἃ γέγραπται ἐν τῇ Φαρμακίτιδι παύοντα τῆς ὀδύνης	<i>On Affections</i> , 28

Analgesics are often qualified by location:

διδόναι ὅπερ ἐν τῇ πλευρίτιδι τοῦ πλευροῦ	administer a medication
recorded in	
τῆς ὀδύνης ἐν τῇ Φαρμακίτιδι γέγραπται ³⁰¹	<i>Book on Drugs</i> for pleuritic
pain	

Mode of Administration

Typically, most analgesics are given orally, as indicated by the presence of a derivative of *πίσαι* (=to drink).³⁰²

Procedures, Theoretical Assumptions, and Illustrations

³⁰⁰ Curiously, the word *ἀνώδυνον* is never used to designate a drug category in the Corpus, yet does indicate the absence of pain in the description of symptoms.

³⁰¹ *On Affections*, 9.

³⁰² *On Affections*, 15: καὶ πίνειν διδόναι τῆς ὀδύνης εἵνεκα, ὅπερ ἐν τῇ Φαρμακίτιδι γέγραπται. ("Give an oral medication for pain which is written in the *Book on Drugs*.")

The authors of various Corpus texts, especially *On Affections*, regularly prescribe analgesics, referring the physician-reader to the *Book on Drugs (Pharmakitis)* for a list of ingredients. It can be postulated, as mentioned above, that this lost Hippocratic Corpus treatise was a compendium of drug prescriptions organized by drug category, as well as further subclassified. Authors often prescribe a drug that is classified by two drug categories:

Give a diuretic medication listed in the Book on Drugs as stopping pain.
(*On Affections*, 28)

This raises the possibility of a “supercategory” of drugs describing a universal mechanism of action yet being further subclassified by a particular physiological outcome. Thus, a warming drug might physiologically warm the body and, though its action, cause a remission of pain. The administered drug, then, would function as both an analgesic (since it alleviated pain) and as a warming drug (since it physiologically warmed the body).

Analgesics, in particular, were administered to mitigate an encountered symptom: pain. Yet, the etiology of this symptom was different in many cases; pain in the head might be caused by an excess of phlegm in the anterior region, in which case a logical therapy would include the elimination of this superfluous humor, while pain might also occur due to a buildup of water in the diaphragm. In both cases, the drugs used to relieve the pain would be classified as an analgesics, yet their modalities of action would radically differ: one would be a phlegmagogue, while the other would be a diuretic. This dual classification then seems to be the result of careful scrutiny and reflection by the authors of the Corpus.

The classification scheme in the lost text *Pharmakitis*, or any other general pharmacopoeia, would reflect this dual scheme. A reconstruction from this lost pharmacological text might display phlegmagogues, cholagogues, diuretics, warming agents, and cooling agents all subsumed under the general symptomologic classification of analgesic.³⁰³

Few treatises give ingredients for analgesics, except *On Diseases III*, 16:

flower of copper, 1 olive
silphium juice, 1/2 olive
clover seed in honey, 5 corns

or

pepper, 5 corns
silphium juice, 1 bean
honey
vinegar
water

V.2.9 Warming Drugs

Indication

Drugs which warm the body are designated by either a (1) adjective modifying *pharmakon* or (2) though a verb which describes the action of the drug itself. No qualifications are inserted in prescription of warming agents.

θερμαντηριοισι φαρμακοισι	<i>Places in Man</i> , 27
διαθερμαινειν	<i>Places in Man</i> , 22
χλιαροισιν	<i>On Diseases II</i> .26

Mode of Administration

³⁰³ Subsumed under analgesics would be purges (esp. Black hellebore and peplium, *On Regimen in Acute Diseases*, 13; *Places in Man*, 20), phlegmagogues and cholagogues (*On Affections*, 7), diuretics (*On Affections*, 28), warming agents (*Places in Man*, 17), expectorants (*Places in Man*, 26).

Most warming agents are administered orally.³⁰⁴

Procedures, Theoretical Assumptions, and Illustrations

Warming drugs, like analgesics, are often associated with another drug category.³⁰⁵ A prescription in *Places in Man*, 22, offers a fine summary of a warming agent:

Warm the inside of the body by employing warming medications which are taken orally; [these warming agents] formed an exit because of the heat.

³⁰⁴ *Places in Man*, 22: "Warm the inside by employing warming medications which are taken orally (πιπίσκοντα). Cf. *On Diseases* II.26 for use of warming agents as gargles.

³⁰⁵ *Places in Man*, 17: analgesic/warming agents; *Places in Man*, 27: anti-pyretic/warming agent (this is an interesting use of warming agents, since it documents one of few examples of the doctrine of *similia similibus curantur*).

