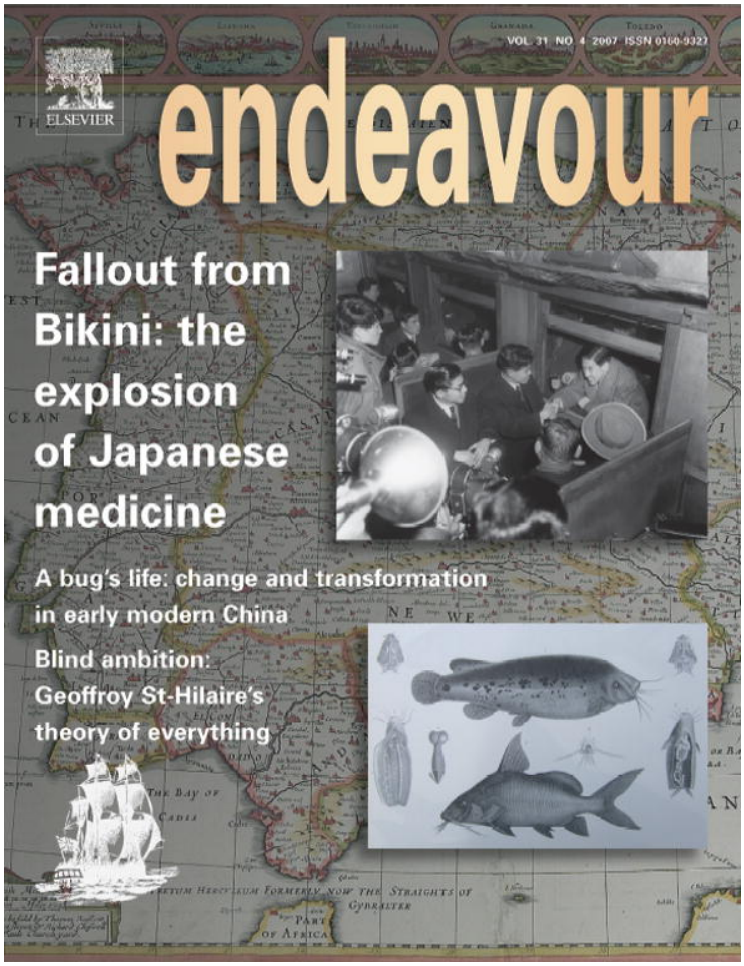

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A bug's life: change and transformation in early modern China

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Chanting wasps and shape-shifting worms were all in a day's work for sixteenth-century Chinese naturalists such as Li Shizhen (1518–1593). In an effort to understand the metamorphoses of both nature and the human body, he and other early modern Chinese scholars looked towards tiny creatures like roundworms, lice and demon bugs. For them, such animals could reveal the most intimate secrets of the universe.

Vespal virgins

Being a parasitic wasp in early modern China had its ups and downs. There was always time to hang out with the boys: these insects (known as *guoluo* or *yeweng*) were, by definition, all male. But finding a lady companion was obviously out of the question. Consequently, those *guoluo* intent on parenthood had to show some initiative.

Stealing off to secluded bamboo stalks or earthen nests, a prospective father would search out a squiggling pile of tiny green worms or *mingling*, hover over it and focus his concentration. 'Become like me! Become like me!' he shouted until, unable to resist the power of the incantation, the tiny worms transformed into mini-wasps and eagerly flew after their new adoptive parent [1]. Versions of this story appear throughout pre-modern Chinese writings on the natural world, many of them giving the *guoluo* human-like characteristics and attempting to rationalize their behavior.

In spite of their apparent thievery, these worm-napping wasps became paradigms of parental responsibility. 'The *mingling* have young, the *guoluo* raise them', explains one song in the *Book of Poetry* (*Shijing*), the earliest existing collection of Chinese poems and one of the 'Five Classics' of Chinese literature. 'Teach your sons well and they will become as good as you are', it urges [2]. The wasps, like many of the plants and creatures mentioned in the *Book of Poetry*, helped lay the foundation for natural history in pre-modern China.

Seeing things

The original claim in the *Book of Poetry* was fairly simple: the *mingling* worms have offspring and the *guoluo* raise them. No magical incantations, no chanting bugs, no speaking creatures. This basic sequence of events, however, went on to exercise nearly every major naturalist in China's history, as the original narrative was transformed to accord with different ways of seeing the natural world.

