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CHAPTER ONE

Grasping the Language of Life

Why hath not my soul these apprehensions, these presages, these changes, these antidates, these jealousies, these suspicions of a sin, as well as my body of a sickness? Why is there not always a pulse in my soul to beat at the approach of a temptation to sin? . . . I fall sick of sin, and am bedded and bedrid, buried and putrefied in the practice of sin, and all this while I have no presage, no pulse, no sense of my sickness.

— John Donne, “Devotions upon Emergent Occasions”

The truth about people is hard to know.

There is much that they will not say, and much of what they say is only partly true. There is also much that people simply cannot say, because they themselves don’t know, because many realities defy introspection. We are in the dark about the state of our souls, John Donne laments. Turning the mind’s eye inward, we sometimes find even our bodies opaque. We may be sick without knowing why, or in what way, or how seriously. We may be sick, even, with no sense of sickness.

Donne hints that there is a difference, though, between bodily

disorders and the diseases of the soul. Of the latter we have no inkling, no sign, our ignorance is complete. The former, by contrast, affords us “jealousies and suspicions and apprehensions of sickness before we call it a sickness” — though these are only vague premonitions, though “we are not sure we are ill.” What’s more, we possess a way to solve our doubts. One hand can ask “the other by the pulse . . . how we do.”¹ Because of the pulse, we can know the body in a way that we can never know the pulseless soul.

Once upon a time, the stirrings of the arteries commanded rapt attention. If John Donne brooded over what the pulse failed to tell him, most marveled instead at its unique revealingness. When Prince Antiochus was wasting away to the mystification of nearly all, it was again the pulse that confessed the cause. Fluttering wildly each time the prince’s beautiful stepmother appeared, it whispered to a clever doctor of the torment of love, unspeakable yearning.² To those who could hear its message, the pulse spoke truths about a person that the person himself or herself would not or could not say.

Especially could not say. People were intensely curious about the pulse because they were intensely curious about themselves, because there were many things that they didn’t know, but desperately wanted to know — such as why they felt ill, whether they would recover or die — and because they believed that the pulse could tell them.

In the second century B.C.E., in the earliest case histories of China, the sick summon Chunyu Yi not with vague pleas for succor, but with the specific wish that he come and feel their pulse. And that is just what the great doctor does. In each case, he arrives, straightaway grasps the pulse, then prescribes a remedy, explaining, “The way I knew the ailment is that when I felt

the pulse...”³ As if it were all a ritual, and his role was that of pulse interpreter.

Pulsetaking still defined the physician nearly two millennia later, when the novelist Cao Xueqin (d. 1763) portrayed the tangle of hopes and subtle suspicions that made this act so thick with meaning.

“Is this the lady?” asked the doctor.

“Yes, this is my wife,” Jia Rong replied. “Do sit down! I expect you would like me to describe her symptoms first, before you feel her pulse?”

“If you permit me, no,” said the doctor. “I think it would be better if I felt the pulse first and asked you about the development of the illness afterwards. This is the first time I have been to your house, and as I am not a skilled practitioner and have only come here at our friend Mr. Feng’s insistence, I think I should feel the pulse and give you my diagnosis first. We can go on to talk about her symptoms and discuss a course of treatment if you are satisfied with the diagnosis. And of course, it will still be up to you to decide whether or not the treatment I prescribe is to be followed.”

“You speak with real authority, doctor,” said Jia Rong. “I only wish we had got to hear of you earlier. Feel her pulse, then, and let us know whether she can be cured, so that my parents may be spared further anxiety.”⁴

For over two thousand years, in China, in Europe, and elsewhere too, people queried the pulse with passionate interest. In principle, Chinese doctors recognized four ways to judge a person’s condition — gazing (*wang*), listening and smelling (*wen*), questioning (*wen*), and touching (*qie*). In practice, however, their attentions concentrated mainly on *qiemo*, palpating the *mo*. Look at what they wrote: no monographs devoted to diagnostic listen-

ing or smelling; no essays on techniques of interrogation; over 150 works on the interpretation of haptic signs.⁵

We find a similar enthusiasm in Western medicine. In antiquity, the Greek physician Galen composed seven extended treatises on the pulse, filling nearly a thousand pages of his collected works. In the sixteenth century, Hercules Saxonia declared that “Nothing is or ever will be more significant in medical science.”⁶ Benjamin Rush reasoned for his part that if admission into Plato’s Temple of Philosophy required mastery of geometry, the gates to a Temple of Medicine should bear the inscription “Let no one enter here who is not acquainted with the pulse.”⁷ Even in 1878, an American doctor could still pronounce pulsetaking “the most valuable of all the devices to which a physician can resort,” and think himself echoing “the unanimous voice” of his colleagues.⁸

Things are different in modern medicine, of course. Past interpretations of the pulse’s murmurings have largely been exiled to the netherworld of antiquarian lore. So it is worth remembering: *some* telling connection binds pulsing and life. No one can doubt this.

A person with a beating pulse still lives. Someone whose pulse has stopped is dead. And we can check for ourselves, at our own wrists, that the pulse changes noticeably, and in distinctive ways, when we eat breakfast, or chase after a departing bus, or stand shivering in the rain. The question of how pulsing relates to life concerns not just the beliefs of people in distant eras and lands, but the logic governing our own lives, here and now.

In how many ways, and why, can, and does the pulse change? Julius Rucco once characterized the pulse as nature’s means of speaking to the doctor – the language of life.⁹ But what then is its grammar, its vocabulary? Doctors said that they knew. For two millennia, much of their authority to mediate between patients and their own bodies turned on their supposed mastery of this secret idiom.

Yet the languages mastered by Chinese and European physicians were not at all the same.

Seventeenth-century travelers to China marveled at the astonishing prowess of local healers, and especially at their exquisite feel for the pulse. The uncanny accuracy of their diagnoses bordered on the incredible. Chinese doctors, Thomas Baker concluded cautiously from missionary reports, apparently had “such skill in pulses, as is not to be imagined but by those that are acquainted with them.”¹⁰ “All the accounts of travelers,” remarks Diderot’s *Encyclopédie*, “agree in presenting the doctors of this country as wonderful (*merveilleux*) in this art.”¹¹ Cures like acupuncture and moxibustion were intriguing, too; but up through the nineteenth century, talk of medicine in China first called to mind this “skill in pulses.”