V.3 Classification Schema

TABLE V.1: Internal Drugs

purge	ὑπεκχωρητικά, διαχωρητικά, καθαρτηρία, καθάρων, περικαθήρα, ὑποκαθάρσιν, ἐλατηρίον φαρμάκων
cholagogue	χοληγάγα, χοληγαγικόν, φ. ὅ τι χολήν καθαιρεί, φ. ἀνωθεν ἤγαγε χολώδεα
phlegmagogue	φ. ὅ τι φλέγμα ἀγει
diuretic	διουρητικόν, ουρητικόν
cooling agent	ψυχτικά, φ. ψυχουσι, φ. ψυχτηριῶ, ἀποθερμιόν
warming agent	φ. θερμαντηρόν, χλιαρόν
drying agent	φ. ξηραίνοντα
expectorant	φ. ἐπαναχρεμπτηρίον, ποιεύοντα ἀναχρεψίν
analgesic	φ. τῆς ὀδύνης, παύοντα τῆς ὀδύνης
emetic	φ. ἐμετικόν
emmenagogue	κατασπαστικόν, καθαρτικόν καταμήνιων, γυναικειῶν ἀγωγόν
sleep-inducing agent	φ. ὕπνου
anti-pyretic	φ. οἷσι μεταστῆσεται ὁ πυρετός ἢ ἀπολείψει
strengthening agent	ἐνισχυόν
hemostatic	στυπτικόν, πυχυσμόν
anti-diarrheal	φ. στασιμα
anti-inflammatory	ἰσχναινόν

TABLE V.2: Mucosal Drugs

emollient	φ. μαλθακον
putrefacient	φ. σηπτηριον, σηπτικον
warming agent	φ. θερμαντηριον
emmenagogue	κατασπαστικον, καθαρτικον καταμηνιων, γυναικειων ἀγωγον
abortive	πεσσον φθοριον, ἀποφθαρμα, ἐκβολιον

TABLE V.3: External Drugs

cooling agent	ψυχτικα, φ. ψυχουσι, φ. ψυχτηριω, ἀποθερμον
emollient	φ. μαλθακον
drying agent	φ. ξηραινοντα
putrefacient	φ. σηπτηριον, σηπτικον
agglutinative	παρακολλησει
depilatory	[clause preceding ingredient list]
anti-suppurative	[clause preceding ingredient list]
contracting agent	στρυφνον, στύφον
tearing	φ. ὅ τι πλειστον αγειν δακρνον μελλει
wetting drugs	φ. ὑγραινοντας
enHEME	ἐναιμον

CHAPTER VI:

Pharmacological Theory in Pseudo-Aristotelian *Problems*



VI.1 Introduction	105
VI.2 Background	106
VI.3 Theoretical Assumptions of Drug Use	107
VI.4 Theoretical Concepts in <i>Problems</i>	117

VI.1 Introduction

The Hippocratic physicians and their publications should not be regarded as the only source of contemporary pharmacology in the fifth and fourth centuries. Medicine during these centuries exhibited a high degree of pluralism; the members of the medical community themselves and their theories varied considerably. The Hippocratic collection makes little mention of this variety of medical caregivers and instead asserts the supremacy of the Hippocratic *iatros*.³⁰⁶ A judicious investigation into Hippocratic pharmacology, then, must include some non-Hippocratic tracts on pharmacology. The closest extant discussion of pharmacology is found in the first chapter of the fourth century Pseudo-Aristotelian text, *Problems*. While this text is theoretically founded in Aristotelian biology, it betrays similarities to Hippocratic pharmacology and its original source as well.

This chapter examines the pharmacology of *Problems* in an attempt to supplement what few explicit theoretical statements of pharmacology exists in the Hippocratic corpus. Since *Problems* was contemporary with later Hippocratic medicine, the theoretical foundations explicitly enumerated in *Problems* might offer clues to the pharmacology in the Corpus Hippocraticum.

³⁰⁶ The Hippocratic texts themselves are highly polemic and agonistic. Not only do they exclude any mention of other members of the 5th century medical community (e.g., the drug-sellers, *pharmakopolai*, and root-cutters, *rhizotomoi*), but they are also an extremely heterogeneous group themselves. They differed not only in methods of care or in theoretical doctrines, but also regarding the aims and goals of medicine itself.

VI.2 Background

Few extant texts of the Hippocratic period provide insight into the theoretical foundations of pharmacology with the exception of the pseudo-Aristotelian tract *Problems*³⁰⁷. The first chapter of this variegated work offers a judicious and systematic presentation of drug theory found nowhere in the Hippocratic writings. Here, one finds a valiant attempt by a Peripatetic author to define the basic assumptions underlying drug therapy. Posing numerous questions about drugs and their mechanisms of action establishes a forum for the author to expound a reasonable synthesis of contemporary thoughts on pharmacodynamics.

