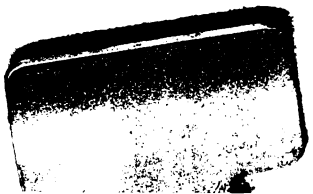

THE CARTESIAN PHILOSOPHY BEFORE DESCARTES.

BY

Dr W. A. P. MARTIN.

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The chief element of interest in the researches of our Society consists in exploring the intellectual resources of this empire. From this point of view ideas of recent importation possess no value. As in the porcelain trade, things that bear the stamp of antiquity are most esteemed — whether of native growth or borrowed from distant lands.

It is not therefore of the rôle played by the Cartesian philosophy in the teachings of missionaries that we propose to speak, but of cartesianism before Descartes — in other words to inquire how far it is possible to trace in the writings of Chinese thinkers the outlines of a system analogous to that of the eminent French Philosopher.

No better vantage ground can be found for surveying the field of Chinese speculative thought. It gives us something clear and precise with which to compare that which is fragmentary and somewhat obscure. For the geologist, it is a great advantage to be able to compare the remains of hipparion with the skeleton of a horse,

rather than with the fragments of some extinct animal.

But is not that assuming, some one will exclaim, that the philosophy of Descartes is not extinct! No! it is not extinct like the cosmogonies of the Timaeus. "Descartes" says Morell (1) — and he cites Dugald Stewart in support of his opinion, — "has unquestionably merited the reputation of standing at the head of the whole modern movement of metaphysical philosophy;" and as sober a critic as J. H. Lewes (2). though not belonging to his school, admits that "no man can dispute the title of Descartes to be regarded as the father of modern philosophy".

Not merely was it his breath that called it into life two centuries ago; the philosophy of the present day still bears, as we shall see, in some of its features the marks of its parentage.

A brief review of some of the doctrines of Descartes will put us in a position to recognise them when we meet with them in a foreign clime and at an earlier age.

He was equally distinguished in three departments of intellectual activity; and his achievements in each were sufficient to win the meed of an imperishable name. Newton combined mathematics and physics; Bacon physics and jurisprudence; but of the three great men (3), with whom he is usually compared, Leibnitz alone shares with him the honor of wearing a triple crown. Each was a sovereign in the three united kingdoms of metaphysics, mathematics, and physical science.

Great as was Leibnitz, the influence of Descartes was so obvious on the course of his speculations, that it may be doubted whether his magnificent genius would have unfolded in its full perfection without the light of the earlier luminary. Descartes, on the other hand, called no man master, and displayed an originality unsurpassed in the annals of philosophy.

(1) *See notes at the end.*

According to his own declaration, the most valuable thing that he carried away from the school of La Flèche was "a conviction of his own utter ignorance and a profound contempt for the systems of philosophy then in vogue." — Not a bad preparation that, for undertaking and effecting a revolution in human thought!

In mathematics, his merit is uncontested and the boon which he conferred on the world in giving it that most powerful aid to research — the method of analysis by the application of algebra — is specially conspicuous.

In physics, he expounded the true theory of the barometer and described the crucial experiment shewing the limit of the ascent of mercury; — before Toricelli. The experiments performed by Pascal at the Tour St Jacques and on the Puy de Dôme were suggested by him as confirmations of his own theory in opposition to that of Galileo (4).

These are now simple things, level to the comprehension of a schoolboy; but the experiments that explained them made the reputation of one of those philosophers and added lustre to that of the other. It is chiefly in the department of physics that we shall have occasion to admire the sagacity of his daring conjectures — I allude to his discovery of a supersensible world to which he was the first to give the name of Ether.

In the department of transcendental metaphysics, he was treading on ground less solid; like Milton's Satan in the realm of Chaos:

"*O'er bog or steep, through strait, rough, dense or rare,*
He swims or sinks or wades or creeps or flies".

