Early Chinese ideas on heredity

EARLY CHINESE IDEAS ON HEREDITY[1]

BY DONALD LESLIE, LONDON

PART I · THE CHOU AND HAN

In a search for Chinese ideas on heredity there are many approaches. Chinese ideas on kinship relationships and mourning degrees are of considerable interest for example, but turn out to be of no great value for our purposes, as in general blood relationships were not fundamental[2]. Perhaps the most interesting discovery from this point of view is the early attempt (c. 79 A. D.) to rationalise marriage customs by the *Po Hu T'ung*, chapter 40 on "Marriage".

"Why does he not choose two younger sisters of his bride as concubines (instead of one younger sister and a cousin)? To hand on different life's-breath *(ch'i)*[3]. Why does he choose the daughters of three different states? To extend the differences in type *(lei)*, lest there be no children, on account of the similarity of the blood from one state alone"[4].

In the classics and elsewhere we find too, many references to "Parents as stems, offspring as branches"[5]. The story of Tseng Shen, noted for his filial piety, who felt pain when his mother pinched her arm[6] is cer-

1. The main sources I have used are the works of the early Chinese philosophers. I have translated quotations independently, but give in the footnotes European works for finding purposes, and for the background. My dates are mostly taken from Fung Yu Lan's *History of Chinese Philosophy*, part 1, translated by D. Bodde.

2. For these see "The Chinese Kinship System" by Feng Han-Chi, *Harvard Journal of Asiatic Studies*, vol. 2, and the works of Granet. Cf. also J. Legge *The Li Ki*, bk. 2, Appendix p. 202–208 (in *Sacred Books of the East*) for tables on the degrees of mourning.

3. See Appendix for Chinese terms.

4. Cf. Feng, p. 48, and also Tjan Tjoe Som's translation, *Po Hu T'ung*, p. 252 and p. 350 for a slightly different translation. See Tjan for a discussion of the date and reliability.

5. For various examples see *Li Chi* bk. 24 (Legge op. cit. part 2, p. 265); the *Ta Tai Li Chi* chapter 41 and 52, and the *Hsiao Ching* (see E. R. Hughes *Chinese Philosophy in Classical Times*, p. 76 and 113).

6. See A. Forke *Lun Heng, Essays of Wang Ch'ung*, vol. 2, p. 189. It is interesting to note that the *Lun Heng* rejects this story, one of the earliest examples of telepathy, on the grounds

tainly linked with the tree of descent, a vague idea of physical connection coupled with a strong sense of sympathetic magic[7]. But these ideas are in general vague and not sufficiently concrete.

An investigation into likeness between parents and children has not provided much material either. The Chinese have written volumes on the ethical relationships between offspring and parents and between brothers, but have hardly mentioned the physical connections. Attempts to find evidence in the early Chinese work on physiognomy[8] have only provided isolated cases. For example, in *Shih Chi*, chap. 7, we find: "It is known that the eyes of Shun had double pupils. I have also heard that Hsiang Yü also had double pupils. Surely he was not his descendant?"[9]. In general, as here, there is the element of moral as well as physical heritage in such examples. Other odd cases can be found[10], but it is not until the *Lun Heng* by Wang Ch'ung (c. 85 A. D.) to be discussed in detail later, that any real synthetic system is attempted.

The Chinese have, of course, noticed that "like begets like", as evidenced in such proverbs as "if one grows melons one gets melons, if one grows beans, one gets beans", and many similar expressions[11], all mixing up, however, the moral and physical problems. But only the *Lun Heng* realises that there is a problem to be solved. In fact the parental contribution is hardly considered elsewhere.

that the distance was too far! For a brilliant exposition of telepathy with a similar motif see the 3rd century B. C. eclectic work, the *Lü Shih Ch'un Ch'iu* bk. 9, chap. 5 (R. Wilhelm, *Frühling und Herbst des Lü Pu-we*, p. 114–115). For further examples see the 10th century encyclopedia, the *T'ai P'ing Yü Lan*, chap. 411.

7. The "worship of ancestors" is presumably connected with this idea. Hurt to the dead may produce hurt to the living too, as the "tree" is never completely severed.

8. For physiognomy, see Forke (op. cit.) vol. 1, p. 304–312, and the *T'u Shu Chi Ch'eng* encyclopedia, bk. 17, chaps. 631–650. H. Giles' "Phrenology, Physiognomy, and Palmistry" in *Adversaria Sinica*, p. 178–184, is taken from this.

9. See E. Chavannes, *Les mémoires historiques de Se-Ma Ts'ien*, part 2, p. 322. This story is taken up later, especially by the *Lun Heng* (Forke 1, p. 324 and 305).

10. H. Giles in an interesting essay on "Childbirth, childhood, and the position of women" (*Adversaria Sinica*, p. 348–378) has some later examples including the case of a posthumous child who was identified by his having four nipples as had his father.

11. For one among many see *Lü Shih Ch'un Ch'iu* bk. 19, chap. 4 (Wilhelm, p. 329).

Leaving aside, for the moment, this question of family likeness, when we come to the problem of the relative importance of Nature and Nurture, it is clear that the place to start is the concept of *hsing* (innate or inborn human nature), a topic discussed by almost every Confucian writer of note from Han times onwards[12]. The Confucians in their concentration on the study of Man have given us a great deal on ethical philosophy and intermingled with it are some quite interesting ideas connected with heredity, though almost invariably with an ethical slant.

