Committee IV
East-West Perspectives
on Spirit and Science

DRAFT - 10/15/88
For Conference Distribution Only

SCIENCE AND SPIRIT: THE PLATONIC MODEL

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The Seventeenth International Conference on the Unity of the Sciences
Los Angeles, California November 24-27, 1988

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In an axiological inquiry about contemporary science, the starting point could be suggested by the statement that today's scientific thought obviously has become a noetic abstraction, and that applied science seems to tend towards the satisfaction of practical needs of mankind. At this very point, the question may be raised: is Aristotle responsible for this situation, since science claims its stemming from Aristotelian epistemological principles ? Should one proceed to Aristotle's trial on the ground that he has misled scientific activity by excluding from it specifically spiritual research and by confining it to a particular aspect of conscious life, that of the relationship between consciousness and the sensible world ?

The underlying intention here is to evaluate Aristotle's contribution to human thought, and its range as well, compared with that of contemporary scientific activity; then to discern to what extent the Platonic scientific model from which Aristotle early deviated could present come aspects that would make it adaptable to a more synthetic view of the spirit.

1. Aristotle's Mediative Scientism.

It has already been stated that pure science is a noetic abstraction; and that applied science is exclusively oriented towards satisfying practical needs of mankind. However, before accusing Aristotelianism of such negative and finally destructive influence, one should consider first that generally speaking, from an epistemological overview, Aristotelianism is not conceivable separately and independently from Platonism. Platonism is the matrix it is derived from and to which it is always reducible(1), in spite of its evident and inherent specificity which indeed has favored the growth and development of what we generally call scientific spirit(2) today . Secondly, it is undeniably been accepted that Aristotelianism can be epistemologically identified with a certain essentialism classically illustrated by traditional chamistry in which what interested the scientist were mainly the initial and the final states which respectively preceed and follow a chemical reaction, leaving aside the becoming this very reaction represents. Contemporary chemistry, on the other hand, is pre-

cisely interested in this very becoming, i.e. the "black box" which classical chemistry disdained(3).

These two considerations help in tuning our epistemological estimations and in reevaluationg Aristotelianism itself as an epistemological model. Namely, we are now able to consider it as a further elaborated phase of a scientific process that has started effectively within the Platonic Academy(4) which flourished for about 1.000 years(5). Consequently, one has to go back to the source from which Aristotelianism amerged, i.e. to the Platonic conception of science, not only in order to better understand Aristotelianism itself, but also in order to fully appreciate the possibility of an effective combination of both scientific and spiritual research within the same order of elaboration of human thought conforming to a single model. Indeed, if science has exclusively relied on the Aristotelian assumption that only particular knowledge is possible, then no synthetic science would have ever been inaugurated and no Weltanschauung could have ever been constructed.

It is true, of course, that Aristotle and his immediate followers took one more step towards the complete liberation of human reason from the mythical context from which it first emerged after the middle of the 6th century B.C.(6). In doing so, however, Aristotle and his school did not merely react against some fundamentally mythical conception of knowledge, presumably present even in the Platonic epistemology(7). On the contrary, they went on trying, like Plato and his own school had already done themselves(8), to further and systematically elaborate a system of methods(9) that would make possible a more adequate knowledge of reality, i.e. a more adequate adaptation of human rationality to the apparent structure of its object; in order to achieve a complete self-sufficient explanation of the world, and hence an adequate interpretation of the place and meaning of man as being integrated into it. Aristotle could have stopped the movement which had started with the Sophists and Socrates, a movement which tended to highlight the importance of human consciousness vis a vis the world, a tendency which differed completely from what had been previously the object of knowledge and the sole point of interest of the Greek thinkers(10), namely the world(3).

What saved Aristotle's enterprise is the comprehensiveness of his aim, inherited from Plato's activity, which consisted in edifying not only a science of objects and events, but also a science of being itself(11). This latter science he himself called first philosophy(12). By pure accident, it was subsequently called metaphysics(13). But it can definitely receive today the correct name of ontology, to avoid being confused with the spaculative exaggerations generally perpetrated in the past by minds improperly considered as philosophical, and even as scientific. Aristotle's partial failure is due firstly to his omission of a new and positive combination of scientific and spiritual needs and interests; and secondly to his lack of fortune in not having successors of genius comparable to his own(14). His successors went on repeating his theories without introducing any important change. Plotinus and neoplatonic thought were by no means attached to pure Aristotelianism. It was not until the early seventeenth century that things radically changed(15), thus revealing a new scientific era, that modern science, which has in our days been itself almost completely replaced by contemporary scientific conceptions(16).