In his *Analects* (*Lunyü*), the thinker and philosopher Confucius urged students to study the *Book of Poetry* to learn the names of 'birds, beasts, plants and trees', advice that founded a tradition of textual commentary on the *Book of Poetry*. The subsequent commentaries contain countless attempts to fathom the behavior of such creatures. Indeed, there are descriptions of the wasps in all of the canonical natural history texts: medical encyclopedias and compendia of *materia medica*, commentaries on poetry, notebooks, and monographs on particular plants and animals. Some authors embellished the original account as it appeared in the *Book of Poetry*, crediting the wasps with powers of prayer, speech and transformation. Many claimed to have personally seen the transformation of worms into wasps, either when spying on the creatures or after breaking open and inspecting the contents of their nests. Such metamorphosis of insects had well-known precedents; for example, earlier scholars claimed to have seen butterflies being formed from flowers and even from ladies' underpants [3].

Other writers, including famed Daoist alchemist and naturalist Tao Hongjing (452–536), were skeptical of stories of talking and chanting worms. For him, the idea that these insects spoke and caused worms to transform was ridiculous. According to Tao, the wasps laid their own eggs, a controversial claim when all other commentators considered the insects to be solely male. Occasionally, he conceded, the wasps might steal spider eggs or small green worms from the surfaces of plants. This, however, was only to enact a kind of sad jest: the lonely wasp would stuff his mouth with the baby worms and pretend they were his own young.

The terminator, the exorcist and the naturalist

In the sixteenth century, celebrated naturalist Li Shizhen (1518–1593) sat down to chronicle these claims and add some of his own. By then, there was ample reason for him to consider the power of sight as one of the many tools available to him [4]. Li is known today as a founding father of modern science and medicine in China, the 'Prince of Pharmacists', the 'Shakespeare of Pharmacology', and the subject of comic books and illustrated tomes chronicling his travels, experiments and adventures (Figure 1). This pioneering naturalist and doctor was fascinated by *chong*, a catch-all term that in the sixteenth century embraced a miscellany of animals, including bees, insect galls, worms, spiders, scorpions, leeches, frogs, toads, snails, slugs and even demons [5]. His obsession with such creatures is evident from the abundance of them that crawl, scuttle

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Figure 1. Li Shizhen about to dissect a spiny anteater while his students look on. From *Li Shizhen: Weida de yaowu xuejia* [Li Shizhen: Great Scholar of Medical Drugs]. Tianjin: Zhongsheng shudian, 1955. Collection of Needham Research Institute.

and eat their way through the pages of his massive *Materia Medica in Categories General and Specific* (*Bencao Gangmu*) (Figure 2).

For Li, *chong* were exemplars of cosmic change: they were amongst the most mutable of all creatures and intimately connected with the raw materials of the natural world. These smallest of living beings were imbued with *qi*, a key component of the universe that generated all life. They took varied forms: feathered, furry, scaly, shelled inside or out, or naked [6]. They might be born from a womb, from eggs, from the wind, from humidity or through metamorphosis, each embodying a particular kind of *qi*. They sang, danced and could make a particularly tasty meal or effective medical drug [7].

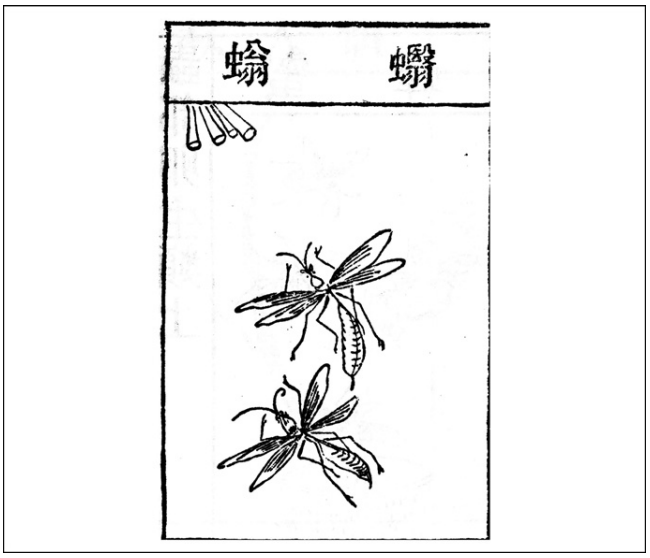

Figure 2. Image of a *yeweng* wasp from an eighteenth-century edition of Li Shizhen's *Materia Medica in Categories General and Specific*. ©East Asian Library and the Gest Collection, Princeton University.