At the end of the Chou dynasty we find already the well-known conflict between Mencius (c. 371–289), ("Man's nature tends to good as water tends to run downhill"), and Hsüntzu (c. 298–238), ("Man's nature is evil; its good is artificial")[13]. But both of these early Confucian views are so idealist and ethical in tone that they really ignore the basic problem of the innate differences of man, not necessarily as non-existent but as unimportant and not relevant to their main point. In spite of this however, both contributed to the problem. Hsüntzu had an excellent though exaggerated view of the importance of the environment: "The children of the barbarians of Kan, Yüeh, Yi and Ho all cry alike when born; that they have different customs when they grow up is due to training"[14]. Whilst Mencius based his belief in the equality of men ("all men can be a Yao or Shun") partly on an appreciation of the instinctive behaviour innate in all men: "Without the feeling of compassion one is not a man, without the feeling of shame, one is not a man,

12. Including Hsün Yüeh and Han Yü (and also the Sung philosophers who considerably altered the concept however), as well as those discussed here. See the *Tu Shu Chi Ch'eng*, bk. 22, chaps. 45–52 on *Hsing*.

13. For these two philosophers see: J. Legge, *The Chinese Classics*, vol. 2, and H. H. Dubs, *Hsüntze Works*. Mencius bk. 6 (I) and Hsüntzu bk. 23, are the most important for *Hsing*. H. H. Dubs, *Hsüntze, Moulder of Confucianism*, is also interesting.

14. Bk. I (Dubs p. 31). Also found with minor variations in *Ta Tai Li Chi*, chaps. 48 and 64; and repeated by *Huai Nan Tzu*, bk. 11, p. 6b. (The page numbers refer to the *Huai Nan Hung Lieh Chi Chieh* edition.) Several more examples can be found in Hsüntzu; cf. bk. 8 (Dubs, 114–118), and bk. 23 (Dubs, 301–317).

nor without modesty and courtesy or a sense of right and wrong''[15]. We have only to read Hsüntzu ''To want nourishment when hungry, warmth when cold, rest when tired, to like what is profitable, and hate what is harmful, these are things men are born with and do not need to have instilled in them. In this even Yü and Chieh were alike''[16], to realise however, that in reality, the differences between the two are more apparent than real, both adopting the same view that all men are basically and potentially equal, and neither appreciating adequately the distinction between innate physical and moral qualities. In fact their disagreement was due partly to the lack of adequate definitions in early Chinese[17].

Before going on to the Han Confucianists it is interesting to notice the views of the other philosophical schools of the Chou. Mo Tzu (within 479–381) was also idealist in this respect and merely gives us ''dyed in blue it becomes blue, in yellow, it becomes yellow'', a theme quoted by later writers as an analogy for the influence of the environment[18]. The early Taoists too, more interested in Nature than in Man have given us comparatively little in detail on this topic, though their influence on later biological thought is very great. Chuangtzu (c. 369–286) gives us a rather vague evolutionary system[19], difficult to disentangle from the superstitions of transformations found in the many books of the Chou

15. Bk. 2 (1), 6 (Legge p. 201). Cf. also bk. 7 (1), 15 (Legge p. 456) for a similar idea. In my opinion, in Mencius, the word *ch'i* translated by Legge as ''passion nature'' is not far off ''libido'' though rather more physical in nature.

16. Bk. 5 (Dubs p. 71); cf. also bk. 23. The germ of the idea of instincts can also be detected in *Li Chi* bk. 35 (Legge part 2, p. 392), cf. also *Lü Shih Ch'un Ch'iu* bk. 2, chap. 3 (Wilhelm p. 19).

17. Cf. A. Waley *Three Ways of Thought in Ancient China*, p. 205–206, and also Andrew Chih-yi Cheng *Hsüntzu's Theory of Human Nature and Its Influence on Chinese Thought*, p. 69.

18. Mei Yi Pao *The Works of Motse*, p. 9. See also *Lü Shih Ch'un Ch'iu* bk. 2, chap. 4 (Wilhelm, p. 22), the *Lun Heng*, chap. 13 (Forke I. 387) and elsewhere.

19. *Les Pères du Système Taoïste* by L. Wieger, chap. 18 F. Also expanded in *Liehtzu* chap. 1 E. This translation must be used with caution, the ones by Fung Yu Lan, Lin Yutang, R. Wilhelm, H. Giles and J. Legge being somewhat better. See Hu Shih's *The Logical Method in Ancient China* p. 131–139, for a more favourable opinion, and an attempted translation of this section.

and Han[20]. It is worth noting, however, that amongst these transformations, we have the change of man into woman accepted by Mo Tzu, by Hsün Yüeh (148–209 A. D.) in his *Shen Chien*, and by the *Lun Heng*[21]. The Taoists in any case, show a considerable appreciation of the interaction of man and his environment which helped in the Han formulations of this topic. As for the Legalists, the 4th main strand in Chou philosophy, we find in the *Shang Chün Shu* in accordance with its realist approach to politics, a firm belief in the innate differences between individuals: "Now Li Chu could see an autumn hair at a hundred paces, and yet could not transfer his keen vision to another, etc."[22]. But in general, the Legalists were not greatly interested in the nature of the individual, but only in his relation to the state. We have also references to differing abilities in most of the Chou and Han Confucian authors[23], but nowhere, not even in the *Lun Heng*, do we find any progress along these lines. It was in fact, the marrying of Confucian preoccupation with human nature with Taoist naturalism that led to the first real attempts to tackle the problem.

