13-4

Words and Wisdom (1960)

Discours composé pour Mgr Roy par C.D.K.

~~Ce texte a [illegible] été composé par [illegible] Maurice Roy.~~ C.D.K.
~~Il est difficile de trouver l'original.~~

①a) Brouillons - lettre à Mgr M. Roy (7 mai 1960)

① Copie faite par CDK. ~~[illegible]~~
~~d'un manuscrit composé et écrit par CDK. ? que les brouillons de la main~~
~~qui permettent de le vérifier.~~
p. 3. - à gauche : note de Mgr Roy.

② copie de ① corrections de CDK. ~~et de Father A Durand (pp 7-15)~~

③ lettre de CDK - à Mgr M. Roy (16 juin 1960)

~~③ même copie que ②~~

④ copie de ① - corrections de F. Anthony Durand

⑤ copie de ④ (peut-être copie préparée pour publication?)

⑥ même texte que ① (peut-être copie du discours?)
pp 8 et ss : Corrections de CDK.

(10)

UNIVERSITÉ LAVAL

QUÉBEC, CANADA

le 7 mai, 1960

Excellence Révérendissime:

Il me reste encore cinq à six pages de notes à faire. Je les composerai demain, dimanche.

Je citerai Heisenberg, à l'appui de Russell; puis je vais tirer la grande conclusion qui, pour le moment, n'a pas même encore de nom. Mais je suis certain qu'elle me viendra tout naturellement.

Quoiqu'il en soit, le sujet me paraît fort opportun, et tout indiqué pour le Grand Chancelier d'une Université.

Votre très dévoué,

Charles

Cher Professeur.

Je trouve la Travail très intéressant. Peut être la fin est-elle un peu difficile à suivre pour celui qui n'a pas le texte sous les yeux, mais vous pourrez peut-être la modifier un peu. La conclusion fera sans doute comprendre qu'en nous ~~efforçant~~ appliquant à regarder le monde en Théologien, nous nous avons invité le savant non à fermer les yeux, mais à les ouvrir plus grands.

Grand merci -

A bientôt.

L. Roy.

3)

UNIVERSITÉ LAVAL
QUÉBEC, CANADA.

le 16 juin 1960 -

A Son Excellence Révérendissime
Monseigneur Maurice Roy
Archevêque de Québec

Excellence Révérendissime,

Voici la révision du texte. Le nouveau passage se trouve à la page 15, jusqu'à la fin du premier paragraphe de la page 16. S'il n'explicite pas suffisamment votre idée, je ferai volontiers un nouvel effort.

Votre tout dévoué,

C. Roy

(5)

WORDS AND WISDOM

One hundred years ago! What changes have occurred in this brief span of time! The last century has seen great social upheavals, some for the better, some for the worse. History has taken on a cosmic dimension, for even the cozy heavens of Newtonian physics must yield to evidence that the whole universe, right down to its minutest particles, is a vast process of birth and death. Billions of galaxies arise and waste into glowing stars that shed their light and foster life on this burnt-out little planet of ours, a mere grain of sand on an endless shore. However insignificant on a cosmic scale, this cooled-down piece of an explosive universe is nonetheless the site of an activity we call 'understanding', that of an animal looking before and after in terms of countless light-years. We have cause to wonder whether thought has not found other sites of thought in the vast regions of space. We ourselves may be on the verge of rousing life in a test-tube. Our daily journals keep us abreast of these vast perspectives and bold anticipations. These casual remarks of mine may serve to recall to us what mighty changes in reach and scope have come to human speculation in this short breath of time. Over and over and again we are assured that everything, including our own mind, is subject to radical change

and transmutation. Some people interpret this to mean that we must renounce once and for all the ability to reach changeless truth; and they even go on to say that to believe we can achieve it will only blunt the mind and thus hinder its progress.

This raises a problem for the Christian. For it may be asked whether the religious dogmas which the future scientist has learnt from childhood do not hamper free scientific investigation. The question is a fair one and may not be ignored. "Free investigation" is the crucial term; it can mean many things. There is a sense in which for instance a thief, especially a successful one, enjoys a kind of freedom which the good citizen rejects. But this is a type of liberty forbidden by natural law as well as by Christian morality, no matter how efficacious the results achieved. Just before and during the last war, certain scientists of both East and West felt free, encouraged by their governments, to perform utterly atrocious experiments upon their fellow-men. But if human persons are to be liquidated simply because their destruction may help man to learn more about life processes and about death, we must call the liberty to use such means perverse.