What wonder that he left behind him no well defined pathway that others are content to follow! Yet it is precisely in this region, that his influence has been most conspicuous. Spinoza, Leibnitz and the noble army of German transcendentalists are all his

lineal offspring. Those who consider that metaphysics have done nothing but obstruct the progress of science, will be slow to admit this as constituting an additional claim to the gratitude of mankind. "His philosophical method subsists to the present day," says Lewes — a writer of the positive school — and he adds, not without a perceptible sneer: "It is the method implicitly or explicitly adopted by most metaphysicians in their speculations on ontological subjects".

As a preparation for gauging the speculations of some of the leading thinkers of China, there are three things in the system of Descartes, to which I beg to direct your attention, to the exclusion of everything else. They are,

1° His Method.

2° His Hypothesis of a universal Ether.

3° His Theory of Vortices.

I. His method is deductive — commencing with general principles and following them out to their consequences. It is the opposite of induction, which from the study of particulars ascends to generals. The one explores a river by entering at its mouth, and working slowly inland against the current. The other strikes boldly across country for the head waters, and then pursues their downward flow. The former is the method of Bacon; the latter that of Descartes. Each wrote a book to expound his mode of philosophizing, and each believed that he was conferring on posterity an invaluable instrument of investigation. No two modes of proceeding could be more opposed to each other and yet, as we have shown by the illustration of the river, each may lead to success.

Nothing so strikingly exhibits the force and originality of the mind of Descartes as the fact, that having read the books of Bacon, he rejected his method, to proceed in the contrary direction;

nor does anything more strikingly exhibit the limitations of the human faculties, than the fact that, like navigators before Columbus, each of these pioneers of science was only able to look on the globe on one side, while in reality it required a combination of both to make out a system of philosophizing complete and round.

As a matter of fact each, while insisting too exclusively on his own view, makes large but tacit use of the other method. From the constitution of the human mind it is as impossible that it should be otherwise as it is for a worker in electricity to restrict himself to the use of one fluid to the exclusion of the other. Descartes' exaggerated estimate of the *a priori* method resulted from the natural tendency of a preeminent mathematical genius; Bacon's neglect of it was due to his ignorance of mathematical science. How extensively Bacon and his followers had recourse to deduction, I shall not pause to point out.

It is of more importance to indicate that Descartes resorted to experiment so frequently, that some of his admirers have made out a plausible argument to claim for him the honor of being founder of the exprimental philosophy — an honor so peculiarly belonging to the great Englishman, that an attempt to tear it away looks as monstrous as the claim to the crown of France so long put forward by the kings of England. His apologists have failed to recognize the essential difference between an experiment in the hands of Bacon and in those of Descartes. With the former it was the first step toward discovery; with the latter it was the last — only resorted to for the purpose of confirming a conjecture or an inference based on general principles. The former was so devoted to experiment as a mode of discovery, that he lost his life in making an experiment with his own hands. The latter believing himself to be in possession of the fountain of truth was so well satisfied with

the potential as to be comparatively indifferent to the actual. "I have proved it by reasoning" said he to his friends, "try it, and you will find it so". Hence, instead of putting himself to the trouble of making them, he suggested those experiments with the barometer which have added brightness to the illustrious name of Pascal. What a curious anticipation of the case of Leverrier divining the existence of a new star, and informing his fellow astronomers where they would find it!

These two types of mind have existed in all times. Aristotle was an experimentalist: Plato an *a priori* reasoner, yet Plato it is who states in the clearest manner the advantages of the experimental method.

"Experiment causes the world to advance in a scientific way, but the neglect of it leaves progress at the mercy of Chance", he says in the dialogue of Gorgias. He saw the better way, but failed to follow it. Descartes in this resembled Plato, as he did in the whole cast of his mind, in his fondness for mathematics, his lofty ontological speculations, and his profound religious feeling.