The early Han philosophers with their eclectic approach developed a profounder view, making use of the beginnings made during the Chou. The most important books for our purposes are the *Ch'un Ch'iu Fan Lu* of Tung Chung Shu (c. 179–104), the leading Confucian of the day, and the *Huai Nan Tzu*, a compilation of about the same time, generally called a Taoist work, but in fact, akin also to the other books of the period, a mix-

20. For all sorts of transformations believed in at this time, see the *T'ai P'ing Yü Lan*, chaps. 887–888.

21. Mei, p. 113; *Shen Chien*, chap. 4, sec. 11 (see *Index du Chen Kien* of the Centre franco-chinois d'études sinologiques); *Lun Heng*, chap. 7 (Forke I. p. 327 has a definite mistranslation). Cf. Giles (op. cit.); and also B. Laufer "Sextransformation and hermaphrodites in China" in the *American Journal of Physical Anthropology*, vol. 3 (p. 259–262), for an interesting discussion of examples from the Histories.

22. See J. J. L. Duyvendak *The Book of Lord Shang* p. 243 (repeated on p. 309). See Duyvendak for discussion of date and authorship.

23. E.g. the *Analects* 17. 3, taken up by later writers. The *Lun Heng* and others explicitly distinguish talents from human nature.

ture of all the earlier schools[24]. Tung, in a discussion on the rectification of names, emphasised the importance of potentiality (a problem not yet solved – cf. the Lysenko controversy), and is worth quoting in some detail.

"Innate human nature *(hsing)* is like a cocoon, which requires to be reeled off to form the silk, or an egg which requires to be sat on to form the chick; it requires to be taught to be good", and later "it has been said that the innate nature has already the origins of goodness within it, and the mind the bases of goodness, and thus how can good not respond to these? But I say 'no'. The cocoon has the silk within it, but yet a cocoon is not silk. The egg has the chick within it, but yet an egg is not a chick"[25]. He also writes "The action of Nature *(t'ien)* stops at the cocoon, the hemp and the grain, but from hemp comes cloth, from the cocoon silk, from rice cooked rice, and (likewise) from innate nature comes goodness. These are all produced by the saint's furthering of Nature, and cannot be realised by the basic material of their nature alone", and again "innate nature is the basic material provided by Nature, goodness is the transformation worked by the training of a Ruler. Without this provision in the first place, the training cannot transform, without the training the basic material cannot be good"[26].

His main idea is that man is neither good nor evil until training by a saint (or ruler) draws out this potentiality to be good. Both he and Hsüntzu before him developed this need for training as their theoretical ba-

24. For these two see "The Cosmological and Anthropological Philosophy of Tung Chung Shu" by Yao Shun-yu in *JNCBRAS* vol. 73, and *Les Trois Théories Politiques du Tch'ouen Ts'ieou* by Kang Woo; "Ti-hing lun (das Weltbild des Huai Nan Tzu)" by E. Erkes in *Ostasiatische Zeitschrift* vol. 5, and *Tao, the Great Luminant* by E. Morgan, the last-named to be used with caution.

25. Both these quotations are from chap. 35 (see Hughes op. cit. p. 298–305) and are repeated with variations in chap. 36; they are also to be found paraphrased in *Huai Nan Tzu*, bk. 20, p. 6b, to show the limitations of the individual.

26. These two passages are from chap. 36, repeated in 35. See Yao p. 56–61 and cf. also Hu Shih (op. cit.) p. 121–122. We find this attitude to the inter-relationship between the object and its environment also in *Huai Nan Tzu*, bk. 2, p. 22a; Hsüntzu too was struggling for this concept, see bk. 19 (Dubs p. 234), and also bk. 23. Much of the thought of the time is hampered by the difficulty in rectifying names i.e. definitions. Tung himself in chapter 35, points out that the conflict between Mencius and Hsüntzu was over words.

sis for an authoritarian state. To show that he is not entirely hypnotised by this idea of training, he (as does also Huai Nan Tzu), follows and develops Confucius in distinguishing three grades of people. The ordinary middle people have this potentiality to be trained, but the two extremes are born to be what they are irrespective of their training[27]. But it is clear that he and the others of the time, though clear about Nurture, are still only groping for the Nature half of the problem.

Throughout the philosophical writings of the Han and even earlier[28] we find emphasised the rhythm of the universe, and the inseparability of man from his environment, perhaps the profoundest ideas in ancient China. The *Huai Nan Tzu*, some of whose ideas we have already seen, has been written from this point of view, and has a long passage[29] on environmental influence, mixed up with mythological geography, of considerable interest. Using the basic categorical method of reasoning of the Han he equates the geology of an area with diseases, and the diet with character[30], seeing a causal (though classificatory) connection between them. In fact the environment acts on the organism by the standard Han process of like on like[31]. He also gives a classification of the various animals based partly on their respective environments[32].

The former Han dynasty (c. 202 B. C. to 9 A. D.), though not providing us with especially concrete ideas[33], thus paved the way for a more de-

27. See Tung, chap. 36; *Huai Nan Tzu* bk. 19, p. 7b; *Analects* 17. 3 (J. Legge, *The Chinese Classics* vol. 1, p. 318).

28. In addition to those discussed here see the *Li Chi*, the *Lü Shih Ch'un Ch'iu*, the *Chuangtzu* and the *Kuantzu* (this last book is a mixed compilation of varying dates).