Problems stands in a long tradition of Peripatetic works beginning with Aristotle (fl. 367-347 BC) and continuing into the first century AD, making the dates of this tract highly problematic.³⁰⁸ The 38 books or sections of this work, each of which is dedicated to a set of problems concerning a given, usually biological, theme, are unquestionably the product of a collaborative effort by Peripatetic scholars from the Lyceum. Each chapter begins with a "why?" question, and the answers proposed often take the form of another question: is it that so and so, ἢ ὅτι...? This method, however, should not be seen to corroborate any genuine tentativeness of the answers offered. In many instances, the author grants unquestionably that many answers are quite evasive, yet other instances afford a thorough presentation of a rational, coherent explanation. Aristotle was unequivocally not the author of this text as it has come down to us. Most probably, the extant text is a collective effort involving continual modification and addition by Peripatetic thinkers directly into the fifth century AD. The uncertain chronology and

³⁰⁷ See Scarborough (1983), 308-12, Scarborough (1991), 152. For a more thorough evaluation, see Touwaide (1993), 350-53. Few scholars have considered *Problems* worthy of inclusion in the pharmacological texts of antiquity.

³⁰⁸ Hett (1926), xi, outlines the evidence for assuming that Aristotle was not the author of *Problems*. He suggests that the original form of the book was a lecture notebook containing problems for discussion, to which many additions were made by the Peripatetics over time. Hett believes this would account for the frequent contradictions evident throughout the work.

transmission of *Problems*, especially the possibility of its modification through the 5th century AD, signals caution in generalizing or extrapolating to any theoretical assumptions in the Hippocratic Corpus. It would be equally rash to assume the theory proffered in the *Problems* has remained homogenous and static.³⁰⁹ Nevertheless, *Problems* originated within the tradition of Hippocratic pharmacology, following shortly after the traditional period of Hippocratic medicine to which we commonly ascribe the construction of "Hippocratic" medical theories. The first chapter of *Problems* betrays a striking similarity to the Hippocratic tract *On Airs, Waters, Places*³¹⁰, and the author of the *Problems* begins with a proposition that had been asserted dogmatically in it.³¹¹ *Problems*, therefore, is an relevant text to examine in hopes of reconstructing how the Hippocratics understood the functions of drugs.

VI.3 Theoretical Assumptions about Drug Use

The first book of the *Problems* begins by asking why some drugs "relax" (λύει) the stomach and not the bladder, while others "relax" the bladder and not the stomach:

Why do some drugs relax the stomach, but not the bladder, while others relax the bladder, but not the stomach? Is it because all medicinal foods, which are naturally wet and full of water, relax the bladder? For there, all the undigested wet matter collects, for the bladder is the receptacle of all undigested moisture in the stomach, which does not remain there, but drains away before

³⁰⁹ The homogeneity of pharmacology within the Corpus Hippocraticum is problematic itself. Searching for similarities among disparate theories of drug function among authors of the Corpus denies Hippocratic medicine the agonistic spirit common to the rhetorically charged era of fifth and fourth century BC.

³¹⁰ Lloyd (1987), 156. *On Airs, Waters, Places*, 10, begins: "If the winter be dry, with northerly winds prevailing, and the spring wet, with southerly winds, the summer will necessarily be feverish and productive of ophthalmia." With this, compare *Problems* 1.8: "Why is it that, when the north winds have been prevalent in the winter, if the spring is wet, with southerly winds, the heat will be necessarily twice as great?" The proposer resolves the problem with reference to "stifling heat," πνίγος, as did the medical writer. This congruence, however, cannot be taken as evidence that the author(s) of *Problems* were familiar with the Corpus and its theories.

³¹¹ Lloyd (1987), 155-7. Lloyd cites *Problems* in discussing the ancient tendency to articulate the difficulties of uncertainty in an inquiry of natural science. Lloyd concludes that it is often recognized in *Problems* that no satisfactory answer to a question exists within the bounds of ancient scientific explanation and that a dogmatic tendency is strikingly subordinated to a willingness to consider alternatives and offer new ideas. "It would be a mistake to dismiss the whole question-posing approach as mere window-dressing, a superficial veneer masking what are essentially dogmatic attitudes."

producing or undergoing any action. But all medicinal foods which are earthly by nature relax the stomach, for into the stomach passes all earthy matter.

(*Problems*, 863b29-

864a2)

The author explains this specificity by introducing the all-important Theory of Elements³¹², which, together with humoral pathology and the Theory of Qualities, underlies Hippocratic medicine: those drugs that are wet and full of water "relax" the bladder because the bladder is where wet matter collects; similarly, drugs that are earthy "relax" the stomach because that is where earthy matter collects.³¹³ In this physical theory, matter has the capacity of moving toward a similar element, as would water to the bladder (which is of a watery nature). Drugs, then, can be classified by their respective elemental forms which define their *locus operandi* within the body.

Qualities	Elements
hot	earth
cold	fire
wet	water
dry	air

³¹² See Lloyd (1979), 34ff., for a discussion on the origin of the Theory of Elements: "Empedocles reinstated sense-perception and interpreted coming-to-be in terms of the mixing and separating of the four 'roots', earth, water, air, and fire." Empedocles' statement was the first clear explanation of an elemental theory. Lloyd claims that his theory was "the most influential physical theory not only in antiquity but throughout the Middle Ages and right down to the seventeenth century." The qualitative theory of Aristotle explains both matter and its changes through a simple system of four elements: fire, air, water, and earth. Aristotle is able to describe all matter assuming that these four elements are but a combination of two of four elemental qualities (hot, cold, moist, dry). By further assuming that every quality can be replaced by its opposite through the action of another body, he is able to explain the transition of one element into another. The ultimate elements of the perceptible physical world are thus not corporeal, but are perceptible as the sensible qualities of heat, cold, humidity, and dryness. Particularly important in Aristotle's theory is heat, which is responsible for all growth and vital function. Plants and animals, then, must have some natural source of heat in them. See also Sambursky (1962), 34-44, for a thorough discussion of Aristotle's theory of qualities and later modifications of this theory.