From the very outset, however, this art posed a conundrum. When Michael Boym’s (1612–59) Latin translation of the *Mojue* (a popular Chinese pulse manual) began to circulate in Europe, it left readers utterly baffled. “The missionary who sent this account,” commented William Wotton, “was afraid that it would be thought ridiculous by Europeans; which fear of his seems to have been well-grounded.”¹² Chinese tenets struck him as not just mistaken but absurd. They literally made no sense. The author of the *Encyclopédie* article, too, judged the exposé of Chinese doctrines “an impenetrable chaos.”¹³ Even John Floyer, perhaps the most enthusiastic early champion of Chinese medicine, had to concede that its teachings about the pulse were sometimes “very obscure” and “phantastical.”

Floyer urged, nonetheless, that the “absurd notions” of the Chinese were “adjusted to the real phenomena”;¹⁴ and he set out to “prove . . . that the Chinese have found out the real art of feeling the pulse.” After all, they got results.¹⁵ Floyer’s formula sum-

marizes the tension that long defined European assessments of palpation in China. In his authoritative text on the physiology of the pulse (1886), Charles Ozanam ridiculed Chinese pulse theory, scoffing that in them “the allegorical triumphs over the real.” But he also added: “One would be tempted to abandon its study were it not for the fact that the most reliable witnesses assure us that by their science of the pulse, the Chinese recognize and cure, sometimes with extraordinary success, the most recalcitrant illnesses.”¹⁶

Here then was a technique that looked so familiar, and allegedly worked wonders in practice, but whose discourse seemed completely alien and misguided. Travelers watched native doctors place their fingers on patients’ wrists and immediately recognized the gesture of feeling the pulse. By the evidence of the eyes, *qiemo*, palpating the *mo*, was unmistakably pulse diagnosis.

Chinese writings testified that the eyes were wrong. The hermeneutics of the *Mojue* were unlike any dialect of the pulse language known in Europe.¹⁷

How can gestures look the same, yet differ entirely in the experience? When three blind men were queried about the nature of the elephant, one replied that it resembled a long, thin rope, another that it was like a stubby, thick pillar, and the third that it was an immense sack. The three disagreed because the first had grasped the elephant’s tail, the second had embraced a leg, and the third was running his hands over the stomach. But they didn’t know this. Each knew only that he was right, and each was bewildered by the delusions of the others. All three had real knowledge of the same elephant. Yet what each knew was absolutely different.

Much the same could be said about European doctors feeling the pulse and Chinese doctors feeling the *mo*. Despite the similarities in appearance, and despite the fact the two procedures

ostensibly examined the “same” place, pulse diagnosis and *qiemo* entailed perceptions as disparate as grabbing the elephant’s tail and rubbing its stomach. I spoke above of Chinese doctors taking the “pulse”; English affords no better approximation. But it is only an approximation, and charting its limits compels us to re-think much of what we take for granted in the body.

Like the pulse. The very idea.

The Birth of the Pulse

Our knowledge of classical Greek medicine derives chiefly from two sources. The first is the collection of treatises composed mostly between 450 and 350 B.C.E. and attributed to Hippocrates of Cos; the second are the voluminous works of Galen (129–200 C.E.).¹⁸ The latter includes extensive, detailed discussions of the pulse, elaborating its causes and functions, its varieties and use in prognosis. Remarkably, however, half a millennium earlier, in the Hippocratic corpus, we hear nothing of pulsetaking. Indeed, Hippocratic physicians seem scarcely even to have recognized a concept of “pulse.” Interrogating the pulse is not some inevitable, prehistoric instinct.

How did the practice come into being? The pulse has been so basic for so long to the Western understanding of the body that we tend, thoughtlessly, to suppose it beyond history. We ask, “How did Chinese physicians interpret the pulse?” as if “the pulse” were a natural given, a fixed, universal reality perceived differently by different peoples — something perhaps like Jastrow’s rabbit duck (figure 3), in which one person sees a rabbit and another a duck. Yes, the pulse was “overlooked” by Hippocratic physicians, those keen observers. But our impulse is to regard this as a perceptual lapse, an odd failure to notice something already there, waiting to be noticed.

This is where comparisons are enlightening.



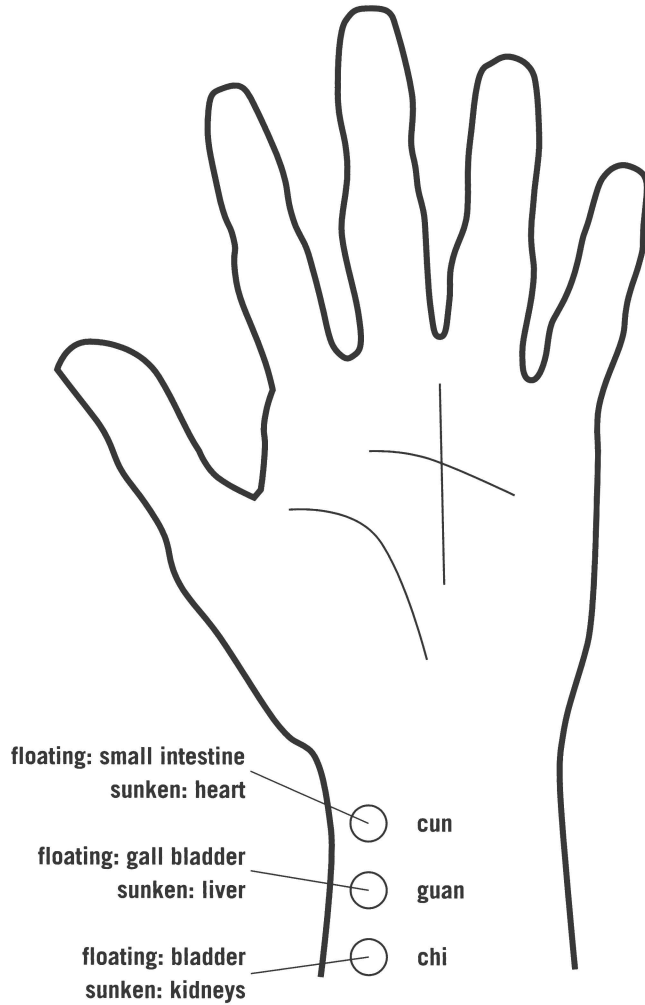
Figure 3. Jastrow's rabbit/duck from Norma V. Scheidemann, *Experiments in General Psychology* (Chicago: University of Chicago Press, 1939).