In Li's opinion, men of remote antiquity recognized the importance of insects much more than his contemporaries did. He described, in detail, the special squad of exterminators responsible for keeping the palace free of pestilence and infestation:

> The *Offices of Zhou* listed the Worm Officer in charge of eradicating demon bugs, the Terminator in charge of eradicating moths, the Locust Officer in charge of getting rid of frogs and turtles, the Officer of Exorcism in charge of removing deadly wild bugs like the earwigs that hide under walls and fences, and the Cauldron Beater charged with eradicating bugs hiding in water like imps of darkness. It is clear that the sages treated even small things with careful attention. How, then, can today's scholar not probe their natures and investigate their helpful and harmful qualities [8]?

Understandably, Li was intrigued by the suggestion that such creatures might be capable of chanting, praying

Figure 3. One of the creatures from Zhou Lüjing's *Mysteries Within Mysteries of the Golden-Bamboo Chest* (*Jinsi Xuanxuan*). ©East Asian Library and the Gest Collection, Princeton University.

and transforming other insects into clones of themselves and he set out to investigate (Figure 3). When it came to the tale of the wasp and the worms, Li claimed to have observed both male and female parasitic wasps in the nest, largely supporting the account of Tao Hongjing, a figure he admired and emulated. Such comments reflected Li's concern with reproduction and generation of creatures in general, and of insects in particular.

Of mites and men

There was one group of *chong* of special concern to Li and his fellow Ming Dynasty (1368–1644) naturalists: those creatures that plagued living and dead bodies. According to Li those bitten by an earthworm would hear the worm singing in their stomach until they took a suitable purgative [9]. All manner of dangerous insects lurked in shadows and corners, waiting for any opportunity to attack and sicken a human victim with poisonous urine, breath or *qi*. Doctors were regularly called to treat maladies brought on when a patient's skin or viscera harbored unwanted pests.

Writing in his jail cell at the end of the fourteenth century, scholar and physician Ye Ziqi (fl. 1378) recalled an occasion on which he examined a patient's *chong*-infested scabies rash:

> The *chong* was less than half the size of a chestnut. I examined it carefully. It had a dark mouth, tiny feet and a bulging back . . . Because the person's blood and *qi* were not in harmony, the [blood and *qi*] transformed and the *chong* were born. Since emerging, the *chong* already developed likes and aversions: they could approach and avoid; they could starve or be satiated; they could move or stay still; they could be at leisure or hard at work; they could inhale and exhale [10].

Several scholars of medicine and natural history in early modern China were similarly fascinated by corporeal

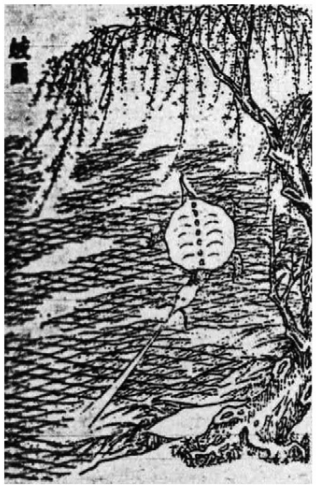

Figure 4. An imp of darkness (*yu*), from the eighteenth-century *Compendium of Images and Texts, Ancient and Modern* (*Gujin Tushu Jicheng*). ©East Asian Library and the Gest Collection, Princeton University.

bug infestations. In his *Mysteries Within Mysteries of the Golden-Bamboo Chest* (*Jinsi xuanxuan*), Zhou Lüjing, a rough contemporary of Li Shizhen, described several *chong* that found their way into human bodies and there transformed into creatures of various sizes, shaped like beetles, clouds, roaches, hairy men, frogs, fish, urns and bats, to name just a few [11] (Figure 4). Ye Ziqi concluded his own rhapsody on body mites with a more lofty observation: 'From this one can examine the principle of fate; from this one can examine the wondrousness of creation' [12].

It might seem odd that a body louse would inspire sweeping meditations on fate and creation, but this kind of association permeated early modern Chinese natural history. These authors shared a tendency to associate the meanest of living creatures with the most exalted and fundamental of processes in the natural world: generation and, more broadly, transformation. Arguably, *chong* became the most significant exemplary case through which scholars of the late Ming understood and discussed one of the most vibrant topics of natural historical debate, change and transformation in the world at large.