Having disposed of this pejorative meaning of freedom, let us return to the original question and consider in what sense it is both intellectually true

and morally right to demand freedom, meaning the freedom to wonder, to escape from ignorance, to seek knowledge. Is there any reason to believe that the mind which has been taught as revealed truth propositions of Faith for which there is no scientific demonstration, is thereby handicapped in scientific research? Of course it would be handicapped, had it been foolishly led to believe that knowledge, in any field, is safe only when based upon authority; or if it had been trained to dodge all problems or solutions not at once seen to agree with existing beliefs. History does provide some regrettable instances of people of this sort; but it is certainly not to the credit of their intellect, nor to the credit of the teachers responsible for such warping of the mind.

On the other hand, it is of course true that, from the beginning, the Church has rejected many a philosophy as contrary to Faith. Manichaeism could hardly be made to conform with the sovereignty of God, nor Marxism with His very existence. But it is also significant that these systems themselves should belong to the type of philosophy which does not tolerate free discussion of its most basic tenets.

There were times when even the wisdom of Plato and Aristotle were frowned on by certain members of the Church. This embarrassed neither Saint Albert the Great nor Saint Thomas, who won out in the end, in defence of

a natural wisdom in which authority is the weakest of all possible arguments. The Faith of these great Doctors of the Church not only allowed them freedom in the field of natural research, but seems positively to have encouraged a man like Saint Albert to expend great efforts for the acquisition of knowledge in the most detailed branches of the natural sciences.

Let us narrow our first general question down to three alternatives, each of which has in fact been upheld at one time or another. The first alternative is that the Church frowns upon free and bold research in the realm of what we call science today; the second that the Church is indifferent to scientific investigation; and, finally, that she urges her own members whose concerns are those of science to extend the frontiers of knowledge as far as possible. The latter is of course our understanding of the attitude of the Church.

Yet the first alternative derives apparent likelihood from the fact that none of the Apostles whom Christ appointed during his life on earth were learned men. Their occupations were of the humblest kind, such as fishing and the collecting of taxes. So one might be tempted to conclude that learning is a diversion from the Christian's chief concern. This would in fact be very bad reasoning from a limited example. The unspoken assumption would be that there is no room in the Church

except for fishermen and tax-collectors; no place even for St. Luke or St. Paul.

How inept such reasoning is can be seen from another sample, which at the same time will serve to dispose of the second alternative, namely, that the Church is indifferent to learning. Theology teaches that a man will be rewarded in Heaven, not in the measure of the innate power of his intellect, nor even according to the depth of knowledge he acquired on earth, but according to the degree of charity which was his at death. From this truth some will leap to the conclusion that we may therefore burn our books, shut up shop, as it were, and go out to practise charity. Whereas the whole point of doctrine is that while the proverbial scrubwoman performs an act of charity as she scrubs, the same charity demands of the scholar that he stick to his books or test-tubes. Charity simply binds a person to excellence at his own task.

Though in themselves many sciences are indifferently related to Christian and non-Christian, to believer or non-believer, to them the Christian cannot be indifferent. He is in fact committed by his very Faith and Charity to perform his work as best he can. The adage Fides quaerens intellectum is far from being confined to Theology; it has a very wide range. We naturally like to learn, even by means of poetry. Faith does not suppress this urge. Quite the contrary. The Book of Nature, in a sense the most basic of documents, was also written by God; the

better we know it, the more we learn about its Author, as was already held by Plato and Aristotle. All of which proves that it is the third alternative which prevails in the mind of the Church: everyone is urged to do his job, whether it be scrubbing floors, inventing and producing machines that will do the scrubbing for us, describing galaxies, or writing a Theological Summa.

We must likewise face another issue, one that has no parallel in the history of mankind. We referred to it at the beginning of this address. Even the uninitiated are quite aware that science has made gigantic strides in these last few years, an advance on all fronts, from biblical studies to mathematical physics, microbiology, and the workings of the mind itself. We have every reason to rejoice at this amazing progress. Yet, if we lack wisdom, the advancement could be a mixed blessing. An analogy would be the invention of a chemical product which incites the soil to produce abundant crops for a time, but soon leaves it waste, destroying the balance of nature.