What do we feel when we place our fingers on the wrist, and palpate the movements there? We say: the pulsing artery. What else could there be? Chinese doctors performing the same gesture, however, grasped a more complex reality (figure 4). The finger placed lightly on the right wrist, at the *cun* position, diagnosed the large intestines, while the finger next to it discerned the state of the stomach. Pressing harder, these two fingers probed, respectively, the flourishing or decline of the lungs and spleen. Under each finger, then, doctors separated a superficial (*fu*) site, felt near the body surface, from a sunken (*chen*) site deeper down. There were thus six pulses under the index, middle, and ring fingers, and twelve pulses on the two wrists combined.

Small wonder that Floyer and Wotton were perplexed. To describe twelve pulses at the wrist is to describe something other than the pulse. But if not the pulse, then what? No sooner do we ask this than we are led to question the reality hitherto taken for granted: What *is* the pulse, and how did it come to be?

The *Synopsis on Pulses*, attributed to Rufus of Ephesus, opens with an intriguing clue about the beginnings of Greek pulse study: “It is necessary to study the art of the pulse carefully, for without it it is impossible to design suitable treatment. It is said that Aegimius, the first who wrote on this matter, took for title not *On Pulses* (*Peri sphygmōn*), but rather *On Palpitations* (*Peri palmōn*), for he did not know, it seems, that there is a difference between pulse and palpitation, as we will show in what follows.”¹⁹ Rufus thus names the first writer on sphygmology. Unfortunately, the name is all we have, and we know virtually nothing about Aegimius.²⁰ The title of Aegimius’ treatise, on the other hand, is rather suggestive.

It poses a puzzle. Why should a work on the pulse be called *On Palpitations*? Galen also found the title odd, and faulted Aegi-



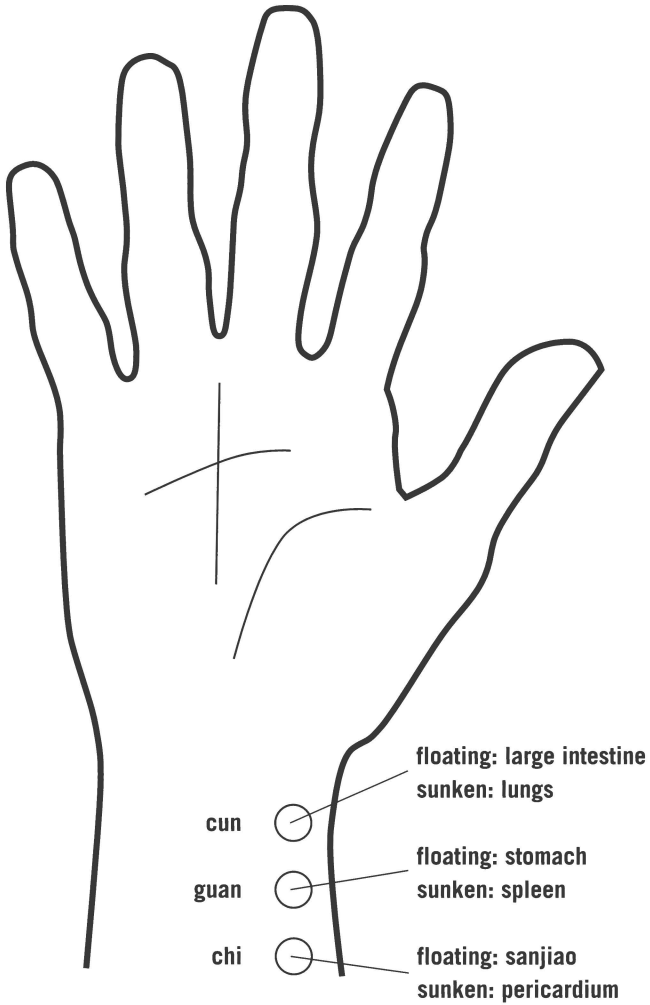


Figure 4. Qiemo sites.

mius' unconventionality. Contrary to both standard medical usage and to common parlance, Aegimius called "palpitation" what Praxagoras and Herophilus would later, more properly, call "pulse."²¹ Rufus, for his part, blamed a subtler ignorance. Aegimius just wasn't yet aware of the distinction between pulse and palpitation. His title reflected the confusions of an earlier, more primitive understanding of the body. In any event, *On Palpitations* struck both Rufus and Galen as a misleading title. Already by their time, that is, by the time of the earliest *extant* writings on the pulse, the meanings of key terms had changed.

Aegimius actually wasn't alone in his "confusion." In Hippocratic writings as well, *sphygmos*, Rufus' and Galen's term for the pulse, formed a continuum with *palmos* (palpitation), *tromos* (tremor), and *spasmos* (spasm). It named a minor pathological sign of only occasional note. References to it are scarce.²² The verb *sphyzein* referred not to the constant physiological activity of the arteries, not to what we call "pulsing," but rather to the throbbing that sometimes accompanies fevers and inflammations.²³ Thus, *Fractures* speaks of a "throbbing and inflamed" injury, and *Wounds* describes how "a wound becomes inflamed, and then shivering and throbbing ensue."²⁴ More remarkably still, *Epidemics 2* cites as a telling sign the fact that both hands of the patient "pulsed" — as if even pulsing at the wrist was a pathological aberration.²⁵ At the start, then, *sphygmos* did not evoke a pulse that beats day in and day out from birth to death.²⁶ The Hippocratic body had no natural beat.²⁷

On reflection, this may not be so strange. In daily life, most of us rarely if ever attend to the pulse. Pulsation intrudes into our consciousness only in extraordinary states, like the throbbing of pain or duress. It is just historical habit — the long tradition of pulse taking — that makes interest in pulsation seem self-evident and instinctive.