29. Most of book 4, see Erkes. Note that the *Ta Tai Li Chi*, chap. 81 has been incorporated in this book.

30. For a similar idea of the correspondence between character and the type of river see *Kuantzu* chap. 39.

31. For this process see especially *Ch'un Ch'iu Fan Lu* chap. 57 (Hughes p. 305), *Huai Nan Tzu* bk. 6, and *Lü Shih Ch'un Ch'iu* bk. 9, chap. 5. Tsou Yen, the reputed originator of the science of the time, unfortunately left very few independent traces of his ideas.

32. For the basic seasonal classifications running through all Chinese philosophy see *Li Chi*, bk. 4, or *Lü Shih Ch'un Ch'iu*, the first chapter in each of the first twelve books.

33. Compare their view of potentiality with Aristotle's detailed treatise on embryology for example.

tailed attempt in the later Han dynasty (c. 23–200) in which one work stands out. The *Po Hu T'ung*, the *Shen Chien*[34], the *Jen Wu Chih* with its attempt to classify character[35], and the *Ch'ien Fu Lun*[36] are all of interest, but for our purposes, the *Lun Heng* overshadows them completely. Let us now turn to this work.

PART II · THE LUN HENG ON HEREDITY

(a) Introduction[1]

Wang Ch'ung (c. 27–97) was a Chinese scholar of the later Han period whose sole surviving work is the *Lun Heng* in 84 chapters written about 85 A. D. This work is mainly concerned with (a) criticism of the prevalent belief in the interaction of man and Heaven according to which man's good and evil actions are responsible for Heaven's rewards and punishments by droughts and seasonal rain, etc.; and the substitution thereof by a natural and automatic system to account for events; (b) his belief in the inexorable operation of fate and chance, linked with his views on man's endowment at birth; (c) criticism of various superstitions and of earlier philosophers; (d) his views on human nature and

34. See H. Busch "Hsün Yüeh, ein Denker am Hofe des letzten Han Kaisers" in *Monumenta Serica* 10, and the Index (op. cit.).

35. See J. Shryock *The Study of Human Abilities*. Shryock overestimates Liu Shao's appreciation of heredity and scientific method.

36. See the *Index du Ts'ien Fou Louen* of the Centre franco-chinois d'études sinologiques for a summary of this work. It includes a chapter on physiognomy and a chapter on dreams.

1. For a fuller description of his main ideas see A. Forke *Lun Heng* vol. 1 and 2; "Wang Ch'ung" by Li Shi Yi in *T'ien Hsia Monthly* No. 5, 1937; and J. Needham's forthcoming *Science and Civilisation in China*. I wish to express my great indebtedness to Dr. Needham for allowing me to read this in manuscript and also for many valuable ideas. I wish also to thank Mr. P. van der Loon and Mr. D. Hawkes for pointing out some mistakes.

To save space I merely give the reference by page number to the two volumes by Forke. This translation is very valuable but at times the sense has been completely misunderstood. I have been greatly aided by the excellent modern edition the *Lun Heng Chiao Shih* by Huang Hui.

education; (e) his belief that Han times were the equal of the ancient times[2].

His methods of proof are one of the striking features of his book. He uses the appeal to the authority of the classics much less than other writers, and has an excellent grasp of logical proof, arguing sometimes by reductio ad absurdum from the innate contradictions of his opponent's thought, and having also some appreciation of the distinction between necessary and sufficient conditions[3]. His acceptance of proof by experience is somewhat marred by his trustingness and lack of any desire to observe for himself.

In short, he shows himself a convinced rationalist arguing logically from his premises. The fact that he accepts those superstitions which fit in with his world view – a rigid fatalism with a complete trust in the rhythm and pattern of Nature – should not make us underestimate his great originality and his attempted demolition of several other superstitions current at the time. His system may be summed up as a belief in a rational, necessary and rhythmical Universe in which all is harmoniously linked[4].

(b) The Spontaneity of Nature[5]

In common with Chinese opinion of the time, Wang looks on Heaven and Earth as the father and mother of the 10000 things[6]. He does not

2. Including the belief that human nature never changes, I, p. 471.

3. The later Mohists had already developed a system of logic distinguishing minor (necessary) and major (necessary and sufficient) causes.

4. There is little doubt that this idea of rhythm comes basically from the agricultural approach to Nature, found in the *Li Chi* etc. Where Wang advances, especially over the other Han writers, is in his rejection of man's influence on Heaven by other than natural means, and in his rejection of purpose in the Universe, whilst retaining a rational approach. At times, too, he seems to reject causal relationships as well, substituting a system of automatic linkages resembling our modern (functional) mathematical view.

5. See especially chaps. 7, 12, 14, 24, 54 and 62 (I refer you to the chapter order in the Chinese text, given in Forke I, p. 45 to 63). Obviously the early Taoists with their insistance on "fitting in with nature" *(wu wei)* and their fatalism have greatly influenced Wang. I have no space to deal with them here unfortunately. I refer you to Needham (op. cit.) and to M. Granet *La Pensée Chinoise*.