But the wisdom I have in mind is not so much that of action and production, but rather one of vision — of the world of nature and of thought. As the eminent physicist, Max Born, tells us in his Natural Philosophy of Cause and Chance: "It is true that many scientists are not philosophically minded and have hitherto shown much skill and ingenuity but little wisdom. I need hardly to

new philosophical, and even theological, problems that have arisen as the result of new knowledge. Consider the problem of evolution, which took on a novel shape about a century ago. The philosopher must face it, and the theologian no less. Curiously, the issue is made more plausible for the latter than for the philosopher, since from Genesis he knows that man was formed from clay. At this moment, moreover, we have reason to wonder, as suggested already, whether life, even of human kind, is confined to our tiny planet. Many of you are aware of the theological problem, surely not insoluble, with which confirmation of such a hypothesis would oblige us to face. Meantime, it will be wise to distinguish between discussion attending the mere hypothesis, and discussion which the fact would impose upon us. But I am distracting you with the example of a bridge which obviously we have not yet reached. Let me turn to a case which is in fact both more basic and common.

We are facing the bewilderment which knowledge without wisdom must lead to. It is nothing less than a paradox that the more we learn about nature, and so succeed in making her serve us, the more we may become strangers to ourselves. This state of things is of course no more than incidental, but the incidental is nonetheless fact. The real difficulty is that of relating new knowledge to old. Let me explain myself

in a concrete case. There is a sense in which the physical world which the scientist carries in his head in the form of relativity and quantum theory is utterly different from that of Newton and Laplace — and even from the shape things had only twenty years ago. We still hold up the ladder on which we climbed from Dalton and Laplace to Max Planck and Heisenberg, but for reasons purely historical. I mean that the over-simplification of classical physics is passée; and even now we must go on climbing. An old type of knowledge must now be shelved, and no harm if it is. But there is old knowledge of another kind which, if we thought we had to discard, would bring about that bewildering state of affairs already referred to.

The old and unimpeachable knowledge which I have in mind is not that of the rate at which the apple falls, but the knowledge we already had of the apple itself and of its falling. No change has occurred at this level of knowing: apples are still apples, and to fall from the tree is still to fall from the tree. Such knowledge is vague, of course, but surely it deserves the name 'knowledge' in at least one sense of this term, and is plainly knowledge of a kind that is certain, however confused. The difficulty arises when we attempt to relate this kind of old knowledge, of apples and of falling, to the new knowledge, as acquired in botany and physics. The point I wish to make is that the value

of previous, common-sense, knowledge, though vague, is vital to further learning. How can we establish this?

As we ask a question about something, if the very question is to have meaning, surely we must already have some knowledge of the subject about which we are inquiring. When asking what a circle is, or what a man is, we must already have acquired some notion of circle or man, however vague. How could we otherwise know what we are asking? Of course it is also true that, if this confused knowledge were sufficient, there would be nothing further to ask questions about. Nonetheless, failing this kind of vague yet certain knowledge, if we ventured a definition of sorts in reply to the question 'What is a man?', having made our definition, we would cease to know what it was the definition of. Accordingly, the question 'What is a man?' would have been a meaningless one. And why on earth should one wish to answer meaningless question, since any reply must be just as meaningless? If we inquire at what rate bodies fall, we must assume that we know what the word 'body' means, even though we may not as yet have determined exactly what a body is. In short, there is no denying that we do have some originally acquired notions upon which all further knowledge is somehow reared.

The knowledge that man is a bundle of events in space and time, or that he is a swarm of electrical charges, may be quite valid, but it is not this kind of knowledge we are using when we first name man. Cabbages and stones are

likewise swarms of electrical charges, but does this make the difference between man, cabbage, and stone irrelevant? From a certain viewpoint and for a time, it may be possible and proper to ignore the difference, but in the end we must get back to what we first called 'man, cabbage, and stone'. If this first, vaguely known difference is irrelevant, then we should be able offer stones for bread, and no one should be allowed to protest the difference. I can see no common sense or scientific reason for becoming confused to this degree. Notice, then, that when we press the matter of differences, and grant that these <u>are</u> meaningful, we must already have had some perception of them, which by further investigation we try to make more distinct. But this more distinct knowledge must never lose contact with earlier knowledge of the very same things. If this contact were broken, then, when the scientist talked about man, his man would in fact be a thing totally different from the creature *he* had already named as the subject for investigation. Literally, it would mean that this particular fellow whose hand we shake, and the fellow who then weighs in at two hundred pounds, are not really the same fellow, or that the two-hundred-pound one is no fellow at all. This would be just another way of saying that there is nothing about which we can come to know anything.