Two philological details hint at the chasm separating pre- from post-sphygmological consciousness. First, there is the term *sphygmoi*, or “pulses.” Several Hippocratic passages deploy this plural where we expect the singular. *Diseases of Women* speaks of “the pulses quivering, faint, and fading against the hand”; *Epidemics 4* relates that, “the pulses of Zoilos the carpenter were trembling and obscure.”²⁸ Note well: it wasn’t the carpenter’s *pulse* that trembled and was obscure, but his pulses. *Sphygmoi* named throbbings and pulsing in their concrete multiplicity; the idea of *the* pulse had yet to crystallize. In later Greek medicine, by contrast, the plural *sphygmoi* would designate the plurality of pulse types. Galen’s title, *On Differences between Pulses* (*Peri diaphorās sphygmōn*), refers to the variety of pulses, such as the large pulse, the small pulse, the quick pulse, and the slow pulse. In diagnosing a specific person at a specific time, Galen always speaks of the patient’s pulse, not pulses.

The second characteristic of Hippocratic usage is the close association of *sphygmos* and *palmos*, of pulse and palpitation. To Hippocrates’ contemporaries, Aegimius’ title *On Palpitations* probably wouldn’t have seemed peculiar. Hippocratic treatises frequently paired pulse and palpitation, and used them in ways that are hard to distinguish. Blood vessels (*phlebes*) “palpitate” as often as they “pulse,” and often they do both.²⁹ Nor was *sphygmos* confined to the blood vessels. It appeared equally in the head, in the hypochondrium, in the womb.³⁰

Palmos and *sphygmos*, in short, both named abnormal movements in the blood vessels and elsewhere, and the difference between them was frequently unclear.³¹ We have late testimony, however, for the views of Praxagoras of Cos, a renowned physician not far removed from the time of Hippocrates.³² According to Rufus and Galen, Praxagoras believed that palpitation was only pulsing of great intensity. He maintained, further, that trembling

(*tromos*) was in turn just a violent palpitation, and spasm (*spasmos*) just intensified trembling.³³ Pulsations, palpitations, tremors, and spasms thus formed a continuum.

There would eventually be a divinatory art devoted to these motions. Palmomantics, one of the superstitions attacked by Christian authors such as Augustine, assigned prophetic meaning to the sudden jerks, twitchings, and throbbings of the body. Beating in the right temple portended greatness and power, and the abuse of slaves; in the right eyebrow, it foretold a short sickness; between the eyebrows, misfortune for all – except for the slave, for whom it meant good luck; in the upper eyelid of the right eye, health and success. This was a minor art; only one treatise, Melampus's *On Palpitations*, survives.³⁴ By Melampus' time, another, more promising system of somatic interpretation had already arisen – sphygmology, a science that segregated a single kind of motion from all the others.

How do pulse and palpitation differ? Galen reports that Herophilus, the founder of Greek sphygmology, began his book on the pulse with precisely this question. Rufus' *Synopsis on Pulses*, too, after its opening definition of the pulse, jumps straight to the differences that distinguish it from palpitations, spasms, and tremors.³⁵ For early Greek expositors of the pulse, the divorce of *sphygmos* from *palmos* represented the first and decisive step toward defining this new realm of study.

Basic to this divorce was the new perception of the body defined by dissection. Anatomy helped to transform *sphygmos* from a vague occasional oddity into a vital sign. The earliest extensive evidence of systematic anatomy appears in the animal dissections of Aristotle; and it is also in Aristotle that we first catch glimmerings of *sphygmos* as a regular physiological phenomenon. In his treatise *On Respiration*, Aristotle notes that "All the vessels throb (*sphyzousin*), and throb simultaneously with each other, because

they are connected with the heart,”³⁶ and he even distinguishes the heart’s pulsation from its palpitation.³⁷ To be sure, he makes no mention of the medical use of the pulse; indeed, he still had yet to separate arteries from veins. His *sphygmos* was still not the pulse of Herophilus and Galen. But his inquiries already adumbrate the ties binding the birth of the pulse idea to the inspection of dissected structures.

Anatomy framed the very possibility of imagining the pulse. Take Rufus’ formula: “The pulse is the diastole and systole of the heart and the arteries”³⁸ — to us a seemingly self-evident definition, yet one for which Hippocratic doctors had not even the words. The artery/vein dichotomy was alien to the system of “veins” (*phlebes*) traced in treatises like *On the Sacred Disease* and *On the Nature of the Human Being*.³⁹ *Phlebes*, moreover, stretched the length of the body in routes that cannot be directly matched with anatomical blood vessels. Indeed, in these treatises they don’t even all spring from, nor return to, the heart. Suggestively, the individual hailed as the founder of pulse study is also the physician credited with pioneering human dissection. I speak of Herophilus.⁴⁰

It is instructive to compare Herophilus’ views with those of his teacher Praxagoras. Apparently, Praxagoras also took an interest in both dissection and pulsation, and may even have taken the first steps toward distinguishing arteries from veins.⁴¹ But he reportedly conceived of nerves as the refined extensions of the arterioles. Nerves and arteries, he thought, both carried *pneuma* and served as the conduits by which the heart controlled the movement of muscles.⁴² This scheme possibly underlay his view of the continuity between *sphygmos*, *palmos*, *tromos*, and *spasmos* — his belief that pulse and palpitation differed only in intensity, not in kind. Thus “*sphygmos* turns into *palmos* as its motion grows faster, and from *palmos* arises *tromos*.”⁴³

Herophilus thus set out, Galen informs us, “at the very start of his book about pulses to refute this doctrine of his teacher.”⁴⁴ And therein lies his claim to found sphygmology. It was Herophilus who determined that “the pulse exists only in the arteries and heart, whereas palpitation, spasm, and tremor appear in the muscles and nerves.”⁴⁵ It was he, not Praxagoras, who demonstrated that arteries and nerves were distinct, and that the pulse belonged uniquely to the former. Once pulse, palpitation, spasm, and tremor were parsed according to their subtending structures, their haptic similarities could no longer confuse. The pulse was no more a type of spasm than arteries were a sort of nerve.