I have said enough perhaps on the method of Descartes; and to show that I have not misrepresented it, I will dismiss the topic with a quotation from the Abbé Fontenelle, in which his procedure is contrasted with the Baconian method of Newton. "L'un, prenant un vol hardi, a voulu se placer à la source de tout; se rendre maître des premiers principes pour n'avoir qu'à descendre aux phénomènes de la nature, comme à des conséquences nécessaires. L'autre, plus timide ou plus modeste, a commencé sa marche par s'appuyer sur les phénomènes pour remonter aux principes inconnus".

II. Descartes' hypothesis of a universal fluid which he called Ether is eminently original. The name existed from the earliest times; he gave it a sense which it had never borne before; because

he had a clear conception of a substance, of which the Greek philosophers had not even a vague notion. Addison's fine lines beginning:—

"The spacious firmament on high
With all the blue ethereal sky" —

show the popular sense of the word; — the same in which it is employed by Homer, when he apostrophizes Jove as "dwelling in Ether."

The Greeks in accordance with their cosmical system used it for the empyrean or fiery sphere, the highest of the nine, the etymology of the word expressing that idea, *i. e.* "burning air."

With Descartes neither fire nor height has anything to do with the meaning of the term. In his acceptation, it signifies a substance out of which he supposes all the forms of matter to have been evolved.

That such a substance must of necessity exist, he inferred from his doctrine as to space. In his view, there is no such thing as void space; not merely are the interstellar regions filled with a subtile fluid different from atmospheric air, the interstices between the molecules of bodies are filled with the same substance. How it acts we shall see, when we come to treat of his celebrated theory of vortices.

The success of the Newtonian astronomy administered a soporific to the Cartesian hypothesis, which kept it dormant for more than a hundred years. But it only waited for the proper hand to wake it from slumber. It is not a mere figure of speech to say that, touched by a ray of light, it sprang again to life.

Newton's theory of light was that of emission, which regarded each ray as a stream of material particles projected through space as sparks fly off from the anvil of a blacksmith. But that theory labored under insuperable difficulties; and there were striking

phenomena, which it failed to explain.

One of these was that of interference or the extinction of light by the collision of two rays. In 1800, Dr Young suggested that this might be accounted for on the supposition of light being the effect of a vibratory motion in some elastic medium. In water, when two waves meet, at the moment when one is rising and the other sinking, they neutralize each other and the surface remains level. In the atmosphere, when two waves of sound meet in a similar manner, the result is the loss of a note. In the same way, might not darkness be produced by conflicting vibrations in a luminiferous medium? Sixteen years later, Fresnel showed that such a medium was required to account for the phenomenon of polarisation.

What was that medium? It could be no other than the subtile ether demanded and named by Descartes. The undulatory theory of light requires it: Heat and electricity equally call for it. At the present hour, it is admitted without exception by men of science; and the study of its properties has lately engaged the attention of physicists of great eminence.

Sir John Herschel, in his discourse on atoms, refers to the ether in which they move as a fluid which like our atmosphere has its elastic tension heightened by pressure — a pressure, he conjectured, of many thousands of pounds to the square inch.

Whewell, in his Bridgewater treatise, argues that this ether however attenuated must in some degree impede the free motion of the planetary bodies and eventually bring them to destruction — a view which derives no little confirmation from the fate of Biela's comet.

Sir William Thomson thinks he has found evidence that ether is viscous, having a consistency somewhat resembling shoemaker's

wax. It yields to pressure, but is split or fractured by a sudden blow such as the passage of a heavy charge of electricity.

This mysterions substance which no sense can percieve, no balance weigh, and no vessel contain, has taken its place securely in the world of science (5).

III. Theory of Vortices.

To represent the planets as moving in a stream of ether like apples in a whirlpool is not much of an improvement on the earlier theory of hollow spheres. Whewell, in his History of the Inductive sciences, points to it as a proof that, though Descartes had announced the first law of motion in advance of Newton, he did not fully comprehend its applications, or he would not have resorted to such a clumsy contrivance as the starting point of his *mécanique céleste*.