To put it briefly, we do realize that, no matter how different the points of view, they must in the end

be related to something we already knew. No matter how scattered as a swarm of electrical charges, Mr. Smith knows that this hardly prevents him from being himself, no matter what he as a physicist may tell us about it. To hold that what we first name, and that which we reach at the term of investigation are utterly irreducible, which is the way some people would have it, or so they say, reflects a kind of intellectual schizophrenia, and supposes that talk is proof of thought.

It is always gratifying to discover some point of agreement with people whose views in other respects differ so widely from our own. Lord Russell points out, in a recent work, that "analysis gives new knowledge without destroying any of the previously existing knowledge... It seems too [he continues] that philosophical investigation, as far as I have experience of it, starts from that curious and unsatisfactory state of mind in which one feels complete certainty without being able to say what one is certain of. The process that results from prolonged attention is just like that of watching an object approaching through a thick fog: at first it is only a vague darkness, but as it approaches articulations appear and one discovers that it is a man or a woman, or a horse or a cow or what not." As he had stated previously, "This applies not only to the structure of physical things, but quite as much to concepts." In an earlier work he had given us a fine illustration of what this view implies: "The Astronomer's sun, for instance,

is very different from what we see, but it must have a definition derived from the ostentive definition of the word 'sun' which we learnt in childhood... The question of interpretation [he adds] has been unduly neglected. So long as we remain in the region of mathematical formulae, everything appears precise, but when we seek to interpret them it turns out that the precision is partly illusory. Until this matter has been cleared up, we cannot tell with any exactitude what any given science is asserting."

In other words, when we say of man that he is a swarm of electrical charges, all appears precise, for we know what we mean by such charges, and we can even count the approximate number of them that go into ~~[the make up of]~~ an average man; but when we seek to interpret what this means of man as this particular kind of animal, it turns out that the precision is partly illusory. Now this is to allow a great deal, for if we had to forget what we understood by the name 'man' which we learnt in childhood, and to replace it by the apparently more precise knowledge, we would be surrendering our primordial knowledge to a kind which is often in the main 'logical fiction' — to use Lord Russell's expression. However necessary and fruitful these fictions may be, they are no substitute for the thing we wish to probe, such as a stone, a man, or a star. If they were, we would not know what we are talking about when using a word such as 'man'.

To know scientifically would be like killing the goose that laid the golden eggs.

A great German physicist, Werner Heisenberg, tells us substantially the same thing. Some writers try to persuade us that common language, at times called 'natural', as distinguished from the symbolic expressions of science, is a sign of backward thinking. They deride the use of words because these may take on so many different meanings and thus allow fallacies of equivocation. Symbolic expression, it seems, is both more stable and exact. But here is what Professor Heisenberg has to say on the subject in his recent Gifford Lectures: "...one of the most important features of the development and the analysis of modern physics is the experience that the concepts of natural language, vaguely defined as they are, seem to be more stable in the expansion of knowledge than the precise terms of scientific language, derived as an idealization from only limited groups of phenomena. This is in fact not surprising since the concepts of natural language are formed by the immediate connection with reality; they represent reality... On the other hand, the scientific concepts are idealizations; they are derived from experience obtained by refined tools, and are precisely defined through axioms and definitions... But through this process of idealization and precise definition the immediate connection with reality is lost."

Professor Heisenberg does not mean, of course, that there is a language produced by nature in the way she provides us with tongue and hands. The language here used is made up of audible or visible signs that signify by convention; these are artifacts. The symbols of theoretical physics are artifacts too, but not in the manner of words pertaining to ordinary language. Words are important. Without them the theoretical physicist could not describe what he is doing. Notice, now, that the words of literature, of much of philosophy, of Scripture and of Theology are those of ordinary language, even when their meanings are frequently extended ones. All the same, extended meanings must retain reference to what we know first by the concepts of ordinary speech. If philosophy (or even Sacred Doctrine) lost all touch with what we know first and foremost, to philosophize would be to stray into a world of meaningless jargon. As Lord Russell said, the word "'Knowledge,' for example, as commonly used is a very imprecise term covering a number of different things and a number of stages from certainty to slight probability." 'Knowledge' is a word with many meanings, all of which must be somehow related to a primitive one that is indubitable. Heisenberg conveys the same idea when he says that "Whenever we proceed from the known into the unknown we may hope to understand, but we may have to learn at the same time a new meaning of the word 'understanding.' We know that