By separating blood vessels from nerves, and among blood vessels, arteries from veins, anatomy thus helped forge the object of sphygmological study. But that isn’t all. It also, and more subtly, framed the method of study. This point can scarcely be over-emphasized. Anatomy shaped how and what the fingers felt.

How do the heart and arteries known to the eye relate to the experience of the fingers? Greek sphygmology was born with the assertion that whatever similarities they might present to the touch, pulsation, palpitation, tremor, and spasm differ in the structures that underlie them. Palpitations, tremblings, and spasms all belong to the nervelike parts of the body, Herophilus discovered. The pulse, on the other hand, occurs only in the arteries and the heart. Further, the pulse “is born with a living being and dies with it, whereas these other motions do not. Also the pulse . . . occurs both when the arteries are filled and when they are emptied, whereas these others do not; and the pulse at all times attends us involuntarily and exists naturally, whereas the others are within our power to choose. . . .”⁴⁶

Bacchius similarly defined the pulse as “the diastole and systole occurring simultaneously in all the arteries”;⁴⁷ for Heraclides

of Erythrae it was “the dilation and systole of the arteries accomplished by the prevailing natural and psychic power”;⁴⁸ and Aristoxenus would characterize it more specifically as “an activity of the heart and arteries that is peculiar to them.”⁴⁹ From the start, the idea of the pulse was inseparable from the image of the pulsing artery.

Inseparable, but of course not identical: the artery was a visible structure, the pulse was a set of motions. Moreover, these motions were largely inaccessible to sight; the pulse had to be *felt*. From this situation sprang the most vexed problem in pulse study, namely, that of how the arteries seen in dissection were linked to what the fingers now sensed.

What *do* we mean by the pulse? Most ancient definitions, like those of Hēgētōr, Bacchius, and Heraclides, required imagining motions in the mind’s eye: they spoke of arteries dilating and contracting, of diastole and systole. This represented the mainstream. Though accounts of the cause and function of pulsation changed considerably in the two thousand years after Herophilus, picturing the tubular artery remained throughout the enduring basis of Western pulse analysis.

Yet some in antiquity already expressed qualms. In particular, physicians of the empiricist school insisted on the distance separating the anatomical definition of the pulse and the actual experience of the fingers. What our fingers feel, the empiricists contended, is merely the sensation of being struck. We don’t actually perceive the artery expanding and contracting. We only *infer* diastole and systole.⁵⁰ Empirically, the pulse is nothing more than a series of beats and pauses.

Nor were the empiricists alone in suggesting limits to haptic knowledge. Herophilus’ follower Alexander, for instance, promoted a two-part definition: in terms of its essential nature, objectively, the pulse was “the involuntary systole and diastole of

the heart and arteries”; but to actual inspection (*episkepsei*), subjectively, it was merely “the striking against the touch produced by the completely involuntary motion of the arteries, and the rest the interval that follows the striking.”⁵¹ Alexander’s disciple Demosthenes advanced the same two-tiered scheme in his three treatises on the pulse, and these works reportedly commanded respect.⁵²

Such debates help to explain the convolutions in Galen’s version:

We detect in several parts of the skin some sort of motion, and this not only by pressing down on them, but sometimes with our eyes as well. Moreover this motion is found among all healthy people in many parts of the body — of which one is the wrist. [In such places] we can clearly detect something coming from below up to the skin and striking against us; after the beat, sometimes it distinctly moves away and then pauses, and sometimes right after the beginning [of motion] it appears to pause, and then comes again and beats, and then it goes away again and rests. And this process goes on in the entire body, from the day we are born until we die. It is this type of motion that all people call the pulse.⁵³

Plainly displayed in this account are the molding pressures of empiricist doubt. No mention here even of arteries, much less of their diastole or systole. Galen starts instead by affirming the occasional visibility of pulsation. The pulse, he implies, is not inferred but directly perceived. Insisting, he asserts elsewhere that in thin individuals with large pulses even the artery’s contraction can be observed by the naked eye.⁵⁴

Visual evidence forms just part of Galen’s defense, however. His main argument is that diastole and systole are tactile truths. We can really feel, he declares, much more than the bare beats and pauses recognized by the empiricists. Our fingers can directly fol-

low the artery as it moves toward and away from them; indeed, they can catch even the pauses punctuating these opposing movements. In affirming anatomical knowledge, we needn't slight the experience of the touch: ultimately, the two converge.

Is this true? Can the artery's systole really be felt? Opinions differed. Herophilus included the systole as part of the pulse, and this, combined with his stress on basing knowledge on experience, suggested to many that he had known it as an empirical fact. Certainly most of his followers conceived the systole in this way. Others weren't so sure. Archigenes affirmed that the contraction could be felt, while Agathinus held that it couldn't.⁵⁵ The pneumatically inspired *Medical Definitions* opposed the direct experience of the diastole to the inferred character of the systole.⁵⁶

Galen decided that he had to judge for himself. For a long time, despite striving strenuously to refine his touch, he found it impossible to follow the artery in its contractions. More than once, he thought of giving up. Then, suddenly one day, a flash of enlightenment.⁵⁷ He grasped it: the systole was knowable by the touch after all. Though he confessed: "Final knowledge seems to require all of a lifetime."⁵⁸

Try, yourself, to perceive more than beats and pauses, to follow the swell and fall of the artery, and you appreciate Galen's toils. Did you really feel the contraction? Or just imagine it? How can you be sure? The motion is so quick. You probably would never feel it if you didn't anticipate it. But does the anticipation then corrupt the experience?