Finally, Aristotle's epistemological theory is both close and far away from contemporary science. It is free from any kind of irrationality, but, at the same time, it fails to meet the spiritual needs of man. It is an objective approach to reality. However, it reflects a purely scientistic mentality relying on an epistemological dogmatism criticized by post-Kantian thought. Aristotle's position within the history of science is thus a curious one, although it seems to be the most normal one. In this perspective, Aristotelianism becomes both too exclusive in the sense that it neglects the spiritual needs of human beings, and too conservative in the sense that its static formalism has to be superceded by the dynamic formalism of contemporary science, in spite of the fact that fundamental categories (such as "static" and "dynamic" themselves(17)) originally distinguished by Aristotle have deeply influenced science for ever.

2. Plato's Synthetic Perspective.

The Platonic model of inquiry combining scientific and spiritual postulates thus seems to be a more adequate one for the real human spiritual needs.

Aristotle conceives of only one exclusive level of scientific research, and this is the valuable aspect of his theory; Plato conceives of a series of levels of research, the most elevated of which directly leads to philosophical thought understood simultaneously as the highest level for the rational fulfillment of spiritual needs, be they cultural, religious or of some other kind. Instead of exhaustively mentioning the passages that deal with this problem in Plato's work(18), I will try here to highlight some extremely relevant texts picked up in the Dialogues.

Plato"s epistemological and scientific strategy is for the first time exposed in book VII of the Republic. In this passage, three levels of harmonic studies, for instance, are distinguished. Empirical research is classified at the lowest level. It is with compassion that Plato leaves aside the reserchers belonging to that category of empirical investigators. Rationalistic research, then, follows; at this intermediate level the harmonicians try to reduce consonant sounds to the numerical ratios believed to be inherent in them, according to the teaching of the Pythagoreans(19). However, at the highest level, the scientist is asked to investigate the very nature (concordance, discordance) of the numbers thus implied, as well as the ultimate cause of this nature, which is rarely, if at all, explored(20). Such an investigation is qualified as "transcendent" and as useful to the extent that it preludes to dialectics itself(21), which, in its turn, transcends science, understood under its modern conception, since dialectics represents the highest degree of epistemological activity, leading to the knowledge of the ultimate reality.

This graduation of levels in scientific investigation allows us to appreciate how tightly Plato connects the scientist's object with an appropriate method to be followed in order to reach the aim of the scientific endeavour: in other words, the graduation of the levels of scientific activity directly corresponds to the scale of importance of the investigator's final objective, this objective being in fact the conscious aspect of the object to be reached. This of course entails that there is also a graduation of such objects, starting with sensible ones, then proceeding through intelligible ones, towards the ultimate object which is the universe of the beings par excellence, i.e. ideas (during

Plato's mature period) and forms (later, in Plato's unwritten doctrines[22]). At a certain moment, nevertheless, Plato himself abandoned the concept of complete purity of ultimate reality, to conceive of it rather as a unique structure consisting of a coherent mixture formed by the coexistence of both being and non being(23).

This theoretical model concerning the ascending order of the various scientific levels is however reversed in the Timaeus where Plato proceeds to the application of his conceptions in a text which he claims to be a kind of summa of the scientific knowledge of his time, as acquired within the framework of the activities of the Academy. This reversal illustrates a descending order in exposing the results of scientific investigation. It is understood that considering the various levels of research, one may proceed from the most humble and inferior to the highest and most eminent, whereas in disclosing the acquired knowledge one may follow an obviously deductive method according to which,once an original principle (or series of principles) has been established and accepted, a whole sequence of propositions depending on it may follow.

The narrative of the Timaeus is, of course, not, in this sense, as rigorous as, say, the first book of Euclid's Elements: it anticipates and ranges over the various parts of its theme. It proceeds from the level of the ontological principles(24) to that of cosmology(25), and thence to those of biology(26), anthropology(27) and medical science(28). In spite of these anomalies, its plan is undoubtedly clear and rational, be it in its own way. This same plan was inalterably followed for centuries through the Middle Ages and modern times by science in its methodical development. Only experimental scientific vision of the world, an Italian insight codified by Francis Bacon(29), which was based upon Aristotelian induction, has been able to overcome the resistance of a glorious tradition which survived in Cartesian scientific thought and dominated philosophical formalism up to Spinoza's geometrical conception of philosophy. But even so, the Aristotelian epistemological view, once it imposed its seal upon modern science, has deprived science of any further interest in broader spiritual objectives, with the results which have been deplored in the beginning of this paper.