any understanding must be based finally upon the natural language because it is only there that we can be certain to touch reality, and hence we must be skeptical about any skepticism with regard to this natural language and its essential concepts. Therefore, we may use these concepts as they have been used at all times." Without such concepts, we could get nowhere either in philosophy or Sacred Doctrine — not to mention the physicist's need eventually to express himself "in plain language as a criterion of the degree of understanding that has been reached."

There is, then, no reason to get bewildered at the feats of science and to abandon as of no account those things which we know firmly though vaguely, and about which we communicate in common speech. To see the one and the other in their proper relation and balance requires the wisdom referred to by Born. From the viewpoint of scientific method and philosophy (to which Heisenberg adds Theology as well), the experience just described —namely, that of the value of basic concepts and of the language that expresses what they represent — is no doubt the door to wisdom. This is a most refreshing realization, after all the facetious "skepticism with regard to those concepts of natural language which do not fit into the closed frame of scientific thought..." (Heisenberg) The facile over-simplification which prevailed in the nineteenth century still fetters the public mind when the word 'Science' is

used. When carried through, it leads to a nightmarish conception of what man is and of his place in the world; it leads in fact to that Mr. Smith who is quite simply a mere bundle of events, basically no more than a bundle, except that it knows horror, misery, and can do such frightful things, for no reason at all. For Mr. Smith can have no reason for his conduct nor for his existence, if he is "just as much the product of blind forces as is the falling of a stone to earth or the ebb and flow of the tides." (Julian Huxley)

Knowledge is not only necessary; it is a most noble pursuit, inducing happiness of the highest kind — provided the knowledge be also wisdom. Meantime it is essential to the wisdom we can achieve in this life that we be aware of the limitations of knowledge, that we dispel darkness wherever we can, and yet realize the frailty of the wisdom we may come to possess. But to bear wisely in mind the limitations of our knowledge is not the same as to rest in them. To the lively intellect, its own limitations are a constant challenge; to shrink from this challenge would be the very opposite of wisdom —like the attitude of the foolish virgins who failed to provide themselves with oil for their lamps. I say this to you as Chancellor of a Catholic University.

It was recently pointed out that scholars of high standing are conspicuously absent among Catholics. If generalized, the observation would be unfair. After all,

Prince Louis de Broglie is a Catholic, and the founder of the theory of an expanding universe is a priest – l'abbé Georges Lemaître – which of course does not make his theory a Catholic one at all! Still, the observation is in some measure true of our own Continent. Whatever the historical explanation of this fact, we most certainly cannot blame the Church for it, neither in her teaching nor in her attitude towards the sciences and the need for interpreting their status.

That the Church should on some occasions take a defensive attitude where the interpretation of certain problems and theories of science is concerned, this too is historical fact, one that will no doubt be verified to the end of time. How can it be otherwise when we are told by a pseudo-Science, that since man's abode and life-span are astronomically insignificant, man himself is of no account; that free will is precluded by causality; that the mores of primitive societies prove all norms of conduct to be arbitrary; that humanity understood as something over and above beast, vegetable, rock and machine, is an aberration of the mind. The Church knows very well that a scientific account of nature leads to no such conclusions; but there always seem to be plenty of people who believe that it does. Actually, the Church is simply warning us that to inflate small learning can be a dangerous thing. In this she has been

consistently proved right, no matter how much time it may take to become aware of it. Her attitude, then, is quite the opposite of the reactionary one with which some people choose to invest her.

So far as the scientist is concerned, Faith and Theology can only widen his perspectives and so lead him to problems fresh, stimulating and, no matter how challenging to our minds, we must forever welcome.

St. Dunstan's is one of the oldest and most venerable institutions in Canada; her numerous Alumni are dispersed through all the provinces of Canada and far abroad. Many of them occupy the highest positions in the Church and in civil society. They are always happy to return here and to visit again the house which has become for them a second home.