There is something dreamlike about the history of generations upon generations of physicians struggling in this way, each concentrating furiously for months, years, on tiny motions of eye-blink swiftness flickering under their fingers, each trying desperately to sort out genuine perceptions from inferences and

hallucinations. Many believed, however, that there was no other way truly to understand the pulse. According to Herophilus, the pulse communicated its message through these elements: size, speed, strength, rhythm, order and disorder, regularity and irregularity. Except for strength, all these required taking the exact measure, in space and in time, of the expanding and receding artery.

In Galen's analysis, size was composed of length, breadth, and height. Along each dimension, the artery's dilation might be excessive (long, broad, high), deficient (short, narrow, or low), or in between. Speed pitted the distance the arterial wall moved against the time consumed in the motion. Gauging this meant splitting fleeting moments into the thinnest instants. For Galen taught that a single pulse comprised four parts: the diastole, the rest following diastole and preceding systole, the systole, and the rest following systole and preceding diastole.⁵⁹ One thus had to separate the durations of the motions from the durations of the rests.

Frequency hinged on the duration of the rests. The shorter the rests, the more frequent the pulse. Since Galen posited two rests, he identified two frequencies: one determined by the "outer rest" (between the end of diastole and the start of systole), the other fixed by the "inner rest" (between the end of systole and the start of diastole). Rhythm was the ratio of the durations of the systole and the diastole. Unevenness and irregularity measured the relative durations of diastole, systole, and also the two rests.

Seizing the pulse thus entailed seizing changes more easily imagined than grasped. We can readily picture the walls of a dilating and contracting tube, and dissect its size, speed, frequency, and rhythm, neatly and geometrically in the mind's eye.⁶⁰ Discerning all these by the touch is much harder. Yet that was the task.

Someone who attended only to beats and pauses would miss

the bulk of the pulse's confidences, would catch merely muffled rumblings. The language of the pulse was an idiom of diastole and systole. Beyond rooting the pulse in the heart and the arteries, anatomy defined what and how doctors trained their fingers to feel.

Today it is nearly impossible to shake the hold of this tradition. You put your fingers on the wrists and you immediately envision the pulsing artery, as a matter of course. You can scarcely even imagine what else you could feel. And yet no necessity dictates the pulsetaker's approach. There are other ways to cradle meaning at the wrist. As palpation in China makes plain.

Qiemo

Against skeptics who rejected Chinese pulse teachings because of their "mistakes in anatomy," John Floyer argued in 1707 "that the want of anatomy does make their art very obscure, and gives occasion to use phantastical notions; but their absurd notions are adjusted to the real phenomena, and their art is grounded upon curious experience, examined and approved for four thousand years."⁶¹

By the early nineteenth century, however, most European doctors seemed to agree with the stance of Johan L. Formey when, in his *Versuch einer Würdigung des Pulses* (1823), he airily dismissed Chinese pulse theory as idle sophistry. It couldn't be otherwise since any theory of the pulse that floated free of a "fundamental anatomical knowledge of the human body" had to remain error-ridden.⁶²

At the start of the twentieth century, the Chinese physician Tang Zonghai noted the same conflict between *qiemo* tenets and the findings of dissection, but drew the opposite conclusion. The efficacy of traditional palpation, he contended, exposed the limitations of anatomy: "Western physicians don't believe in the

method of the *mo*. They say that the *mo* which circulate around the body all arise from the blood vessels of the heart, that it is because of the ceaseless activity of the heart that the *mo* move. But how can the condition of the five viscera be determined by just the blood vessels? They further talk of the *mo* of the hand being a single pathway. But then how could it be divided into *cun*, *guan*, and *chi*?"⁶³

Experience showed that by palpating the *mo* doctors could diagnose not just the heart, but all the viscera; showed, too, that the wrist comprised several sites, not just one. That dissection suggested otherwise proved only that dissection could mislead. Qian Depei argued likewise that, although Western medicine excelled in anatomy, Chinese medicine excelled in palpation. The future of medicine lay in their combination.⁶⁴ In any event, Tang and Qian concurred with Western doctors on one point: Chinese palpation wasn't based on the imagination of the dilating and contracting artery. The *mo* wasn't the pulse.

Travelers who wrote back to Europe with the first reports of Chinese palpation saw a technique that looked identical to pulse taking. Doctors silently felt the wrist for a long time and then announced what was wrong. However, if we consult the *Huang-di neijing* or simply *Neijing*, the oldest and most revered of the Chinese medical classics, we find a rather greater variety of techniques.⁶⁵ In the *Suwen* and the *Lingshu*, the two texts that compose the *Neijing*, palpation concentrated on the wrist alone appears as merely one technique among several, and not even the most popular one at that. At the start, other strategies held more sway.⁶⁶

The *Lingshu* especially promoted comparison of the *mo* at the wrist with that at the neck. The latter revealed the body's yang powers, the former, the yin powers. A *mo* at the neck twice stronger

than that at the wrist, for instance, indicated a “Greater Yang” condition – an ailment in the bladder and small intestines. Conversely, a *mo* twice stronger at the wrist meant a “Greater Yin” affliction, affecting the spleen or lungs.⁶⁷

Treatise 20 of the *Suwen* favored comparing nine sites (eighteen total, adding together the sites on the right and left sides): three on the head, three on the arm, and three on the feet. Each gave insight into a separate part of the body. The movements at the temple, for example, announced the condition of the eyes and ears, the movements at the wrist corresponded to the lungs, and the movements behind the ankle to the kidneys.⁶⁸

Suwen treatise 17 outlined a third technique, which postulated twelve sites at the *cunkou*, or “inch-opening” at the wrists.⁶⁹

	Left wrist	Right wrist
Upper (<i>shang</i>)		
Outer (<i>wai</i>)	Heart	Lungs
Inner(<i>nei</i>)	<i>danzhong</i>	Thorax
Middle (<i>zhong</i>)		
Outer	Liver	Stomach
Inner	Diaphragm	Spleen
Lower (<i>xia</i>)		
Outer	Kidneys	Kidneys
Inner	Abdomen	Abdomen

The disposition of sites thus roughly mirrored the spatial organization of the body. The upper position corresponded to the body above the diaphragm, the middle position to between the diaphragm and the navel, and the lower position to the lower body.⁷⁰

The *Nanjing*, the classic exploring “difficulties” (*nan*) raised by the *Neijing*, subsequently replaced plain everyday words like “upper,” “middle,” and “lower,” “outer” and “inner,” with the technical vocabulary of *cun*, *guan*, and *chi*, “floating” (*fu*) and “sunken” (*chen*). Wang Shuhe’s *Mojing*, the canonical compilation on the *mo*, further eliminated the repetitions in the *Suwen* scheme and matched inspection sites with specific yin and yang viscera rather than with broad areas such as the abdomen and the thorax (figure 4).