But the Cartesian Vortex is not merely a huger kind of maelstrom that carries the worlds on its bosom; it is also exceedingly minute and bears in its circling embrace each individual atom. This is evident from his explanation of the gaseous form of the atmosphere as due to the action of *tourbillons* of ether, which prevent the particles from coming in contact (6).

This view bears some analogy to the kinetic theory of gases, which explains their elasticity as resulting from the motion of their particles; and all who are familiar with the recent progress of molecular physics will perceive how the minute *tourbillon* of Descartes reappears in the hypothesis of vortex rings now resorted to to account for the activities of atoms as centres of force. The champion of this hypothesis is Sir W. Thomson, who constructed a machine to illustrate the action of the vortex ring. What a rehabilitation of a long neglected philosopher to find the foremost physicists of our century not merely accepting his ether as the basis

of their theories of light and electricity but borrowing his idea of vortex motion as an explanation of the constitution of matter!

Bearing in mind these salient points, let us travel back to the fifth century before Descartes and see if we can find in China anything answering to the Cartesian system. We shall occupy ourselves mainly with a constellation of thinkers who illumined the middle period of the Sung dynasty.

The most noted are Cheo Lien-hi, Chang Heng-chü, the two brothers Ch'eng, and Chu Hi, and their names being curiously alliterative are woven into a line of four syllables to assist the memory — *Cheo, Chang, Ch'eng, Chu.* Of the five, the most famous in China, and the best known abroad is Chu Hi, or Chufutsze — a preeminence due rather to his labors as expositor of the canonical books, than to any superior acuteness in speculation. In that respect he was surpassed by several, perhaps by all of the others. Chu Hi however was eminently endowed with the judicial faculty. He presents himself to our imagination as the incarnation of criticism; holding aloft the golden balance, not, like the fabled goddess, with blind fold eyes, but scanning the horizon with searching gaze; ready to welcome the precions metal from whatever quarter it may coome. Taoism and Budhism as well as the relics of Confucian antiquity engaged his attention and quickened his intellect. Like China's greatest sage, he might have said of himself: — "My office is to select and transmit, not to create or invent." His stamp is accepted as the hall mark not only for the orthodoxy of classical exposition, but for any opinion admitted into that huge conglomerate known as Confucian philosophy.

In speculation the method of all these worthies is uniform, viz to seize a first principle and deduce its consequences. Like their countryman Chang Ch'ien, the Stanley of the Yellow River, they

seek first to arrive at the milky way before exploring the course of the terrestrial stream. Not one of them ever thought of questioning nature by means of a careful induction of particulars. Confucius had indeed in one prophetic sentence laid down the maxim 致知在格物, "The progress of science depends on the study of things;" but the chapter which they say the sage had written on that subject was lost. They record the fact and expound his words, but not one of them undertakes to supply the place of the missing manual by a treatise *de augmentis scientiarum*. To them the example of Confucius was more powerful than his solitary saying; and that saying though embodying a vital germ, remained as barren as seeds wrapped in the cerements of an Egyptian mummy. For had not Confucius, like Plato, set the vicious example of indulging in speculations which are susceptible of no proof? Had he not accepted at the hands of the ancients, without questioning, a calculating machine called the Book of Changes, which professes by means of diagrams resembling an abacus to grind out great truths pertaining to all things in Heaven and Earth? His followers, even the bold thinkers of the Sung dynasty, have not ventured to question what the master accepted. Bound by the yoke of authority and led by a habit of the Oriental mind, they have clung to the *a priori* method even in matters susceptible of easy verification by experiment. — Witness that preposterous classification of elements which includes such an organic substance as wood, and omits atmospheric air. Witness again a blundering enumeration of the five senses, which includes the heart among the organs of sense, and omits the sense of touch. May not the omission in either case be accounted for on the supposition that the functions of air as a component of bodies were too subtle to strike the attention of primeval man; and that the authors of the other classification omitted

the sense of feeling from inability to find a special organ to which to refer it?