6. See *Ch'un Ch'iu Fan Lu*, chap. 41 and 56 (and elsewhere), for the extension of this idea

accept, however, the prevailing Confucian (and Mohist) belief that Heaven loves all its creatures, and joins the Taoists in pointing out that Heaven and Earth's joining their seed *(ching)* to produce their offspring is (like that of men and women) a spontaneous action without intention of any kind[7]. Once its creatures are formed, Heaven does not interfere (just as the child in the womb automatically develops beyond the mother's control). Thereafter the natural course of life cannot be stopped, and living things inexorably march on, until their death[8], each species having a natural but ideal limit to its length of life (– as opposed to the Taoists of his time, who claimed to produce immortality –) in accordance with its bodily form. Both the form and the length of life depend upon the original life's-breath *(ch'i)* it is born with[9]. Animals struggle for survival, bodily strength, courage and skill being most valuable. Man himself is no exception, for grain is not created for man, just as man is not created for the tiger[10]. He insists in fact, that man is an animal like other animals, albeit the noblest[11], comparing him in his relationship to Heaven with the lice on his own body[12]. Man, he says, bears his children like the other creatures, and compares the process with that of the beasts, likening the placenta also to an eggshell or the husk of a fruit[13]. Death, he says[14], is the return to the formless mass, comparing it to an unhatched egg without form. Once the life's breath has gone,

to include a thoroughgoing parallelism between Heaven and Man, e.g. "as Heaven has 365 days so Man has 365 joints in his body" etc.

7. I 92–93, I 99, I 103. Cf. I 101–102 where he explains the birth of a horse to a cow as due to Heaven's lack of control of its emission. For belief in hybrids see "The Jumar in China" by R. C. Rudolph in *Isis* vol. 40, p. 35–38.

8. I 337.

9. See I 325 and also I 315. For man, 100 years is the ideal expectation, his approximate maximum if nothing intervenes to cut it short.

10. I 92, I 105–107; compare *Lieh Tzu* bk. 8 Y, which has the same idea.

11. I 528, I 191, II 365.

12. I 103, 109 and elsewhere.

13. II 381–385.

14. Chap. 62 on "Death", I 191–201; cf. I 329–330, and II 113.

the body collapses just as a sack when the contents are withdrawn. And at death no soul can linger on[15].

(c) On Species[16]

Following this naturalistic pattern, he rejects the commonly accepted belief in the miraculous births of the mythological Emperors, explaining the associated phenomena as portents occurring coincidentally with the natural birth or conception of great men. His most interesting reasons are found in this quotation from chapter 15, "Miracles"[17]:

"Suppose a giant had impregnated Chiang Yüan, how could she with her small body, have received the whole of his semen *(ching)*, without which Hou Chi could not have become a complete man. If Yao and Kao-tsu were really the sons of dragons, since a son's nature is of the same kind *(lei)* as his father's, they ought to have been able to ride clouds just as a dragon can. All plants born from the earth resemble their original species *(chung)*; that they are not of the same kind as earth is because their life did not come from the earth, which merely nourished them. A mother's carrying her child is like the earth's rearing of plants. The impregnation of the mothers of Yao and Kao-tsu by a dragon is just like the sowing of seed in the earth[18]. Thus, the two Emperors ought to resemble dragons since plants are automatically of the same kind as their original species. Moreover, sanguineous animals pair as male and female. When male and female meet, all require their semen to be stirred *(kan)* and their lust aroused by sight of a creature of the same kind before they

15. The problem of the soul, though connected indirectly with heredity, cannot be entered into here.

16. See especially chaps. 7, 15, 24 and 50.

17. I 318–324 where can be found further valuable examples, though not all of the calibre of this quotation.

18. Cf. J. Needham *History of Embryology* page 25–26 for this same view as to the mother's function in Egypt and Greece. Aristotle, however, believed that the male gives "form" to the female "matter". The Chinese "Yang is Spirit, Yin is material", and "*ch'i* from Heaven, body (shape) from Earth" have similarities with this latter view. In fact, the two theories are not as far apart as one might think.

can produce an emission. Thus, when a stallion sees a cow, or a male sparrow a female chicken, the reason they do not mate is that they are of different kinds. Now a dragon is of a different kind from man, how can he be stirred by man to emit the life-giving fluid *(ch'i)*[19]."

It is clear that Wang has an excellent notion of species[20]. It is true that he believes in spontaneous generation[21] and accepts transformations unknown to modern biology[22]. But we must realise that to the non-naturalist belief in metamorphosis of birds is no more to be surprised at than that of insects. My own opinion is that the Chinese belief in weird transformations is due to their appreciation of the great importance of the environment. "The sparrow turns into a clam", so commonly found in the Taoists and elsewhere, is the change produced by going from the air to the water. Wang in general rejects transformations for man, on the grounds that animals which undergo metamorphosis must do so and vice-versa[23]. Thus he was clear on the basic point; those transformations which do occur are natural and fixed, following a pattern. His main interest in all this was to prove that man cannot increase his span of life by the various methods used by the Taoists of his time; species are fixed and their ideal length of life unalterable[24]. We can forgive, perhaps, his lack of practical biological knowledge[25], when we find attempts to fit into his world view bird migrations[26], foretelling of weather by animals[27], and heliotropism of plants[28].

19. For the technical and philosophical terms see the appendix. It is not always possible to use the same English word for these basic concepts. In the Chinese they have many different connotations, sometimes all at the same time.

20. Compare also I 334, I 325–329.

21. II page 364–366 and elsewhere.

22. I 322, 326, 193, and elsewhere. In addition to previous references see "Pao-P'u Tzu" by E. Feiffel in *Monumenta Serica* vol. 6, p. 142 for various transformations.