I should like to feel that when the Chancellor of Laval comes to St. Dunstan's, he, too, comes as one of the family. In age and in ideals, your institution is Sister to the Quebec University, and we recall with pride that she was for many years our affiliate. Thus has been formed the spiritual bonds by fraternal collaboration and cherished friendships which make a visit to Charlottetown particularly pleasant. I am above all happy that the old college has become a

university, and that its radiance continues to increase.

It is with much pride and gratitude that I receive today the title of Doctor of St. Dunstan's. It is a great honour for me that I have been chosen to open the series of Doctors honoris causa of your University. By taking my place in this hall as a member of your institution, I should wish to do more than to receive passively such an honour, and I trust that henceforth we shall be more closely associated than ever before in the accomplishment of the same great work.

So why not begin at once by trying to understand better some of the newer aspects of the great cultural enterprise in which St. Dunstan's and Laval have been engaged for over a century.

One hundred years ago! The changes that have occurred in this brief span of time! The last century has been the scene of great social upheavals, some for the better, some for the worse. History has taken on a cosmic dimension, for even the cozy heavens of Newtonian physics must yield to evidence that the whole universe, right down to its minutest particles, is a vast process of birth and death. Billions of galaxies arise and waste themselves into burning stars that shed their light and foster life on this burnt out little planet of ours, a mere grain of sand on an endless shore. However insignificant on a cosmic scale, this cooled down piece of the explosive universe is nonetheless the site of an activity we call "understanding", that of the animal looking before and after in terms of countless light-years. We have cause to wonder whether there are not other sites of thought in other regions of space. We may be on the verge of arousing life in a test-tube. Our daily news-

sheets keep us abreast of these vast perspectives and bold anticipations. All of which goes to show how deeply the reaches in which the human mind soars and sounds have changed in this short whiff of time. We are told over and again that everything, including our own mind, is subject to radical change and transmutation. Some people interpret this to mean that we must renounce once for all the ability to reach some changeless truth; and they even go on to say that to believe we can achieve it will only blunt the mind and thus hinder its progress.

This raises a problem for the Christian. For it may be asked whether the religious dogmas which the future scientist has learnt from childhood do not blunt it against free scientific investigation. This is a fair question which it would be unwise to ignore. "Free investigation" is the crucial term; it can mean many things. There is a sense in which for instance a thief, especially a successful one, enjoys a kind of freedom which the

good citizen rejects. Yet this type of liberty is forbidden by natural law as well as by Christian morality, no matter how efficacious the results achieved. Just before and during the last war, certain scientists of both East and West felt free, encouraged by their governments, to perform utterly atrocious experiments upon their fellow-men. But if human persons are to be liquidated simply because this may help to learn more about life processes and about death, we will call freedom to do so perverse.

Having disposed of this pejorative meaning and use of freedom, let us return to the original question and consider in what sense it is both intellectually true and morally right: what we call the freedom to wonder, to escape from ignorance, to seek knowledge. Is there any reason to believe that the mind which has been taught as revealed truth certain propositions of Faith for which there is no scientific demonstration, is handicapped in the field of scientific research? Of course it would be handicapped, had it been led to believe,

ineptly, that knowledge, in any field, is safe only when based upon authority; or if it had been trained in such a fashion as to be inclined to dodge all unsolved problems or even solutions which are not at once seen to agree with existing beliefs. History does provide some regrettable instances of people of that sort; but it is certainly not to the credit of their intellect, nor of teachers responsible for such warping of the mind.

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of the Apostles whom Christ appointed during his life on earth were learned men. Their occupations were of the humblest kind, such as fishing and the collection of taxes. And so one might be tempted to conclude that learning is a diversion from the Christian's concern. This would in fact be a very bad enthymeme. The unspoken assumption would be that there is no room in the Church except for fishermen and tax-collectors; no place even for St. Luke or St. Paul.

How inept such reasoning is can be seen from another instance of its kind, which at the same time will serve to dispel the second alternative, namely, that the Church is indifferent to learning. Theology teaches that a man will be rewarded in Heaven, not in the measure of the innate power of his intellect, nor even according to the depth of knowledge he acquired on earth, but according to the degree of charity which was his at death. From this truth some will leap to the conclusion that we may therefore burn our books, close shop,

as it were, and go out to practise charity. Whereas the whole point of the true doctrine is that the proverbial scrubwoman performs an act of charity as she scrubs, while the exercise of charity demands of the scholar that he stick to his books or test-tubes. Charity binds him to excellence at his own task.