³¹³ *Problems*, 863b30: ἢ ὅσα μὲν ἐστὶν ὑγρὰ τὴν φύσιν καὶ ὕδατος μεστά, ταῦτα ἂν ἢ φαρμακῶδη, λύει τὴν κύστιν. ἐκεῖ γὰρ ὑφίσταται τὰ ἀπεπτα τῶν ὑγρῶν. ("Is it because all medicinal substances, which are naturally wet and full of water, relax the bladder; for there is where all undigested wet matter collects?")

The Theory of Elements, however, is incapable of providing a complete explanation for a drug's action according to the author of *Problems*. The Theory of Qualities, known from a long history of Greek philosophy going back to Anaxagoras³¹⁴, further specifies a particular drug's *locus operandi* within an anatomical region. The hot drugs (*therma*), because of their heat (θερμότητα), move from the upper part of the stomach to the upper anatomical region where they melt anything foreign to them (συντήξαντα ἀλλοτριώτατα). Similarly, drugs which are cold (*psuchra*) descend into the lower regions from the lower part of the stomach because of their weight (βάρος). These cold drugs, however, make their way through passages (πόρους) into the upper regions of the body where they act similar to hot drugs. Drugs of a mixture of these properties (i.e. hot and cold) share these qualities. Even though Hippocratic medicine is essentially humoral and subordinates health maintenance to the equilibration of bodily fluids, in *Problems* anatomy and physiology establish a foundation for pharmacology. Thus far, the pharmacological theory in *Problems* has specified the anatomical region where drugs will act and has ignored the means by which the drug causes its effect.

Important in the milieu of Peripatetic thinking was the notion of “power” (δύναμις), which can be understood as “property” within the context of pharmacology³¹⁵.

³¹⁴ Cf. *Nature of Man*, 5; see esp. Lloyd (1964).

³¹⁵ Cf. *Ancient Medicine*, 16, where the most significant *dynameis* are hot and cold. In this case, *dynamis* refers to “elemental force.” In the context of pharmaceuticals, Theophrastus, *Inquiry into Plants*, 8, 11.1, and 9, offer examples of the use of *dynamis* in pharmacodynamics. See also Scarborough (1983), 309. According to Touwaide (1993), 353, while the term *dynamis* appears in the *Corpus Hippocraticum*, only with Diocles does it attain its true Aristotelian meaning.

The author of *Problems* qualifies a drug's efficacy with a statement about its *dynamis*: if it has the power (*dynamis*) of producing any motion, it upsets the stomach.³¹⁶ *Dynamis* appears to encompass all the properties of a drug, both elemental and qualitative, and is an accurate measure of its effectiveness within the body. While later medical authors use the term much more extensively and comprehensively, especially Dioscorides, earlier writers, the author of *Problems* included, employ this term without any concrete specificity.³¹⁷ Although the term *dynamis* is used in the context of pharmaceutical properties, *Problems* also contains the term *arete* to describe the properties of drugs, in this case a styptic.³¹⁸ In sum, *Problems* offers an explanation for the specificity of drugs and suggests a measurement of their pharmaceutical action: the innate elemental nature of certain drugs is responsible for their attraction to similarly composed anatomical regions where, if their properties (*dynamis*) are such, they cause movement (*kinesis*).

The author of *Problems* has established a pharmacology based on the Theories of Elements and Qualities which conceptualize a drug's *locus* of action in the body. This formulation, however, is not specific enough to differentiate between foods and drugs, an important distinction in light of certain Hippocratic authors who emphasized either dietetic or pharmacological treatment of disease³¹⁹. The author finds it puzzling that some drugs

³¹⁶ *Problems*, 864a2.

³¹⁷ See Scarborough (1983a), 309. See also Touwaide (1993), 350ff.

³¹⁸ *Problems* 863a13: τίς ἐναίμου ἀρετή. ("What is the power of a styptic?").