In a long discussion of roundworms in his *Materia Medica*, Li Shizhen elaborated this fundamental principle of his work in explicit terms, describing several creatures along the way:

> *Chong* receive wood *qi* and are born, receive rain *qi* and transform, how can it not be that wind and wood govern heat, rain and humidity govern moisture? Each of the Five Phases has its own *chong*. All wood has moths, all fruit has *cao* bugs, all beans have *fang* worms, the Five Grains harbor pests such as *ming* worms, *te* bugs, blister beetles, and *zei* bugs. When wheat rots, moths take wing; when chestnuts are cracked, bugs emerge; when herbs rot, fireflies transform. These all are *chong* of wood. Blazing fire has rodents, burnt-out ashes generate flies. These all are *chong* of fire. Ants in holes, scorpions in walls, mole crickets in the field, lizards in the rock—all are the *chong* of earth. Tadpoles, leeches, fish, soft-shelled turtles, flood serpents, and dragons, all are the *chong* of water. In ancient times there was a forger who broke a cauldron, and saw inside the crevice where it had broken, a creature like a rice bug, perfectly red in color. Thus even with metal there are *chong* [13].

This passage reveals the Five Phases (*wuxing*) in which *chong* experienced change in Li's natural history [14]. The Phases (wood, fire, earth, metal and water) were the fundamental modes of being for everything in the universe. They were transitory, inextricably linked by cycles of mutual creation and replacement, usually in a set order (the sequence of production was usually wood → fire → earth → metal → water) [15]. In his *Materia Medica*, Li customized this order to classify his drugs: water and fire (the most fundamental, according to Li) were followed by earth, metal (and stone), and then by plants and wood, before Li moved on to the sections on implements, animals and humans [16].

For a naturalist and doctor of the late sixteenth century, one of the most important aspects of the Five Phases was their inherent instability: the Phases were the material and formal basis of all things, but they were always potentially in flux. The Phases did not just exhibit change: for many scholars, they *were* change incarnate. They bred change, and organisms along with it. Li Shizhen's roundworm-inspired digression on the Five Phases and their associated *chong* was neither inappropriate nor revolutionary, though its explicit narration of the link was uncommon. *Chong* were born from the Phases themselves. If the Phases embodied the transformative processes of the natural world, then *chong* in turn embodied the Phases.

Rich aphids and poor maggots

Li Shizhen's work on roundworms and other pests ensured a response from later naturalists. In addressing *chong* that infested corpses, medical author Zhao Xuemin (1719–1805), the most significant commentator on Li Shizhen's work, dispensed with the lengthy discussions of universal creation that recurred in Li's text and remained more down-to-earth:

> When people die, their blood and flesh decay and transform into *chong*, sometimes becoming maggots, sometimes becoming aphids (*ya*). The shape and appearance of these are not the same; sometimes it is said that the two [kinds] are born simultaneously, sometimes it is said that one is born first and transforms into the other. Additionally it is said, [corpses of] poor men have many maggots and few aphids, while [corpses of] rich men have many aphids and few maggots. But, not having deeply investigated the matter, I have included both theories and I await the judgment of a learned gentleman [17].

Chong remained a powerful symbol of transformative phenomena in the natural world throughout the natural history and medical literature of the eighteenth century. While early modern naturalists like Li Shizhen treated *chong* as an exemplar of cosmic change, however, later scholars like Zhao preferred to describe the transformations of *chong* in terms of social class and economic status. Once again, the most minute and lowly of creatures came to

represent the most significant and penetrating social and intellectual issues in pre-modern China. *Chong* and metamorphosis would continue to remain intimately linked, while the conceptual fabric within which this relationship was embedded metamorphosed along with broader discourses on the Chinese natural world.

References

1 The phrase *mingling zi* ("*mingling* child") came to be used in the late 16th or early 17th century to refer to an adopted child, or a son whose profession differed from that of his father

2 For an introduction to the *Book of Poetry* (also *Book of Odes* or *Book of Songs*), see Nylan, M. (2001) *The Five "Confucian" Classics,* Yale University Press, pp. 72–119. An excellent modern English translation of the text is Waley, A. (tr.) *The Book of Songs*, edited with additional translations by Allen, J.R. (New York: Grove Press, 1996). This was required reading for students taking the imperial palace exams, and included many references to plants, insects, birds and beasts. The poem in which the wasp and worm first appear is poem 196, "Xiaowan"

3 On butterflies, see Li, Shizhen (2002). (Liu, Hengru and Liu, Shanyong, eds), *Bencao Gangmu*, pp. 1512–1513, Huaxia chubanshe: In his discussion of butterflies, Li emphasized the importance of first-hand or experiential knowledge. He first listed the opinions of previous scholars (who claimed variously that butterflies metamorphosed from the bugs on vegetables or the vegetables themselves, plant leaves and colorful underwear), each of whom spoke "according to what he saw". He then proceeded to compare butterflies to the class of all moths, whose changes could be understood as the kinds of changes silkworms pass through, and whose color depended on what they ate prior to metamorphosing. For Li, even false prior claims of observation were nonetheless excused (rather than being explicitly derided) precisely because each scholar claimed to speak from experience.