With us, chemical analysis has long since abolished the four elements, which our forefathers regarded as pillars of the universe; but in China, until recently, no analysis has been applied. It inspires us with a feeling akin to contempt to see philosophers resting their world-moving levers on a hypothesis as baseless as that of a numerical relation between the elements, the planets and the cardical points of the compass, which curiously enough they make five.

Their method was at fault — it was the deductive method of Descartes plus the bondage of ancestral tradition.

It is concisely expressed in a passage of Chang Heng-ch'ü.— "To know nature you must know Heaven. If you have pushed your science so far as to know Heaven, then you are at the source of all things. Knowing their evolution, you can tell what ought to be and what ought not to be, without waiting for anyone to inform you." (7.)

This is precisely the mental attitude of Descartes, who with the substitution of 'God' for 'Heaven' would have accepted the formula for his own. Descartes however examined his premises, a thing which our Chinese philosophers no more dared to do, than the Hebrew priests to open the ark of the covenant. Yet is it more surprising that they should entertain irrational opinions, than that Descartes should believe that the actions of brute animals are purely automatic, or that Bacon should believe in witchcraft?

We have said enough to show that the Chinese, though less rigorous in its application, employed substantially the method of Descartes; it is time to show that they held the same conception of Ether as that for which the illustrious Frenchman has obtained such deserved renown.

Chang, the writer last quoted, was born in the year 1020, a little more than a century before the advent of Chu Hi. He is the author of a small treatise entitled *Chang meng*, "Right discipline for youth." Its leading aim is moral instruction; but, with that kind of thoroughness so characteristic of the Chinese, he begins with the origin of the universe. "The immensity of space, though called the great void, is not void, but filled with a subtile substance. In fact there is no such thing as a vacuum.

Therefore the Holy Sage in speaking of Nature and Nature's laws comprehended the whole in the transformations of an organizing principle." (8.)

Here we have brought before us the old question of a *vacuum* or a *plenum*, so much discussed by the sophists of Greece; and our author resolves it in a truly Cartesian manner by denying the existence of a vacuum and filling all space with Ether.

With Changtsze or with Descartes this Ether is the primordial stuff out of which matter was formed; but he goes a step further than the Frenchman ventured and adds that into Ether all forms of matter are destined to return. His words are — "Within the immensity of space, matter is alternately concentrated and dissipated, much as ice is congealed or dissolved in water". (9.)

This conception, in all its fullness, we find presented in a recent work on the unseen universe; in which the hypothesis is advanced that matter may disappear by reverting to the state of ether; in preparation for reappearing in a new creation. Science however knows of no force capable of evoking it from its grave. At this point we must call in the intervention of a Deity to save us from the impossible idea of a defunct universe. Is it not what Horace calls

Nodus tali vindice dignus?

The consideration of this change of state brings us to what I have called the dynamics of ether. By Descartes this is comprehended in his theory of vortices — a term by which he described certain whirls and eddies of an attenuated fluid, which he represented as required not only to maintain the planets in motion, but to keep the particles of air from coming in contact with each other, and so changing into a solid.

The whirling and grinding of that primitive element, he believed to result in the production of the grosser forms of matter; and professed to point out the exact way in which the three leading forms, the gaseous, the liquid and the solid are actually generated.

The modern physicist who holds the dynamic theory of the molecule, entertains substantially the same view, however he may differ from Descartes as to details of the creative process. Curious as it is to see an obsolete theory revived in the heyday of western science, it is more curious to meet with it in China more than eight centuries agone.

Not only does Chang tsze agree with Descartes in making ether the primordial element, which condenses into matter, he and his fellows seem to have hit on vortex motion as an explanation of the mode of condensation:

"The great void" he says "is filled with a pure fluid. Since it is pure it offers no obstruction to movement"; or, to translate into the language of modern physics "in a frictionless fluid, the original motion is maintained without alteration." He adds:

"There being no obstruction to movement, a *divine* force converts the pure into the gross." (9.)