On the other hand, the Platonic scientific model remains open to every kind of spiritual interest, though it encourages the application of a series of important partial methodical devices of which the Philebus contains a certain number of examples(30) completed by those contained in the Laws(31), in the Sophist(32) and in the Politicus(33).

Plato indicates two primordial aspects of the same method consisting in grouping together all available elements of a given problem, then in separating them into categories(34) within each one of which one has to proceed to a complete enumeration of the elements in question(35). The expression "how many and of which quality" recurs often in the texts of the philosopher's last creative period(36). Long before Kant, Plato insists upon the rigor of considering a multitude of dissimilar objects under a single concept(37), thus imposing unicity upon diversity and reducing multiplicity to unity(38), as well as distinguishing the object itself and what is said about it, including its own name(39), a conception which Ferdinand de Saussure illustrated through his opposition between the "significant" and the "signified". This leads to the process of what one could call "hierarchical classification" according to criteria which have been established in advance(40).

This method is explicitely analyzed in the Philebus(41) where Plato raises the problem of the reduction of the unlimited to the limit(42), of variety to unity(43), by considering each element in comparison with each one of the others (44). Under such a viewpoint, the function of the number in the process of enumerating and of opposing the various elements of a given problem is that of making possible the distinction of a measure, i.e. of a criterion according to which an attempt of reducing multiplicity to unity is made(45). In this respect, measure itself is opposed to number. On the other hand, such a reduction helps in discerning pure genus(46) which may finally be considered as principles(47) and as ideas(48). It is through number and measure that uncertainty may be overcome(49) before clarity and certainty themselves are introduced into thought under the aspect of rigor(50) that qualifies scientific truth(51),thanks to the transition from the changing status of the impure becoming to the sta-

tus of immutability of the pure eternal being(52), and hence from "opinion" to science(53).

The various particular sciences deal with phenomena. Beyond them, Plato places the "most true knowledge" whose objects are eternal realities. This seems to be an illustration of the epistemological program already exposed in the Republic . True knowledge has to do with transcendent objects, and this is precisely the Platonic conception of metaphysics ante litteram, as a science. However, Plato's views differ from those of Aristotle in this respect, in that Aristotle tries to found a science of being qua being, and defined through the intellect that follows appropriate methodical procedures, whereas Plato accepts that methodical procedures lead to transcendent realities which are independent from the intellect itself. Methodical procedures thus become a system of techniques which help clear the way towards transcendence. To start with, for instance, there is no way to acquire a general view of a problem without a preliminary division of its elements into adequate categories of species(54). The application of this method to further superior levels of knowledge allows consciousness to attain in its turn a level from which the vision of transcendence becomes possible. In such an activity, consciousness proceeds thanks to logos(55), considered, of course, not as a mere relation, but as an operational intellectual principle. This nature of logos allows it to discern similarities among different objects of consciousness and to highlight the unity these similarities express(56).

The specific nature of an object of consciousness(57) is to be defined through the difference of that object from all other similar objects, which recalls the Aristotelian definition of definition, where the notions of gender and difference are functionally related to each other(58). The Platonic approach to being results in its qualification as the most general entity from where specific objects stem thanks to a "methexis", a "participation" that makes possible their permanent relation to it, a relation according to which such an entity remains a paradigm to them(59). Whereas partial sciences deal with particular objects(60), the science of the most real being(61) opens towards immensity and therefore is the only real science. It is the importance of the very object of

a science that makes a science an important one. The "methexis"of consciousness to the object of that science becomes, under such conditions, a "methexis" to the reality of transcendence: it is not an ontological participation any more, but an epistemological one. It becomes a kind of Wesenschau, to use a term of the Husserlian epistemological vocabulary, and hence it means a certain spiritual fulfilment. Such a Wesenschau may be as wide as possible, so that the fulfilment in question also may indicate the plenitude of consciousness as well as a plenitude of human spirituality, which obviously cannot be provided through the Aristotelian approach towards being, and even less through the Aristotelian scientific formalism. A reevaluation of the situation, then, becomes necessary.