³¹⁹ The distinction between dietetic (*diatetike*) and drug (*pharmakeutike*) therapy is not entirely clear in the *Corpus Hippocraticum*. Lonie (1977) argues that dietetic therapy existed before the fifth century in a much weaker form, but gained importance during the fifth and fourth centuries, to the extent that in later texts, *diata* encompasses the entire treatment of disease, including drug therapy. Some Hippocratic tracts employ more dietetic treatment, while others focus on pharmaceutical therapy. See also Goltz (1974) who argues for the development of dietetic treatment based on the greater instances of the word *dieteta* in later works (e.g. *Diseases in Woman* 1.66 and *Places in Man*, both of which have been argued to be later texts). The distinction between food (*trophe*) and drug (*pharmakon*) is not clear-cut in practice or in theory. For instance, while honey can be used as a sweetening agent (food), it also functions as an ingredient in many compound drug preparations. The author of the *Problems* maintains that drugs are the opposite of foods (ἐναντίον εἶναι τῇ τροφῇ τὸ φάρμακον, 864b7) and remarks that "what is naturally digested becomes part of the body and is called a food." While the author recognizes the distinction between food and drug and consciously attempts to explain these separate categories theoretically by suggesting that foods are digested while drugs are not, the ambivalence is by no means resolved in practice: foods still make their way into the drug category, and drugs cross the line to foods. Stannard (1961), 512, concedes that distinguishing foods from drugs is a "problem," and maintains that

are purgative (καθαίρει), yet substances that surpass these drugs in astringency (πικρότερα) and bitterness (στρυφνότερα) do not act as purgatives. Based on the Theories of Elements and Qualities, substances that exhibit a bitter nature should be stronger in their pharmaceutical actions than milder substances. While the Theories of Elements and Qualities provided an explanation for a drug's *locus* of action, nothing clearly defines the difference between drugs and other substances. Not all substances are drugs, and *Problems* seeks to establish a physiologically based criterion for discriminating a drug from other ingestible materials (including foods). Pivotal in explaining this food/drug dichotomy is the concept of coction or digestion³²⁰. While some substances have the elemental and qualitative properties of a drug, they are not pharmacologically active since they become digested in the stomach and follow the course of foodstuffs, eventually becoming assimilated into the biological organism with the action of innate heat. Drugs, on the other hand (1) remain undigested (ἀπεπτά), (2) are easily dissolved by the two parts of the stomach (εὐδιάχυστα ὄντα ὑπὸ τῶν δυο κοιλιῶν)³²¹, and (3) master the heat of the living organism (κρατεῖν).³²² In this way, drugs can maintain their qualitative and elemental properties against a natural tendency toward thermal breakdown and assimilation. The pharmacology of *Problems* recognizes that foods often produce the

the distinction is "purely a pragmatic one: if an item is administered to a sick person with a curative aim, regardless of its mode of administration and the nature of the complaint, it is *ipso facto* a drug." Such a pragmatic interpretation, however, fails in light of textual evidence suggesting a much more complicated distinction between food and drug; cf. *On Internal Affections* 17: Ἦν δὲ βούλη ἄνευ φαρμάκων ὑγιᾶ ποιῆσαι, παχύν ποιῆσαι ἀπὸ τῆς διαίτης, ἦν τε ταύτην τὴν νοῦσον κάμνη, ἦν τε τῶν προτέρων τινά. ("If you wish to cure a patient without drugs, whether he is suffering from this particular disease or from one of the ones above, first fatten him through a regimen.")

³²⁰ Coction (*pepsis*, of which a more appropriate translation would be "cooking," "maturation," or "digestion") itself is derived from the ancient Greek concept of cooking. Although coction includes fermentation, the term *zymosis* (from which biochemists have derived the word "enzyme") is more appropriate for the process of chemical fermentation. See Majno (1991), 938 and notes. *Pepsis* is an important step in the healing process, eventually leading to *krasis* of the four humors. Jones (1923) suggests that *pepsis* blends the concepts of mechanical and chemical digestion. Cf. *Ancient Medicine*, 18-19, for the function of *pepsis* in the equilibration of the four humors and in recovery from disease.

³²¹ The "two stomachs" here recall Hippocratic anatomy which refer to the terms "upper" and "lower cavity," referring, respectively, to what is held to be above and below the diaphragm inside the body's trunk; see, e.g., *Aphorisms* 4.18, *On Diseases* I.19, *Nature of Man*, 12.

³²² Aristotle believes that the innate heat of a living organism is responsible for its metabolic activities. Everything that grows must ingest and assimilate food to remain alive.

same observable effects as drugs, but realizes that they do so through a different physiological mechanism. Foods are typically digested and mastered by the organism. Food in excessively large quantities, however, cannot be completely absorbed by the two stomachs. Foods, then, can then act as drugs strictly because of their quantity (τῶ ποσῶ) and not because of any inherent quality (τῶ ποιῶ).³²³ Metals are also denied the status of drugs. Bronze, silver, and the like, although digested and potentially drugs, are not absorbed by the two stomachs (οὐκ εὐδιάχυστα ταῖς κοιλίαις).³²⁴ Furthermore, the *Problems* recognizes that digestion is not identical in all organisms, and accordingly some people digest things more easily (ἄλλοις εὐπεπτα), and others with more difficulty (δύσπεπτα). Recognizing the variability in digestion neatly explains why similar drugs produce different effects. This disquisition on digestion defines a drug within the larger context of ingested materials as a substance that is not digested, which is absorbed by the stomach, and which is not overcome by the internal heat of the organism, all of which are essential functions of digestion and assimilation of food. In sum, the authors of *Problems* provided a theoretical explanation for the difference between foods and drugs by appealing to the physiological process of digestion.