23. I 325–329, but see I 193, I 322 and II 359 for the contrary view.

24. As opposed to the Taoists; see chap. 24. See also *Pao-P'u Tzu* for the Taoist view.

25. For example, he believed hares conceive by licking the down of plants, and give birth via the mouth (I 319).

26. II 4–5.

27. II 124 and 368, I 109. 28. II 320–322.

Even in his discussion of mythical animals, we can find a good deal to interest us. In chapter 50[29], in the middle of a highly fanciful discussion of good omens, he repeats his belief in like begetting like but qualifies it by writing that "ominous" creatures such as the *Ch'i-lin* (unicorn) and the *Feng-huang* (phœnix) are not of a separate species but are produced by an ordinary deer or bird as an abnormality due to the harmony of the times[30]. He continues that they cannot produce another "sport" and that their offspring (though possibly he thinks they cannot reproduce at all) revert to the normal. He uses this mechanism to explain the evil sons of the Sage Emperors. Before we conclude that he appreciated the modern theory of segregation or of mutations we must note that he explained this also by means of the analogy of fish born of the water without parents. In fact, his ideas are so overflowing that we find the most brilliant and most absurd speculations side by side, and, it must be admitted, more internal contradictions than one likes.

(d) On Man's Endowment[31]

Each animal is distinguished by the kind of life's-breath *(ch'i)* it is endowed with, and man's whole future is governed by his. He receives at conception (at times he writes "at birth", possibly by mistake but possibly because he is never exact as to the parental connection with the *ch'i*) his *ch'i* from Heaven *(t'ien)*. According to the copiousness of this *ch'i* so is his innate nature *(hsing)* and also his bodily size and health, and his length of life[32]. At the same time, he receives with the emanation *(ching)* of the stars his destiny *(ming)* which governs his wealth and station in life[33]. This theory of a personal destiny and nature, fixed

29. See I 365–369.

30. See also II 310.

31. See especially chaps. 4, 6, 7, and 12.

32. See chap. 7 and chap. 4; see also I 471.

33. See the very important chap. 6, I, p. 138. He does not clearly differentiate *ching* and *ch'i*, both being life-giving fluids. Nor is he always consistent as to whether Destiny governs the length of life as well as success and failure.

from the beginning and unalterable thereafter, runs through his work. He takes up the earlier ideas we have seen and compares man and his fate to the egg and its potentiality, saying[34]:

"The fate they (the Emperors) are endowed with is fixed in the (mother's) body just as the chicken's sex is determined already within the eggshell[35]. When the shell hatches, the male or female is born. When after days and months its bones and joints wax stronger, the cock mounts the hens of its own accord. It is not a case of its needing to be taught after it has grown to act the cock and mount the hens. It is a spontaneous act after its nature *(ch'i hsing)* has grown stronger."

He goes on to say that for plants too, the branches, leaves, and size are all from the seed. In fact, all is decided from the beginning. There is no attempt to give a mechanism for this process; Wang thinks the problem solved by his system of predestiny. His appreciation of the importance of congenital inheritance is, however, undoubted, though he is not always clear as to the part played by the parents.

He distinguishes three types of nature *(hsing)*, the ideal *(cheng)*, the concomitant *(sui)* and the accidental *(tsao)*[36]. The first is the nature endowed with the Five Virtues by Heaven, the second the nature received from the parents and the third that due to misfortunes from outside.

As I understand his theory (though perhaps making it more consistent than it actually is), the ideal nature is fixed by Heaven in accordance with his species, the concomitant nature is due to the copiousness of the endowed *ch'i* caused (at least partly) by the parental influence, and the accidental is due to the pre-natal influence, the *hsing* being fixed at

34. I 132. See also p. 130–131.

35. The odd references to the sex of human embryos are hardly worth mentioning. The methods of prediction are similar to superstitions elsewhere. See *T'ai P'ing Yü Lan* chap. 360–361, on birth and pregnancy. The *Lun Heng* does not consider the topic.

36. Chap. 6, I 140. These three terms are also used for the three types of destiny (with similar connotations) accepted by the Confucians of the time, which he rejects in favour of two kinds, the concomitant destiny (due to good actions) being rejected. It is also significant that he used the word *cheng* to signify the ideal length of life. Cf. I 313.

birth by a combination of these three (though possibly later environmental influence also has its say)[37].

In chapter four[38] after writing that, should the 100 years mark not be reached by a man, it is because the life's-breath itself is insufficient in the first place, and that still-births and abortions are due to the sparseness and weakness of the endowment of *ch'i*, he goes on:

"Just as when Heaven and Earth produce (living) things, there are those which do not complete their natural span, so when parents produce a child there are those who do not come to completion. Some may, as fruit, wither and die and fall before their time, and some may, when children, be short-fated and harmed. Should the fruit not have withered it would have reached its full year, and should the child not have been harmed it would have reached its 100 years. But the fruit and the child which wither and die, are endowed with too weak a life's-breath, and though the body is complete, the deficient life's-breath is insufficient to fill it. When a child is born if its voice is shrill and powerful it will live long, if croaking and feeble it will die young. Why? Because when the fate of long or short life is endowed, the quantity of the life's-breath[39] is the cardinal factor for the inborn nature *(hsing)*.

If a woman bears children infrequently they live. If she bears *(ju)* frequently they die[40]. Why? If she bears infrequently the life's-breath is copious and the child strong, if frequently then it is sparse and the child weak. If a woman who has previously born a child which died, be-

37. In mixing up destiny *(ming)* with long life, and relating both long life and nature to the *ch'i* we find some inconsistencies. Once again it is due to a failure in definition of *hsing* and other terms.