3. Applying the Platonic Model on Contemporary Science ?

From the foregoing, it is clear that (a) the Platonic scientific model is broader and more adequate to support both scientific and spiritual tendencies, and (b) the inherent validity of the Aristotelian scientific model which has impressed the evolution of science for centuries is being mistrusted nowdays, at least to the extent it has supported a static science. Therefore, one is confronted firstly by the problem of finding out whether the traditional Aristotelian model admits of some readaptation in order to fit to the new conditions that prevail in contemporary scientific activities. Secondly, there is the problem of combining the possibility of such a readaptation with that of broadening the applicability of this model not only to strictly scientific but also to genuinely spiritual aims. Then there is the third problem: that of appealing, even partially, to the Platonic model as far as it corresponds to some contemporary necessity. In other words, is the Platonic model expedient, desirable, opportune ?

The present scientific reality displays three major characteristics. The first of them is the scientific claim of the 19th century epistemological attitude which, in a way, has survived in the scientific conceptions of our time, but is being contested in some other aspects during the 20th century. The image of the world, which has been created since then, has a quite different perspective: traditional rigor is still considered necessary to the scientific study

of the world; yet it is not linked any more to postulates which do not take into consideration the reality of the scientist himself. Besides, the realistic view of nature and of its laws has been replaced by a rather idealistic view of them. On the other hand, the idea of scientific explanation of nature has been replaced by that of scientific interpretation of reality, due to the influence of the notion of the Geistwissenschaften.

In a context of Kantian origin, it is understood that natural laws, in their expressions through science, are not inherent in nature and that, in fact, they are projections, in a way, of the scientist's conception of the problems he intends to solve. The growing mathematization of science shows that what is of the utmost interest in scientific research is not the description of a thing, as the realistic understanding of science may still allage(62), but that of a relation, which has led to a moderate idealism illustrated by thinkers like B. Russell(63), A.N. Whitehead(64), H.B. Alexander(65) and A.S. Eddington(66). In some way, the whole scenery of scientific activity and of scientific expectation has changed.

The second major characteristic of contemporary science is that it appeals more than ever to imagination. For instance, in its conception of structure it takes into consideration geometrical and even artistic views. It is true that scientists have always had recourse to imaginative processes; however they structly refrained from accepting such a fact, pretending that their whole conduct was exclusively based on rigorous logical regulations. This is no longer claimed. No doubt, science still proceeds on a logical basis; still, it continuously needs further help on behalf of the imagination, in order to consolidate its own intuitions by formulating them in a more comprehensive manner.

Since scientific data increasingly become more complicated, they require an even more complicated means of scientific exposition. Hence the accelerated mathematization of science and the need for further materialization of its conceptions. Science, then, seems to become externally less rigid without losing its fundamental rigor. No scientific codification is valid any more. G. Bachelard

has shown (a) that there is no demarcation line between the consciousness of the scientist and the scientific object(67) and (b) that the growing use of imagination in scientific activity brings the latter closer to artistic creation(68). In this respect, scientific truth is no more considered as the product of some discovery, but as the outcome of a creative process(69). In the same order of ideas, the scientist is no more considered as a mere observer of the world, but as actively participating in its functioning through his own intentionality which entails a kairic attitude on his behalf(70).

The third major characteristic of contemporary science is that it is more obviously philosophically oriented than science has ever been, in that it has to refer constantly to some world model upon which it may found its own views. If such a model is to be consequential at all, it also has to be conceived of in such a way as to be adequate to the views in question, and besides, to admit of a constant remodelling, according to the needs that renewed scientific acquisitions entail. This is why the world models proposed by theories based on the fundamental principles of continuity or discontinuity, for instance, are basically similar and differ from each other only as far as their respective function is concerned(71). Contemporary scientific world models are objectifications of hypothetical explications of various interpretations of reality. Restricted models representing the structure of particular aspects of reality, e. g. those referring to biological data such as the structure of the DNA, have to be derivatives themselves, i.e. to fit into wider world models(72). In this respect, it has even been proved that similar constructions, for instance "armillary" spheres representing the celestial movements, already existed in Plato's time and were used in the Academy(73).