Even the *Mojing* wasn’t the final word. When the eighteenth-century Japanese doctor Katō Munehiro reviewed the evolution of Chinese palpation, he counted no less than eight distinct ways to feel the wrist, each matching sites with viscera in disparate ways.⁷¹ *Qimo* thus wasn’t a single, timeless system, but encompassed a congeries of approaches that continued to be revised.

A unifying assumption, however, ran through them all. All approaches took for granted that the meaning of *what* the fingers felt, depended on *where* they felt. When it appeared under the index finger, a given quality might signal recovery, under the middle finger, continued decline. As one doctor summed up: “Although the three fingers are separated by mere hairbreadths, the diseases they indicate are a thousand leagues apart.”⁷² Chinese debates about palpation almost all revolved around the issues of which sites the diagnostician should examine, and what each implied. If the *mo* was the language of life, its grammar was topological.

Comparatively viewed, this is perhaps the most salient characteristic of palpation in China: the belief in the significance of place. From Herophilus through Galen, Greek diagnosticians evinced little interest in, or even awareness of, the differing feel of the pulse in distant parts. Galen merely remarks that one inspects the wrist because the pulse there can be felt clearly and without offending the patient’s modesty.⁷³ The idea of systematically com-

paring alternative sites never arises.⁷⁴ Why should it? Since the arteries all spring from the heart, doctors expected traits like speed, frequency, and rhythm to be the same in them all.

But those traits do not exhaust what can be felt, and other qualities do not always manifest themselves uniformly everywhere. Again, check yourself. Monitor the pulses in your left and right wrists and you may find that on a given day the left pulse feels harder or bigger than the right, yet on another day the reverse may be true. Chinese doctors deliberately sought out such variations and shifts. *Qimo* was not a science of the pulse.

What was palpation of the *mo* all about? A wise minister in the *Zuozhuan* warns the marquis of Jin that foreign-bred horses, unaccustomed to the local climate and people, will fluster easily; and he conjures up the image of their frantic panting, blood pounding through their bodies, their *mo* bulging taut, standing out. We picture the veins of the nervous steeds, made tumescent by fear, excitement, and the rush of blood. This is the earliest reference to the *mo*.⁷⁵ Originally, *mo* evoked blood vessels.

Until a few decades ago, historical analysis of the *mo* in medicine would have had to begin with the *Neijing*. But in 1973, some remarkable manuscripts were unearthed from the Mawangdui tombs at Changsha. Composed or copied probably sometime between the third century B.C.E. and 168 B.C.E. (the date of the tombs) — that is, before the compilation of the *Neijing* — they have forced historians to rethink the development of classical Chinese medicine. Two texts in particular shed fresh light on the evolution of ancient thinking about the *mo*. Modern scholars have dubbed them the *Zubi shiyimo jiujiing* (Treatise on the moxibustion of the eleven *mo* of the legs and arms) and the *Yinyang shiyimo jiujiing* (Treatise on the moxibustion of the eleven yin and yang *mo*).⁷⁶

Portions of major arteries and veins can be recognized in portions of each of the *mo* described in these texts, especially as they become visible near the joints – the neck, ankles, knees, elbows, wrists. Recurrent references to the *mo* “emerging” and “entering” at these junctures reveal how blood vessels visible at the body surface remained, as in the *Zuozhuan* tale of frightened horses, integral to the imagination of the *mo*.

But none of the *mo* corresponds directly to particular arteries or veins. The Greater Yang Leg Mo, for example, emerges from the outer ankle, rises up through the back of the lower leg, and emerges at the knee. At this point it splits in two, with one branch servicing the thigh, and another running up along the spine and into the back of the head. There it splits again, with one branch terminating in the ear, and another running through the eye into the nose.⁷⁷ No major blood vessel matches these meanderings from ankle to eye.

Even more telling is the silence about the heart. The Mawangdui *mo* neither arise from nor return to the heart, and no interconnections seem to bind them together. They run between the head and trunk and the legs and arms like eleven independent tracts. The *mo* were not the arteries or veins of the anatomist. Only partly did their explanation lie in blood vessels seen from the outside. More decisive was the inner experience of pain.

Uniting the disparate places through which the *mo* coursed was the thread of affliction and its relief. Aching twinges in the lower leg, spasms of the knee, agony gripping the lower back and buttocks, hearing difficulties, and prickly pain around the eyes – all found relief in the same cure: burning moxa on the Greater Yang Mo. And so it went for all the conduits. The Teeth Mo, the Eye Mo, and the Shoulder Mo owed their names mainly to the fact that cauterizing these *mo* relieved discomfort, respectively, in the teeth, the eyes, and the shoulders. Crucial to conceiving what

the *mo* were and where they wandered were observations about how and why treating one site on the body solved suffering in other, distant parts.

The connections drawn by the *Zubi shiyimo* and *Yinyang shiyimo* show them unmistakably to be the near ancestors of the conduits, the *jing* or *jingmo*, of acupuncture. The pathology and trajectory of the Greater Yang Leg Mo in the *Zubi shiyimo* closely approximate those of the Greater Yang Bladder vessel later needled in the *Neijing*; and we can similarly identify the acupuncture correlates of the ten other *mo* as well. The Mawangdui manuscripts, in short, offer a window onto the origins of the acupuncture body portrayed in figure 1.