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mind of the Church: everyone is urged to do his job, whether it be scrubbing floors, inventing and producing machines that will do the scrubbing for us, describing galaxies or writing a Theological Summa.

We must ~~likewise face another issue, one~~ face an issue that has no parallel in the history of mankind. ~~We referred to it at the beginning~~ of this address.) Even the uninitiated are quite aware that science has made gigantic strides these last few years, ~~and~~ an advance on all fronts, from biblical studies to mathematical physics, microbiology, and the workings of the mind itself. We have every reason to rejoice at this amazing progress. Yet, if we lack wisdom, the advancement could be a mixed blessing. An analogy would be the invention of a chemical product which incites the soil to produce abundant crops for a time, but soon ~~lays it to waste~~ leaves it waste, ~~upsetting~~ destroying the balance of nature.

But the wisdom I ~~want~~ have in mind is not so much that of action and production,

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but rather one of vision - of the world of nature and of thought. As the great physicist, Max Born, tells us in one of his recent works: "It is true that many scientists are not philosophically minded and have hitherto shown much skill and ingenuity but little wisdom. I need hardly to enlarge on this subject." (Natural Philosophy of Cause and Chance, Oxford, 1949.) He then goes on to state that an unrestricted belief in deterministic causality "leads necessarily to the idea that the world is an automaton of which we ourselves are only little cog-wheels. This means materialistic determinism." Max Born rejects this, as well as an idea of predestination which would rob us of free will. In the Nineteenth Century it was fashionable to believe that the world was one vast machine grinding on blindly, so tightly bound by inexorable law that a man was not free to raise his hand. The hypothesis of absolute determinism was unwise and should have bewildered more than it in fact did.

The point to be made, in a wider context, is that if we lack wisdom, our

knowledge must lead, inevitably, to that state of utter bewilderment which even now is all too prevalent. To be bewildered is to be led mentally astray; it is the opposite of being enlightened - so my Webster says. But how, you may ask, can such a state of affairs attend great strides in knowledge? Should we not expect these to make us more wise all by themselves?

Before going on with this subject, we might point out that the bewilderment referred to is far more in the public mind than in that of the first-rate scientists themselves. Many of these are ~~profoundly religious men and at times~~ more philosophical than those who lay claim to the name "philosophers." And this is of no small account. ~~Nonetheless, it should not make us overlook new philosophical, and even theological, problems that have arisen as the result of new knowledge. Consider the problem of evolution, which took on a novel shape about a century ago.~~ The philosopher must face it, and the theologian no

less. Curiously, the issue is made more plausible for the latter than for the philosopher, since from Genesis he knows that man was formed from the clay of the ground. Right now, moreover, we have reasons to wonder, as I have suggested, whether life, even of the human kind, is confined to our tiny planet. Many of you are aware of the theological problem, surely not insoluble, with which confirmation of such a hypothesis would confront us. Meantime, it will be wise to distinguish between discussion attending the mere hypothesis, and discussion which the fact would impose upon us. But I am distracting you with the example of a bridge we have not yet reached. Let me turn to a case which is in fact both more basic and common.

We are facing the bewilderment which knowledge without wisdom must lead to. It is nothing less than a paradox that the more we learn about nature, and the attendent success in plying her to our use, the more we may become strangers to ourselves. This

is of course no more than incidental, but the incident is nonetheless fact. The real difficulty ~~we are faced with~~ is that of relating new knowledge to old. Let me explain myself in a concrete case. There is a sense in which the physical world which the scientist carries in his head in the form of relativity and quantum theory is so utterly different from that of Newton and Laplace - ~~to say nothing of~~ and even from the shape things had only twenty years ago. ~~The reason for holding~~ we still hold up the ladder on which we climbed from Dalton and Laplace to Max Planck and Heisenberg is but for reasons purely historical. I mean that the oversimplification of classical physics is passée; and even now we must go on climbing. ~~This is the~~ An old type of knowledge must ~~that is~~ now to be shelved, and no harm if it is. But there is old knowledge of another kind which, if we ~~believed~~ thought we had to discard it, would bring about that bewildering state of affairs already referred to.