It becomes clear that contemporary science is ready to accept and utilise the Platonic scientific model to the extent that the latter is susceptible of facilitating the expression of the spiritual needs of contemporary man, without restricting however the rigorously logical prescriptions of the Aristotelian conception of the scientific process, although this conception has been shaked lately due

to its rigidity and to its excessively static character. Classical 19th century scientism suffices no more to answer the great spiritual ans existential questionings that move contemporary consciousness. Personified by Einstein and Freud, the great revolution in the field of scientific knowledge of the world and of man, in addition to the increasing use of technology, claims renewed visions of both: visions that, beyond mobility and uncertainty, may ultimately provide reassuring paradigms of external and internal reality. The irruption of art into scientific procedures is far from being a novelty, since Plato had already accepted and practiced it(74). It simply helps a better understanding of man's physical and moral place in the universe, a place that is continuously moving since he continuously tries to integrate himself into the world and to better control the process of this integration.

The very range of science, thus, is broadened, since science is asked to answer questions emerging from the depth of human consciousness and needing only an explicit scientific wording in order to be accepted as such by scientific thought. Millennia ago, myth alone was utilized to answer such questions about the true relation between man and the world(75), through the same structures. Then rational philosophical interpretations of the problems were formulated. But in Hegel's time already they were no more able to remain adequate to the changing data of a fast accelerating science(76). It is beyond these changing data that contemporary science has to aim in order to conceive of the constant infrastructure of the universe, i.e. of the ultimate reality.(77) Nevertheless, in so doing, it cannot refuse the help of the various spiritual disciplines both in orienting itself towards new scientific activities and in formulating its considerations. The Platonic model of science may be recalled here for its wise moderation.

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N O T E S

(1) Cf. J.N.THEODORACOPOULOS, Relations entre Aristote et Platon, Proceedings of the World Congress on Aristotle (Thessaloniki, 1978), Athens, Publ. of the Ministry of Culture and Sciences, vol. 1, 1981, pp. 87-94.

(2) Cf. E. MOUTSOPOULOS, Cognition and Error, Athens, 1961, pp. 16-18; IDEM, Knowledge and Science, Athens, Publ. of the Univ. of Athens, 1972, pp. 161-162 ; G. BACHELARD, Le nouvel esprit scientifique, Paris, Alcan 1934, pp. 60-64.

(3) Cf. ibid., pp. 57-59; IDEM, La philosophie du non. Essai d'une philosophie du nouvel esprit scientifique, Paris, P.U.F., 1940, pp. 43-47. Cf. infra and n. 16.

(4) J. BRUN, Platon et l'Académie, Paris, P.U.F., 1960, pp. 12 sq.; H.F.CHERNISS, The Riddle of the Early Academy, Berkeley, Cal. Univ. Press, 1945 ("Lectures"), pp. 89-91; IDEM, Aristotle's Criticism of Plato and the Academy, American Journal of Philology, 1944, XXVII-610 pp.; J. BRUN, Aristote et le Lycée, Paris, P.U.F., 1961, pp. 5-7; 16-19; 121-122.

(5) Namely, from the 4th century B.C. to 529 A.D., when it was closed by imperial decree issued by Justinian. Today's Academy of Athens of which the Author of this paper happens to be a Member, is officially recognized by the other National and International Academies as the authentic continuation of Plato's Academy, being listed first in a chronological order.

(6) Cf. E. MOUTSOPOULOS, From Mythos to Logos, Athens, Gregoris, 1978, pp. 30-35.

(7) Cf. H.F.CHERNISS, Aristotle's Criticism (cf. supra, n. 4), pp. 134 sq.

(8) On "dichotomy", for instance, cf. PLATO, Politicus, 262 e; 302 e.

(9) On "analysis" and "synthesis", "deduction" and "induction", for instance, cf. respectively ARISTOTLE, Nicom. Eth., Γ 5, 1112 b 19 and 23; De An., Δ 6, 430 a 27 and b 2; Probl., B 32, 869 b 28; Topics, A 12, 105 a 13.

(10) Cf. E. MOUTSOPOULOS, From Mythos to Logos, pp. 68 sq.

(11) Cf. P. AUBENQUE, Le problème de l'être chez Aristote, Paris, P.U.F., 1962, pp. 11 sq.

(12) Cf. ARISTOTLE, Phys., A 9, 191 a 36; B 2, 194 b 14; De coel., A 8, 277 b 10; Metaph., E 1, 1026 a 16.

(13) Nomination due to Andronicus of Rhodes (1st century B.C.); cf. P. MORAUX, Les listes anciennes des ouvrages d'Aristote, Louvain, Univ., 1951.