38. I, p. 313–314. He is considering here only the ideal destiny, the accidental destiny also coming into play after birth. Cf. also chap. 6.

39. *ch'i* means breath (i.e. voice) as well as life-giving fluid. Investigation of the sound of a new-born baby's voice was one of the methods used by the physiognomists.

40. The *T'ai P'ing Yü Lan* adds here "as a gourd which has many flowers has only few fruits". In *Liehtzu* 6 E, the same idea occurs. It is possible that the interpretation by the *Tz'u Hai* dictionary (and European translators) of *ju* in the *Liehtzu* passage as "suckle" is correct. But I doubt it. In the *Lun Heng* such an interpretation (by Forke) is a mistake.

comes pregnant then it is said that the fœtus will not live and it is called an abortion. The meaning being that as the former child died, the child which is aborted will lose his original nature[41]. The child which was born, died, and the child in the womb meets with misfortune because, due to the frequency of the births, the life's-breath is sparse and the child's body cannot be completely formed. Though his body be formed, he is easily harmed, becomes ill before others and he alone cannot be cured."

Though Wang does not specifically link this with his concomitant nature (from the parents), it is clear that the original life's-breath from Heaven is affected on Earth too. In chapter 6[42] he has an equally interesting section on pre-natal influence as his example of the third (accidental) type of nature.

"Thus if a pregnant woman eats a hare her child will be born with a hare-lip[43]. The 'Yüeh ling' (chapter of the *Li Chi*) says[44]: in this month, if anyone does not compose his countenance when thunder is about to sound, his children will be born incomplete and will certainly meet with misfortune. As for the deaf, the dumb, the lame and the blind, their life's-breath has met with a hurt whilst within the womb, and hence they have received a perverse nature. Yang She Shih Wo had a voice like a wolf at birth and when he grew up had a wicked nature and died through misfortune[45]; it was whilst within his mother's body, that his nature became like this. The like holds good for Tan Chu and Shang Chün. Character and destiny are there from the beginning, and there-

41. The text is not convincing at this point, but the main argument is clear. Cf. the *Nei Ching* (the first medical work, probably of the former Han dynasty) bk. I, chap. 1, which claims that children of old parents are feeble as the life's-breath *(ching ch'i)* is used up.

42. I, p. 140–141.

43. Found elsewhere, e.g. *Huai Nan Tzu* bk. 16, p. 19b has "if a pregnant woman sees a hare her child is born with a hare-lip, etc.", embedded in a section on the influence of like on like. This superstition is of course world-wide.

44. See *Li Chi* bk. 4 (Legge I, p. 259–260), repeated in *Huai Nan Tzu* bk. 5, page 3a, and in *Lü Shih Ch'un Ch'iu* bk. II, 1 (Wilhelm, page 15).

45. See *Tso Chuan*, Chao Kung 28th year (J. Legge *The Chinese Classics* vol. 5, p. 724).

fore the *Li Chi* has a method of training the unborn. When the child is within her body the mother must sit only on a straight mat, eat only correctly cut food, see only the proper sights and hear only the proper sounds[46]. Though the child when older may be provided with a good teacher and wise master and taught the way of a ruler and minister and of father and son, his worth will be formed at this time. At the time of conception if the mother does not take care and has wild feelings and wicked thoughts then the child will grow up perverse and evil, and his body ugly. When Su Nü expounded to the Yellow Emperor the methods of lovemaking of the five maidens[47], not only did she do harm to the bodies of the parents but also to the natures of the children[48]."

(e) On Human Nature

We have seen now the different influences that work upon the life's-breath and thus alter the inborn nature. But what does Wang say of this nature once formed? Unfortunately nothing very original. He takes up[49]

46. This comes from the *Ta Tai Li Chi* chap. 48 and not the *Li Chi* as we have it, an abbreviated version of the former. The *Lun Heng*'s rendering is somewhat different but seems to have been taken from an early commentary adopted by many later writers. Cf. also J. Legge *The Chinese Classics* vol. 1, p. 17. See also the *T'ai P'ing Yü Lan* chap. 360–361 for this and other interesting examples on birth and pregnancy. For later views see the *T'u Shu Chi Ch'eng* bk. 15, chap. 31, bk. 17, chap. 405–407 and chap. 421. Chinese medicine is greatly concerned with pre-natal care.

47. Forke's "To have five wives" does not fit the context here and is wrong. It would fit in well with the ideas of chap. 4 on the need to ration the life's-breath, and also with Taoist methods of sexual hygiene. Cf. R. van Gulik *Erotic Colour Prints of the Ming Period with an Essay on Chinese sex life from the Han to the Ch'ing Dynasty.*

48. Later, of course, it was accepted that adultery and other evil acts caused maimed children. A glorious example is found in Giles (op. cit.) of a child born with a small head because his father was beheaded! See also the *Nei Ching* bk. 13, chap. 47, in which is suggested that mental disease may be caused by frightening the pregnant mother. In general, the modern scientific view is that such influences are imaginary. It is interesting to compare, however, Jung's *Contributions to Analytical Psychology* (Translated by H. and C. Baynes) p. 283: "If its (the neurosis') determination were shifted back into the intro-uterine existence, thereby involving the psychical and physical disposition of the parents at the time of pregnancy and conception – a view which in certain cases seems not at all impossible – . . ."