What was the genealogy of conduit theory in ancient China? Ma Jixing and others have compared the Mawangdui treatises with each other and with *Lingshu* treatise 10 and studied the theoretical elaboration of the *mo* from the end of the Warring States period (476–221 B.C.E.) through the Qin (221–206 B.C.E.) and Western Han (206 B.C.E.–8 C.E.) dynasties.⁷⁸ The process almost certainly involved multiple lines of development: a lacquer conduit-figurine recovered from a Western Han tomb in 1993 depicts only nine *mo*, even though it ostensibly dates from after the Mawangdui treatises describing eleven *mo*. Moreover, two of the *mo* etched on the figurine are ones that these treatises don't discuss.⁷⁹

But the most startling feature of the pre-*Neijing* evidence (including the lacquer figurine) is the absence of any reference to acupuncture points, or, for that matter, to acupuncture. Both the *Zubi shiyimo* and the *Yinyang shiyimo* speak only of treating particular *mo*, without specifying particular sites; furthermore, the treatment they prescribe is moxibustion, not needling.

Lu Shouyan speculated in the 1950s that primitive healers began by discovering the efficacy of needling particular points,

then gradually inferred a series of channels to link them together; and this was long thought a plausible story.⁸⁰ However, the discovery of the Mawangdui texts has raised serious doubts, and Yamada Keiji, for one, has recently advanced the opposite scenario, urging that the discovery of the *mo* preceded the discovery of points.⁸¹ At the very least, it now seems possible, perhaps even probable, that theories of the *mo* developed independently of a theory of points.

Yet if the *mo* weren't inferred from points, how did belief in them originally arise? Current evidence supports no definite view on the matter — though I shall suggest in chapter 5 that the practice of bloodletting may have played a part. We can be sure only of this: the consequences of this new belief were absolutely decisive. The theory of the *mo* not only justified, and in turn found justification in, therapies like moxibustion and needling, but it also illuminated, suddenly, connections between afflictions as seemingly disparate as shooting pains in the back and ringing in the ears. It provided, that is, a fresh framework for interpreting sickness. Henceforth the problem of understanding an illness became intimately linked to the task of determining the *mo* that governed it.

We return to the problem of diagnosis. English affords us little choice but to translate *mo* in two distinct ways. When referring to the objects of needling and moxibustion, we render *mo* as blood vessel, conduit, or the like; when the issue is diagnosis, we speak of the pulse. This is one legacy of Greek sphygmology — the bifurcation of the artery and the pulse, the structure and the motion. Lu Gwei-djen and Joseph Needham state flatly that the word *mo* had two meanings, and they even represent them with two separate Chinese characters.⁸² But this obscures the guiding logic of Chinese palpation.

Qimo began as and essentially remained exactly what its name

indicated: palpation of the various *mo*, that is, a procedure for tracking changes in the conduits that so powerfully affected the body's pains and powers. The *mo* grasped in diagnosis was the same *mo* burned and needled in therapy. *Qiemo* inquired not into the single voice that Greek doctors called *sphygmōs*, but into a multiplicity of vital streams.

This is why doctors had to inspect twelve different sites — because there were, from the *Neijing* onward, twelve different *mo*. The *Lingshu*, the *Shanghanlun*, the *Jingui yaolue*, and the *Mojing* all preserve, in fact, vestiges of a diagnostic technique in which doctors examined twelve separate sites dispersed around the limbs, the trunk, the neck, and the head.⁸³ A floating quality at the ridge of the foot suggested an overactive stomach, while the same quality felt at the outer edge of the wrist bespoke intrusive wind. The meaning of the qualities discerned by the fingers changed with the place, because in the beginning distinct places belonged to and expressed distinct *mo*.

By the latter Han dynasty, admittedly, the *mo* were no longer independent tracts. The *Nanjing* links them together into one great circulation, and details how the *mo* moves three *cun* with each exhaling of breath, and three *cun* with each intake — six *cun* total with each respiratory cycle. A person takes 13,500 breaths in a day, and this translates into the *mo* making fifty circuits of the body. The *cunkou* inch-opening at the wrist represents the great confluence (*dahui*) of the *mo*, the site where circulation starts and ends — which is the reason, *Nanjing* 1 concludes, that doctors must inspect the *cunkou*.

The *Nanjing* was perhaps the first work to concentrate palpation exclusively on the wrist, and at the time of its composition this approach still needed justifying. As the very opening lines of the treatise explicitly acknowledge, “All the twelve conduits have *mo* which move (*dongmo*). Why, then, do you examine the *mo* at

the *cunkou* alone to judge the five *zang* and six *fu*, life and death, prognoses auspicious and inauspicious?"

Conventional wisdom, the query implies, recognized twelve moving *mo*. At the end of the Han dynasty, people still knew the older, more laborious method of checking the various *mo* by palpating each one directly, at twelve widely separate sites in the body.

Nanjing 2 and 3 subdivide the *cunkou* into *cun*, *chi*, and *guan*, identifying the three as the realms, respectively, of the yang and the yin, and the divide between them. Interpretation here turned on relative position. Toward the head was yang, toward the feet was yin; toward the fingertips was yang, toward the trunk was yin; the surface was yang, the inner depths were yin. The *Suwen* method of interpreting the wrist, remember, linked the *cun* with the upper, or yang part of the body, the *chi* with the lower, or yin part of the body, and the *guan* with the viscera in between. *Nanjing* 18 would go further and associate the *cun*, *guan*, and *chi* with the heavenly, human, and earthly realms. Just as the microcosmic body reproduced the yin and yang dynamics of the macrocosm, so the yin and yang dynamics of the microcosmic body could in turn be shrunk to the inch-opening at the wrist. Topological analogy thus made it unnecessary to check from head to foot, and feeling the *mo* came to look like taking the pulse.

Appearances are deceptive, though. Unlike pulse taking, *qiemo* never aimed to judge the movements of arteries rooted in the heart. Although Han-dynasty doctors posited a continuous circulation and explored how they might alter one *mo* by treating another, this circulation had neither center nor starting point. There was a *mo* for the heart, but it claimed no special priority.⁸⁴ Glance at figure 4 and you see that the site for inspecting the heart was just one among twelve.

Each *mo* retained its own distinct dynamic. Early intuitions of

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