The Chinese philosopher no more than the Frenchman can explain the creation of matter without invoking the aid of a *divine* force. That he meant God in a proper sense, we shall not assert;

all that we insist on is that he attempts to explain the process by a theory of vortices.

A citation or two from other writers may serve to throw light on a view which they held in common. Cheo Lien-hi, a contemporary of Changtsze, is known as the author of a diagram of cosmogony. He begins with a single ring or circle of uniform whiteness. This represents the uniform, primitive ether. Then follows a circle partly dark, which shows the original substance differentiated into two forms, the *Yin* and the *Yang*, the meaning of which suggests night and day as the source from which the symbolism was derived.

Speaking of this diagram Chufutsze says "it shows how the primitive void is transformed into matter," and he goes on to describe the process. "The two forces" he says "*mo lai mo ch'ü*, grind back and forth in opposite directions, and the detritus resulting from their mutual friction is what we call matter." (10.)

We may smile at the rudeness of the illustration, but is it not very similar to that of Descartes, who describes the particles of ether as cubes which in the course of revolution get their angles rubbed off and thus give birth to matter?

I have not cited these passages for their intrinsic merit, but for the sake of their resemblance to the vortex theory of Descartes. So similar are they, both in substance and in imagery, that one might almost take them for different versions of the same original.

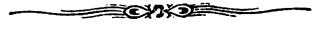
The Chinese are held to have borrowed much (some say even their written language) from India or Babylon: whence did they obtain their conceptions of ether and of vortices? Whatever analogies may be found in other countries, it is certain that their theory on this subject springs from the most ancient of their own sacred books. (11.)

On the other hand, is it certain that Descartes borrowed nothing

from them? Is it not possible that some fragment of Chinese philosophy translated by Jesuit missionaries may have fallen into his hands, while a student at the college of La Flêche?

If this could be shown to have been the fact, we should have to acknowledge an obligation to the extreme Orient of which we have hitherto entertained no suspicion. We should have to confess that the philosophic movement which rose in France and swept over the whole of Europe drew its first impulse from Chinese thinkers of the 11th century.

Until that can be proved, we must still concede to Descartes the honor of originality; but it may heighten our respect for the Chinese to know that they have had thinkers, whose speculations are not unworthy to be compared with those of the "Father of modern philosophy."



NOTES.

(1) J. D. Morell, History of speculative Philosophy in the Nineteenth century.

(2) G. H. Lewes, Biographical History of Philosophy.

(3) "Descartes, Bacon, Leibnitz, Newton, les quatre grands chefs de toute la philosophie moderne". *(Pensées de D., Disc. prélim.)*.

"Les trois grands titres de Descartes à l'immortalité : sa géométrie, sa métaphysique, et sa physique." *(id)*.

(4) Pascal's experiment was performed in Sept. 1648. A letter of Descartes addressed to P. Mersenne is extant dated Dec. 1647 in which he alludes with an air of unconcern to the suggestion he had given.

" J'avais averti M. Pascal d'expérimenter si le vif argent montait aussi haut lorsqu'on est au dessus d'une montagne, que lorsqu'on est tout au bas : je ne sais s'il l'aura fait." *(Pensées de D.)*

After the experiment had been effected, he addresses a friend to obtain information as to the result, and complains of Pascal for withholding it. Here is what he says, of his claim to priority :

"J'aurais droit d'attendre cela de M. Pascal plutôt que de vous : parce que c'est moi qui l'en ai avisé *il y a deux ans* et qui l'ai assuré que, quoique je n'eusse pas fait cette expérience, je ne doutais point du succès." *(id)*.

(5) A recent work on Physics by Professor Daniell of Edinburg places all the chapters on light, heat and electricity under the common rubric of " ether waves ", which appears as a running title at the top of each page. There can be no better proof of the new importance assumed by ether in physical science.