49. Chap. 13. The three grade theory is also developed by the more orthodox *Shen Chien*, bk. 3, sec. 7.

the scattered references of Confucius, and incorporates them brilliantly into the three grade system commenced earlier in the Han and later to be taken up by the great Han Yü of the T'ang dynasty. He controverts Mencius and Hsüntzu by giving examples from the classics contradictory to their theses, and concludes that those to whom Mencius' theory applies are the very good, Hsüntzu's the very bad, and those in the middle who can be trained, as Yang Hsiung wrote[50], good and bad mixed. In chapter 8, he discusses the environmental effect on the *hsing* and the value of training without any new ideas. It seems that he too has not adequately distinguished ethical and congenital nature. He never succeeds in happily marrying (or divorcing) these two problems. In his attitude to *hsing* as congenital nature, he follows, in the main, his Taoist leanings; but to *hsing* as "ethical nature" he is a Confucian. The bifurcation is still not solved, and he does not explain how his unalterable *hsing* can be altered.

(f) On Likeness to Parents

Wang, unlike the other early writers who took it for granted[51], shows some signs of appreciating that there is a problem of likeness to be solved. In his chapter 15, we have already a discussion of likeness to the father. He gives also the examples of Hsiang Yü's double pupils and Confucius' musical ability as evidence of their descent from Shun and the Yin Emperors respectively[52], writing that men follow their father's nature. In his chapter 50, however, we find, besides his discussion of "sports", examples of men of like appearance by chance. So we are no further.

But in chapter 11, on "physiognomy", he puts forward a constructive theory to account for likeness between parents and offspring. An integral part of his philosophy is that human destiny and nature, fixed at

50. In his *Fa Yen*, bk. 3.

51. e.g. the *Ch'un Ch'iu Fan Lu*, chap. 41 and elsewhere.

52. I, page 324; see also I 305 and II 115, for these two stories.

birth, can be seen in the sky and in the body respectively[53]. Moreover, people meet and marry by a predestined scheme. If unsuitable, one or the other dies, not through any causal relationship, merely by destiny[54]. Linking these ideas he writes: "From this we can infer that the people of a household all have a physiognomy showing a noble or wealthy destiny together. Being of one kind they have the same *ch'i* and the same *hsing* so that their bodily structure and physiognomy resemble one another[55]."

His ingenious theory is spoilt somewhat by his including likeness between husband and wife as well as children (though this attractive idea has probably a great deal of truth in it)! A further weakness is that by similarity he means the abnormalities such as "four nipples" and "seventy-two black spots" which he accepts (as did everyone else) as the mark of the Sage or noble person. In fact we must dismiss this theory as not necessarily concerned with heredity. However, there can be no doubt that Wang was sufficiently interested to attempt to give an explanation of what others had assumed, and it shows his desire to include as many phenomena as possible into one all-embracing system.

PART III · CONCLUSION

Later Chinese ideas cannot be discussed here. Looking at the encyclopedias we find a wealth of material to be investigated. Though we have discussed one topic only, I think we can use it as a pointer to the scientific ideas of the Chinese, and to what we may discover of value in later work.

It is not unfair to sum up the early Chinese achievement by compar-

53. Actually, physiognomy, he writes, can give us both the destiny and character of a man. Previously, in China, the two ideas had not been associated together.

54. Unfortunately this interesting theme of "ships that pass in the night", reminiscent of Leibnitz' clock analogy (used by him in another context) cannot be followed up here. It is in fact, one of the fundamentals of his scheme.

55. Note that in ancient China with its punishment up to the ninth relationship, it is not unreasonable to assume a common fate for each household.

ing Wang with Aristotle. The latter was a biologist who happened to be at the same time a brilliant philosopher, whereas Wang was a philosopher who speculated, at times brilliantly, on biology. It is in fact, as a rationalist that he scores his most telling points. He believes that many of the most absurd tales of the time are true, but he is in advance in attempting to explain them rationally and naturally in one simple theory. Later work, especially that connected with medicine, can be expected to give us many interesting ideas, but in general based on unsubstantiated theories. It may be superficial to write that science did not forge ahead in China after a promising start because it lacked experiment and observation. Nevertheless, this is true. But why these were missing is another story. Nor is it certain that European ideas before the Galilean revolution were ahead of the contemporary ideas in China.

APPENDIX OF CHINESE TERMS

I do not give all the meanings, only the most frequent for the early period, and those found specifically in the *Lun Heng*. I repeat that they often have several connotations at the same time.

1. Cheng 正 upright, correct, ideal, formal, regulate.
2. Ch'i 氣 vapour, emanation, fluid, influence, life's-breath, life-giving fluid, breath, air, that essential substance by which a thing exists.
3. Ching 精 semen, emanation, seed, life-giving fluid, essence, fine parts, pure.
4. Chung 種 species, kind, to sow (seed), race.
5. Hsing 性 nature, innate (or inborn) nature, human nature, character.
6. Ju 乳 suckle, feed at breast, milk, nipple, bear, rear, (in fact) the whole process of rearing a child.
7. Kan 感 influence, stir, move, affect, a technical term for the influence of like on like.
8. Lei 類 like, kind, type, species, similar, category, class.
9. Ming 命 destiny, Destiny, order, lot, decree, order of Heaven, will of God, fate, life.
10. Sui 隨 follow, concomitant, associate, accord with, accompany.
11. T'ien 天 Heaven, Nature, natural, sky.
12. Tsao 遭 meet, accident, accidental, run into.