The theory of digestion proposed in *Problems* is founded in the Aristotelian concept of digestion explained in *Parts of Animals* 650a ff. Aristotle describes how food, supplied by solid and liquid matter, is digested and transformed into blood through the internal heat of the stomach (διὰ τῆς τοῦ θερμοῦ δυνάμεως). Although other anatomical

³²³ The author maintains that substances are not digested for either of two reasons: quality (διὰ τὸ ποιῶ) or quantity (διὰ τὸ ποσῶ, 864b3-4).

³²⁴ Metals are neither digested substances (ἀπεπτά) nor pharmacokinetic. Substances that are not digested, then, can not readily be classified as drugs, since they also need to be absorbed into the body from the stomach. Cf. *Problems*, 863a25ff.: "...the bronze itself has curative (φαρμακῶδες) properties...so the drug [bronze], acting at the moment of cutting, makes it [wound] heal more quickly." This statement is not consistent with the theory offered just a few lines later which restricts metals from being classified as drugs because of the stomach's inability to absorb them. This inconsistency could be resolved by not requiring topical remedies to be absorbed, but allowing them to pass through the wound into the body. I would be cautious in accepting this resolution on two accounts: (1) the pharmacology offered in *Problems* does not distinguish between topical and oral remedies; (2) *Problems* itself is not a homogenous text, but an incongruous notebook spanning centuries; inconsistencies reflect not so much a ill-defined theory but rather the heterogeneity of the text itself and its turbulent transmission.

regions assist digestion, the stomach contains the natural heat which allows successful digestion. The stomach and related intestines are viewed as large receptacles from which the body draws nourishment, just as the earth provides unlimited nourishment to plants. The blood vessels (αἱ φλέβες), likened to the roots of plants, transport the digested food (now blood, the end-product of digested food) to all parts of the body through extended structures. *Parts of Animals*, then, provides the foundation for the theory of digestion and metabolism of food which *Problems* taps in expounding its pharmacology.

Important in the theoretical backdrop of drug use is an understanding of the modality of action of these pharmaceutical agents. In general, *Problems* suggests that drugs cause a disturbance (ταράττον) in the body. Specifically, though, two modalities of action are presented, each conforming to the overall assumption of a drug as a disturbance: (1) drugs carry obstructions with them as they pass through the body (864a34); and (2) drugs move waste products and melted substances out of the body (864a18-9). In each of these modalities, the drug is conceived as an active motive agent and acts by extruding pathogenic material. Essentially, *Problems* subscribes to a pharmacodynamics based on purgation. Drugs in this theory of pharmacodynamics are not static agents of therapy, but move throughout the organism and expel disease material in their course. The removal of this pathogenic material presupposes a nosology in which disease is considered the accumulation of waste products and obstructions. Furthermore, this theory presupposes some internal vascular system through which the drugs pass and in which the pathogenic material resides.³²⁵ Expulsion of these tangible entities is the manifestation of a drug therapy theoretically rooted in unobservable physiological processes.

Although *Problems* does not necessarily follow the traditional Hippocratic nosology in which disease is considered the imbalance of humors and the equilibration of

³²⁵ The author of *Problems* presents a drug theory which presupposes an internal system of passages but which does not necessarily demand a coherent concept of a vascular system. It does suggest, however, that a crude idea of some sort of internal communication system was present.

these fluids constitutes the *modus medendi*, it is extremely surprising that no hint of humoral pathology enters this Peripatetic description of pharmacology. The entire pharmacology is founded on the understanding of disease as pathogenic obstruction. Therapeutic management of diseases, then, takes the form of purgation and does not require any humoral equilibration. While the waste products (*perittomata*) could be construed as dried blood, phlegm, or bile, the procrustean violence needed to establish this implicit connection is far too great. Aristotle's theory of digestion, which stresses the importance of the innate heat of the organisms which is responsible for not only food digestion and assimilation but also for the production of the reproductive faculties of the two sexes, underlies the pharmacology in *Problems*. No recourse to a humoral pathology is necessary, and would only obfuscate the theory itself.

The underlying nosological doctrine in *Problems* resembles the theory of *perissomata* ascribed to Euryphon in the *Papyrus Anonymous Londinensis*:

"Euryphon of Cnidos, for example, thinks that diseases are caused in the following manner. "When the stomach does not discharge the nutriment that has been taken, residues are produced, which then rise to the regions around the head and cause diseases. When, however, the stomach is empty and clean, digestion taken place as it should; otherwise, what I have said occurs."