(14) Cf. E. MOUTSOPOULOS, Cognition and Error, p. 4.

(15) Cf. F. BACON, De dignitate et augmentis scientiarum, 1621.

(16) Cf. supra, and note 3.

(17) Cf. ARISTOTLE, Metaph., Γ 4, 1007 b 28; Θ 3, 1047 a 18; M 10, 1087 a 16; Phys., A 8, 191 b 28.

(18) Cf. E. MOUTSOPOULOS, La musique dans l'oeuvre de Platon, Paris, P.U.F., 1959, 430 pp.

(19) Mainly Archytas of Tarentum; cf. E. FRANK, Plato und die sogenannte Pythagoreer. Ein Kapitel aus der Geschichte des griechischen Geistes, Halle, 1923, pp. 37 sq.

(20) PLATO, Republic, VII, 531 b-c.

(21) Cf. ibid., 531 c-d.

(22) Cf. L. ROBIN, La théorie platonicienne des idées et des nombres d'après Aristote, Paris, Alcan, 1908, pp. 55 sq.; H.F. CHERNISS, Plato as a mathematician, Review of Metaphysics, 1951/4, pp. 395-425; R.S. BRUMBAUGH, Plato's Mathematical Imagination, Bloomington, Indiana Univ. Press, 1954, pp. 127 sq.

(23) Cf. N.-I.BOUSSOULAS, L'être et la composition des mixtes dans le "Philèbe" de Platon, Paris, P.U.F., 1952, pp. 65 sq.;82 sq.; 108 sq.; 142 sq.; IDEM, Etude sur l'esthétique de la composition platonicienne des mixtes, Revue de Métaphysique et de Morale, 1960, pp. 422-448 and 1961, pp. 142-158.

(24) Cf. Timaeus, 28 d - 31 b; 52 a - 53 c; 68 e - 69 a.

(25) Cf. ibid., 31 b - 39 d; 53 c - 61 b.

(26) Cf. ibid., 39 e - 44 d; 61 c - 68 d; 77 a-c.

(27) Cf. ibid., 44 d - 51 b; 69 c - 76 e; 77 c - 86 b.

(28) On the rules that should be followed in setting out tables of comparison of repeated phaenomena, a method that had first been indicated by Italian scientists, cf. F. BACON, Novum organum (1620), L, I, C-CII; L, II, II.

(29) Cf. P. KUCHARSKI, Les chemins du savoir dans les derniers dialogues de Platon, Paris, P.U.F., 1949, namely pp. 275 sq.

(30) Cf. ibid., pp. 59-149.

(31) Cf. ibid., pp. 11-57.

(32) Cf. ibid., pp. 147-273.

(33) Cf. ibid.

(34) Cf. Sophist, 264 c; 267 d.

(35) Cf. Laws, I, 633 d; II, 653 a; cf. E. MOUTSOPOULOS, On the Quadruple Root of Practical Reason in Plato, Athena, 1965, pp. 12-16.

(36) Cf. Laws, V, 733 a-d; VII, 818 d; IX, 865 a; 870 a; 874 d.

(37) Cf. ibid., XII, 965 c-d; cf. infra and note 43.

(38) Cf. Laws, VII, 823 b; XII, 945 c.

(39) Cf. ibid., X, 895 d-e; XII, 963 c-d; 964 a.

(40) Cf. Philebus, 11 b; 13 e; 21 a-d; 28 c; 58 d.

(41) Cf. ibid., 16 d sq.

(42) Cf. ibid., 16 d-e.

(43) Cf. ibid., 18 a-b; cf. supra and note 37.

(44) Cf. Philebus, 17 c-e. Cf. P. KUCHARSKI, op. cit., pp. 117-128.

(45) Cf. ibid., 64 d.

(46) Cf. ibid., 52 c; 52 c; 53 a.

(47) Cf. Sophist., 254 b - 256 d.

(48) Cf. already Phaedo, 65 d - 66 a; 79 d.

(49) Cf. Philebus, 55 d; 56 a.

(50) Cf. ibid., 57 c-e.

(51) Cf. ibid., 58 a.

(52) Cf. ibid., 58 a-b.

(53) Cf. ibid., 59 a-c.

(54) Cf. Phaedrus, 453 b-e; 454 a.

(55) Cf. Sophist, 219 a.