4 The *Materia Medica* was first published in 1596 and is still consulted by doctors today. For much more background on Li Shizhen and his work, see Nappi, C. (2006). "The Monkey of the Inkpot: Natural History and its Transformations in Early Modern China", PhD Thesis, Princeton University

5 For a concise treatment of the history of this term, see Fèvre, F. (1993) Drôles de bestioles: qu'est-ce qu'un chong? *Anthropozoologica* 18, pp. 57–65

6 These categories reflected the major groups of living beings according to many popular Chinese classifications of nature. In essence, Li was saying that *chong* represent a microcosm of all life in the universe

7 According to Li, "It can be seen in the *Classic of Rites* that the cicada, the bee, ants and ants' eggs were once used as ritual food offerings; it was noted in prescription books that the centipede, silkworm, toad and scorpion could be used in medicine"

8 For the text of this account, see Li Shizhen, *Bencao Gangmu*, 1480. The "imps of darkness," or *yu*, were creatures that lived in lakes and streams awaiting unwary bathers, in some ways resembling the Japanese *kappa*. These creatures, classified as *chong* in Li's work, would shoot streams of poisonous sand or *qi* at human bodies or shadows, sickening and potentially killing their victims. A favorite targets of the imps were lascivious women bathing in the nude

9 Earthworms (*qiuyin*) and grasshoppers could also interbreed by singing upwind and downwind, respectively—when their songs met on the wind, one of them was instantly impregnated. According to natural history texts, a variety of birds, serpents (including dragons) and insects could mate via wind-carried song or gaze. For more of Li's thoughts on the sometimes bizarre behavior of earthworms, see Li Shizhen, *Bencao Gangmu*, 1568, (2002). (Hengru, L., Shanyong, L., eds), Huaxia chubanshe

10 Ye Ziqi (1997). *Master of Herbs and Trees* (*Caomuzi*), 15, Zhonghua shuju. The *Caomuzi*, finished in 1378, was first published in 1516 by Ye's grandson. Li Shizhen worked in part from Ye Ziqi's book in making his own comments on body parasites: "People and things all have bugs, but the shape of each kind of bug is different. They originate in changes in *qi*, afterwards they give off eggs from which nits (young lice) emerge. According to the *Caomuzi*, bugs have six legs, and when they move they must face north. The *Baopuzi* states: Lice on the head are black, and when they move to the body they turn white; body-lice are white, and when they move to the head turn black. This is because they are subtly influenced as a result of contact."

11 Zhou, Lüjing (1966) *Mysteries Within Mysteries of the Golden-Bamboo Chest (Jinsi xuanxuan),* Yiwen yinshuguan

12 Ye Ziqi, *Caomuzi*, 15

13 Li Shizhen, *Bencao Gangmu*, 1576–1577. Many of the creatures described in this passage had powerful medical or military uses. Fireflies were particularly good at keeping thieves and bandits away, and were lauded by several Daoist authors for their striking medical effects. One prescription for "firefly pills" in Li's *Materia Medica* cited the efficacy of these bugs for "preventing the onset of diseases, attacks by vicious agents, evil and demons, and attacks of tigers, wolves, snakes, wasps, and scorpions, as well as injury from soldiers' weapons, thieves and bandits." The text went on to describe a Han Dynasty (206 BCE-220 CE) general who was protected from the arrows of a military troop (appropriately named "The Tigers") and fooled them into believing he was guarded by deities, simply by hanging a pouch of firefly pills from his arm

14 *Wuxing* is most commonly translated as "five phases" or "five elements," but literally can also be translated as "five movers" or "five movements." Most contemporary scholars have avoided the "five elements" translation made popular by early modern Jesuits out of concern that it invites a direct comparison with the conceptually very different Aristotelian elements

15 The five constituents of the cycle could also be ordered in different sequences of change, depending on the context

16 For a full list of the contents of Li's work, see Nappi, "Monkey" pp. 251–254

17 Zhao Xuemin (1971 and 1982) *Correcting and Supplementing the* Bencao gangmu (*Bencao gangmu shiyi*), 521, Shangwu yinshuguan