(*Papyrus Anonymous Londinensis*, IV.31-

40)

The putrefaction of feces leads to an intestinal residue which rises and causes disease in various anatomical regions. Within this theoretical understanding of diseases, the logical therapy would include purgative substances which could eliminate the pathogenic obstruction. In Aristotelian biology, *perissomata* are directly related to the process of *sepsis*, or putrefaction of feces.³²⁶ There was a consciousness of the decomposition of nutriment and its pathogenic importance. *Sepsis* is the ambivalent final stage of digestion which is both necessary for the maintenance of health and implicated in pathogenesis. *Perissomata* contained a destructive quality (*dunamis phthartike*) which was actually

³²⁶ Steuer (1959), 7ff.

responsible for disease. Early Hippocratic pharmacology likewise forms a pharmacology based on the nosological doctrine of *perissomata*.³²⁷

The ambivalence surrounding the use of *pharmakon*, exemplified in the term's dual meaning as both a drug and a poison, is resolved in *Problems* on the basis of therapeutic effectiveness. No longer does *pharmakon* vacillate between magic, religious, and medical connotations, but instead takes on a specifically defined purpose as a agent involved in the elimination of pathogenic material. Substances that are deadly in even small quantities are not classified as drugs, but are instead defined as poisons (θανατηφόρα). Even though *Problems* recognizes the detrimental, and often fatal effects of drugs taken in large doses, this does not permit a drug to assume the dual role of poison/healing agent.³²⁸

The sustained use of the same drug was considered poor practice by the author of *Problems* who advised that certain drugs be changed in treatment so that they do not become foods. Implied in this admonition could be the modern concept of tachyphylaxis, the diminishing effectiveness of some pharmaceuticals after continued use. Occasional observation, rather than directed empirical research, was probably responsible for this awareness of tachyphylaxis.³²⁹

³²⁷ As was shown in chapter III, early Hippocratic physicians can be considered to have a pharmacology since they saliently restricted a large folk medical pharmacopeia to only purges. This limitation was forced by the physiological doctrine of *perissomata* which only allows purges in the therapeutic maintenance of health.

³²⁸ A clear idea of drug, represented in its broadest meaning as *pharmakon*, is first discerned among the Greeks in the Homeric epics. The word means "drug", "magic", or "poison" standing alone, yet is qualified by certain adjectives. The wide semantic spectrum which *pharmakon* spans is illustrated by the diversity of meaning within the *Odyssey* alone: the *pharmakon allo* which Circe administered to change Odysseus' men back to their proper forms is contrasted with the *pharmakon oulomenon* which transforms them into swine. For uses of *pharmakon* as "poison", see Thucydides II.48; Plato, *Phaedo*, 115a; *Od.* X, 394 (*oulomenon p.*); I, 261 (*andraphonon p.*).

³²⁹ *Tachyphylaxis*: diminished response to increments in a sequence of applications of a physiologically active substance. This modern pharmacological concept was adumbrated in *Problems*. For a discussion and bibliography on the use of experiment in ancient science, see Lloyd (1991), 70f., who contends that the appeal to experimental research was more aligned toward corroborating a theoretical point of view (as in law courts) than in supporting a hypothesis or arriving at new information. The concept of tachyphylaxis originated from the experience gained with pharmaceuticals (and probably also from ethnopharmacology which most likely also observed this effect), rather than any sustained research effort.

The theory presented in *Problems* is not exceptionally complex, nor flawed by many incongruities and contradictions symptomatic of later pharmacological theory.³³⁰ This allows the author to summarize the main points of the pharmacological theory at the conclusion of the section:

For what is naturally digested becomes part of the body and is called a food; but what is not of a nature to be mastered, but enters into the veins and because of its excess of heat and cold causes disturbance, this is the nature of a drug.³³¹

(*Problems*, 864b7-12)

In sum, the author of the Peripatetic text *Problems* formulates the theoretical assumptions for pharmacology based in part on contemporary philosophical dogma and Aristotelian biology. The Theories of Elements and Qualities, dictating a drug's qualitative nature (i.e. hot, moist, and earthy), modulate the drug's place of action within the body. The theory of digestion adopted from Aristotelian biology resolves the traditional conflict between a food and a drug and establishes a drug as a substance that is not digested. Two further requirements, that a drug not be overcome by the innate heat of the living organism and that it be easily digested by the two stomachs, conclude the definition of a drug in its most specific case. According to *Problems*, drugs act by expelling pathogenic material as they travel through the body, essentially limiting the modality of drugs to purgative functions. An admonition against tachyphylaxis and the resolution of ambivalence

³³⁰ Later attempts by medical writers to establish the foundations for drug action led to the complex amalgamation and adulteration of various pre-existent theories which resulted in a complex and contradictory set of explanations. *Problems*, however, is not free from incongruities with a very complicated and contradictory explanation for the actions of two drugs following the neat presentation of drug theory (864b13ff.). The author asks why pepper in large quantities relaxes the bladder, but in small quantities the stomach, while scammony in large quantities relaxes the stomach, but in small quantities and when it is old, the bladder. The explanation proffered assigns diuretic properties to pepper and purgative to scammony. The author states that the pepper in small quantities is mastered by the stomach, relaxes the stomach, and thus acts on it as a drug. Similarly, the scammony in large quantities is mastered by the stomach, dissolved, and acts like a drug too. A fundamental contradiction is at once obvious to the astute reader: a drug by nature is not digested, not mastered by the heat of the organism. Both pepper and scammony retain pharmaceutical activity after having been mastered by the heat of the body. After such a neat presentation of drug actions, this patent inconsistency questions the possibility of any practical application of the theory.