(56) Cf. Polit., 278 b.

(57) Cf. Soph., 218 d; 223 c. It is in a parallel way that such a nature is designated in Aristotle; cf. Metaph., B 2, 996 b 20; Rhet., A 5, 1360 b 7; Phys., A 10, 218 a 31. Even the technical locution by which quiddity is designated in Aristotle was initially used in Platonic circles; P. AUBENQUE, op. cit., pp. 23-27.

(58) Cf. Cf. Categ., 3, 1 b 17; Metaph., Γ 2, 1004 a 21; I 3, 1054 b 23; 4, 1055 a 27; 7, 1057 b 7.

(59) Cf. Sophist, 132 d. Such a relation will also be accepted by neoplatonism; cf. E. MOUTSOPOULOS, Les structures de l'imaginaire dans la philosophie de Proclus, Paris, Les Belles Lettres, 1985, pp. 29-41.

(60) Cf. Parmenides, 134 c.

(61) Cf. Phaedrus, 247 c.

(62) Cf. E. MEYERSON, Identité et réalité, Paris, Alcan, 1907; IDEM, L'explication dans les sciences, vol. I, Paris, Payot, namely books I and IV; cf. R. BLANCHÉ, Intersubjectivité et objectivité, Annales de la Faculté des Lettres de Toulouse, 5, 1956, pp. 17-32. → 1912

(63) Cf. B. RUSSELL, Physics and Experience, Cambridge, Univ. Press, 1946.

(64) Cf. A.N.WHITEHEAD, Science and the Modern World, Cambridge, Univ. Press, 1926 ("Lowell Lectures", 1925).

(65) Cf. the list of his writings in Contemporary American Philosophy, 1932.

(66) Cf. A.S.EDDINGTON, The Philosophy of Physical Science, Cambridge-New York, 1939 ("Tarner Lectures", 1938).

(67) Cf. Essai sur la connaissance approchée, Paris, Vrin, 1928, pp. 272.

(68) Cf. IDEM, L'activité rationaliste de la physique contemporaine, Paris, P. U. F., 1951, p. 21.

(69) Cf. IDEM, L'intuition de l'instant, Paris, Stock, 1932, pp. 25 sq.; cf. IDEM, Le surrationalisme, Inquisitions, 1, 1936.

(70) Cf. E. MOUTSOPOULOS, L'avenir anticipé, L'Avenir. Actes du XXIe Congrès des Sociétés de Philosophie de Langue Française (Athènes, 1986), Paris, Vrin, 1987, pp. 9-12; IDEM, L'homme à l'ère de la technologie, Diotima, 15, 1987, pp. 190-192.

(71) Cf. L. DE BROGLIE, Continu et discontinu en physique moderne, Paris, A. Michel, (1937) 1941; IDEM, La physique quantique restera-t-elle indéterministe ?, Revue d'Histoire des Sciences, 1952/4, pp. 289 sq. and Bulletin de la Société Française de Philosophie (Paris, A. Colin, 25.4.1953), pp. 135-173; R. BLANCHÉ, La science physique et la réalité, Paris, P.U.F., 1948; J. ULLMO, La mécanique quantique et la causalité, Revue Philosophique, 1949/2; F. PERRIN, L'abandon du déterminisme fondamental, Bulletin de la Soc. Fr. de Philos. (Paris, A. Colin, 28. 5. 1949).

(72) Cf. M. BOLL, Les certitudes du hasard, 6th ed., Paris, P. U. F., 1951, which has preceded recent biological views on this subject.

(73) Cf. P.-M. SCHUHL, Autour du fuseau d'Ananké, Revue Archéologique, 1930/2, pp. 58-64; IDEM, Sur le mythe du "Politique", Revue de Métaphysique et de Morale, 1932; cf. E. MOUTSOPOULOS, La musique dans l'oeuvre de Platon, pp. 376-377.

(74) Cf. ibid., pp. 363-375.

(75) Cf. R.B. ONIANS, The Origins of European thought about the Body, the Mind, the Soul, the World, Time and Fate, Cambridge, Univ. Press, 1951.

(76) Cf. E. MOUTSOPOULOS, Knowledge and Science , p. 78.

(77) Cf. IDEM, The ultimate: Insight and reality, God: Experience or Origin ? (ed. by A. de Nicolàs and E. Moutsopoulos), New York, Paragon, 1985, pp. 172-185, namely pp. 179-182.