(6) In 1881, M. Nourisson read before the Academy of moral and political sciences in Paris a paper on the "Discovery and demonstration of the Theory of the Barometer." From an original letter of Descartes, he proves that the writer had a clear notion of atmospheric pressure. We shall cite the same letter to show how he explains the action of vortices in separating the particles of bodies: —

"Imaginez l'air comme de la laine, et l'éther qui est dans ses pores, comme des tourbillons de vent qui se meuvent ça et là. Et pensez que ce vent qui se joue de tous côtés entre les pores empêche qu'ils ne se pressent si fort l'un contre l'autre, comme ils le pouvaient faire sans cela, car ils sont pesants."—

The professor says "qu'il ne faut pas confondre l'éther cartésien avec l'éther des philosophes grecs". *(Le Temps, Mars 1881).*

(7) In the 五子近思, a work compiled by Chufutsze and subsequently enlarged by the addition of his own best thoughts, this passage occurs as Chang's answer to a question as to 格物, the study of nature:

學至於知天則
物所從出當源
源自見知所從
出則物之當有
當無莫不心喻
亦不待語而後
知

(8) Chang's celebrated treatise 正蒙 forms the 5th vol or 卷 of the 性理大全 or Grand Encyclopædia of Philosophy. For convenience sake I bring together in the following paragraphs all the passages in it bearing on the nature and origin of matter.

太虛無形氣之本體其聚其散變化之客形爾

太虛不能無氣氣不能不聚而爲萬物萬物不能不散而爲太虛循是出入是皆不得已而然也

氣坱然太虛升降飛揚未嘗止息山川之融結糟粕煨燼無非教也

氣之聚散於太虛猶冰凝釋於水知太虛即氣則無無故聖人語性與天道之極盡於參伍之神變易而已諸子淺妄有有無之分非窮理之學也

太虛爲清清則無礙無礙故神反清爲濁濁則礙礙則形

凡氣清則通昏則壅清極則神故聚而有間則風行而聲聞具達清之驗與不行而至通之極與

(9) The text of this and the preceding quotation is found appended to the above note. As to the literal accuracy of the rendering here given, I have some doubt. It makes 神 the subject of 反, which is liable to more than one objection. If however 神 be taken as an adjective, the general meaning amounts to the same thing; "Being freed from obstruction, it becomes divine" *i. e.* developes a divine energy in virtue of which the "pure becomes transformed (or returns) into the gross". This gives, it is true, no distinct idea of personality or what Plato calls eternal mind, but it does imply the inherence of a *divine power.* Ch'engtsze says in commenting on this passage: "Spirit and matter 神氣 are one and inseparable. To say that the divine spirit exists outside of matter, or that matter exists outside of the divine spirit, is to make two things of one." This is not atheism but pantheism.

(10) Cheo's diagram of cosmogony forms the first chapter of the 性理精義 or Minor Encyclopædia of Philosophy. It begins with the statement that "This (the diagram) shows the evolution of matter out of Chaos — its motion producing light, and its rest darkness," *i. e.* the dual principles. The comment of Chufutsze adds that "in Heaven and Earth, there is nothing besides motion and rest".

The last of the following paragraphs is from his book on 理氣 Matter and Force; and in this he sets forth his idea of vortex motion and its result in the production of matter:

周子曰㊯此所謂無極而太極也所以動而陽靜而陰之本體也朱子曰天地之間只有動靜兩端循環不已更無餘事此之謂易而其動其靜則必有所以動靜之理是則所謂太極者也

天地初間只是
陰陽之氣此氣
運行磨來磨去
便椰許多査滓
裏面無處出便
結成箇地在中
央氣之清者便
爲天爲日月爲
星辰只在外常
周環運轉地便
只在中央不動
不是在下

(11) The character inscribed in the first circle of Cheo's diagram is 易 change, the name of the Book of Changes. It means transformation, and its use here is an a acknowledgment that this theory of transformation is drawn from that ancient work. The other philosophers equally extol that venerable book as the source of their wisdom. Its different parts date back from 1200 to 2800 B. C.