³³¹ *Problems*, 864b7-12: τὸ μὲν γὰρ πεφθὲν ὑπὸ τῆς φύσεως, τοῦτο προσφύεται τοῖς σώμασι καὶ καλεῖται τροφή. τὸ δὲ μὴ πεφυκὸς κρατεῖσθαι, εἰσιὼν τε εἰς τὰς φλέβας καὶ δι' ὑπερβολὴν θερμότητος ἢ ψυχρότητος ταραττον. Αὕτη δὲ φαρμάκου φύσις ἐστίν.

surrounding the term *pharmakon* occupy less prominent, but still important position in the pharmacology of *Problems*. This Peripatetic text, although fraught with numerous incongruities, offers a very comprehensive and simple definition of a drug and the reasons for its action in the body.

VI.4 Theoretical Concepts in *Problems*

The theoretical assumptions upon which the pharmacology in the *Problems* is based includes some interesting concepts that must be recognized in light of the scientific revolution³³² of Greece. *Problems* employs unobservable physiological mechanisms to account for the action of drugs. Practical observation would not suffice in providing an explanation for the effects of drugs; needed was a nexus with internal phenomena visible only to the powerful and dangerous tool of the *gnomes opsei*, the sight of the mind. Since no research method existed to provide suitable information on the action of drugs for these ancient scientists, they were required to entertain the option of employing physiology and natural science to account for pharmacodynamics. Their resulting pharmacology, however, did not suffer from the complexities and impracticalities common to many natural science inquiries and theories, but rather sustained a balance between intelligibility and usefulness.

Defining the difference between a food and a drug occupied an important place in the pharmacology of *Problems*. Discriminating a drug from the various foodstuffs was problematic, especially when some foods caused the same effects as drugs. In resolving this ambiguity, *Problems* marginalized a definition based on effect to one mediated by physiological processes. A drug was no longer a drug because of its active therapeutic properties, but rather because of its modality of action within the physiological system. Again, deferring a problem to an unobserved physiological mechanism, in this case

³³² I hesitate in my use of this term "scientific revolution," but offer it with reservations. For a thorough analysis of the claims and practices of ancient Greek science, see Lloyd (1987).

digestion, allowed the author to provide a firm definition of drug as a substance which is not digested, absorbed by the two stomachs, and not overcome by the heat of the living organism.³³³ Yet, marginalizing the "observable" effectiveness of drugs and instead relying on unobservable physiological processes to define a substance as a drug is problematic if not understood within the context of this Peripatetic work and Greek science in general. In the Greek scale of values, the theoretician was always superior to the technologist.³³⁴ The fifth-century concern with foundational problems, not to mention the agonistic spirit sustained by the law court experiences of most citizens in a *polis*, led to overemphasizing the theoretical explanation in light of practical experience. The rationalist doctors of the fifth century prided themselves on being able to explain the effects of drugs theoretically and were not content with merely empirical remedies in the modern medical sense of the term.³³⁵ Sustaining this tradition, the author of *Problems* finds it more worthy to set forth an account of pharmacokinetics which relies on the hidden physiological process of digestion. A drug could not be defined, then, on the basis of its efficacy, since that is an appeal to empirical observation which has no need for a medical theorist. The definition must be based in the curiously wrought pharmacology offered by the author, a product of the dominant ideology in ancient science.

The theoretical foundations for drug action offered in *Problems* might have been easily confirmed by experience, especially since most drugs were purgative in nature. The often wide gap between theory and practice, especially in some later medical writers, is not present in this disquisition. The modality of action of a drug in *Problems* -- the elimination of pathogenic material -- can easily be substantiated by observable effects of

³³³ This problem of the firm distinction of drug from the various foodstuffs was not resolved by *Problems*, yet persisted, and is recognized by Galen, *De alimentorum facultatibus*, VI, 468:

³³⁴ Lloyd (1991), 140.

³³⁵ Lloyd (1987), 99. Lloyd argues that the fifth-century ideology compelled physicians to engage in highly theoretical, epideictal arguments about the foundations of their medical art, eschewing any empirical data or therapeutical effectiveness. Thus, the goal of such "medical scientists" was to find a neat, sometimes quite arbitrary, theory to explain the effects of drugs, for instance, and to not to be concerned with the effectiveness of certain remedies.

drug treatment. A patient given black hellebore as an emetic would undoubtedly experience diarrhea. The practicality of this theory rests not so much in the rationality of the theory itself, but in the natural purgative effects of most ancient pharmaceuticals which appeared to confirm the theory to most medical scientists.

In sum, the author of *Problems* sustains the spirit of the fifth-century "medical scientist" in offering a theoretical foundation for a drug's action based in the unobserved physiological processes of digestion and vascular transport. The nature of ancient science conditioned the theoretical foundations by emphasizing the importance of the theoretician.

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LSJ = Lidell, Scott, and Jones. *Greek Lexicon*.

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