The old and unimpeachable knowledge which I have in mind is not that of the rate at which the apple falls, but the knowledge we already had of the apple itself and of

its falling. No change has occurred at this level of knowing: apples are still apples, and to fall from the tree is still to fall from the tree. Such knowledge is vague, of course, but surely it deserves the name "knowledge" in at least one sense of this term, and is plainly ~~no doubt~~ of a kind that is certain, however confused. The difficulty arises when we attempt to relate this kind of old knowledge, of apples and of falling, to the new knowledge, as we acquire it in botany and in physics. The point I wish to make ~~at this juncture~~ is that the value of previous, common sense knowledge, though vague, is vital ~~crucial~~ to further learning ~~knowing~~. How can we establish this?

As we ask a question about something, if the very question is to have meaning, surely we must already have some knowledge of the subject about which we are inquiring ~~questioning~~. When asking what a circle is, or what a man is, we must already have acquired some notion of circle or man, however vague. How could we otherwise know what we are asking?

of course it is also true that,

On the other hand, if this confused knowledge had been sufficient, there would be nothing further to ask questions about. Nonetheless, failing this kind of vague yet certain knowledge, if we ventured a definition of sorts in reply to the question "What is a man?" having made our definition we would cease to know what the definition is the definition of. Accordingly, the question "What is a man?" would have been a meaningless one. And why on earth should one wish to answer meaningless questions? Seeing that the proper reply to a meaningless question must be just as meaningless? If we enquire at what rate bodies fall, we must assume that we know what the word "body" means, even though we may not as yet have determined exactly what a body is, apart from the vague knowledge sufficient to name it. And so we do have some originally acquired notions upon which all further knowledge is somehow reared.

The knowledge that man is a bundle of events in space and time, or that he is a swarm of electrical charges, may be quite valid, but it is not that kind of knowledge we are seeking when we inquire into the nature of man. Cabbages and stones are likewise swarms of electrical charges,

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is a swarm of electrical charges. But does this make the difference between man, cabbage, and stone irrelevant? It may be from a certain viewpoint and for a time, but in the end we must get back to what we first called "man, cabbage, and stone". If this first, vaguely known difference is irrelevant, then we should be able to offer stones for bread, and no one should be allowed to protest the difference. I can see no common sense or scientific reason for becoming confused to this degree. Notice, then, that when we press the matter of differences, and grant that these are meaningful, we must already have had some perception of them, which by further investigation we try to make more distinct. But this more distinct knowledge must never lose contact with earlier knowledge of the very same things. If this contact were broken, then, when the scientist talks about man, his man would in fact be a thing totally different from the creature other than what we had already named as the subject for investigation. Literally, it would mean that this particular fellow whose hand we shake and who then weighs in at two hundred

pounds, are not really the same fellow, or that the two hundred pound one is no fellow at all. This would be just another way of saying that there is nothing about which we can come to know anything ~~about~~.

To put it briefly, we do realize that, no matter how different the points of view, they must in the end be ~~brought to bear upon~~ related to something we already knew. No matter how scattered as a swarm of electrical charges, Mr. Smith knows that this hardly prevents him from being himself, no matter what he ~~might~~ as a physicist may tell us about it. To hold that what we first name, and that which we reach at the term of investigation are utterly irreducible, which is the way some people would have it, or so they say, reflects a kind of schizophrenia ~~in the one who thus seems to believe~~ and supposes that talk is proof of thought.

To discover some point of agreement with people whose views in other respects differ so widely from our own, it is always gratifying. Lord Bertrand Russell points

out, in his latest work, that "analysis gives new knowledge without destroying any of the previously existing knowledge... It seems too, he continues, that philosophical investigation, as far as I have experience of it, starts from that curious and unsatisfactory state of mind in which one feels complete certainty without being able to say what one is certain of. The process that results from prolonged attention is just like that of watching an object approaching through a thick fog: at first it is only a vague darkness, but as it approaches articulations appear and one discovers that it is a man or a woman, or a horse or a cow or what not." As he had stated previously, "This applies not only to the structure of physical things, but quite as much to concepts." In an earlier work he had given us a fine illustration of what this view implies: "The Astronomer's sun, for instance, is very different from what we see, but it must have a definition derived from the ostentive definition of the word "sun" which we learnt in childhood... The question of interpretation (he adds) has

been unduly neglected. So long as we remain in the region of mathematical formulae, everything appears precise, but when we seek to interpret them it turns out that the precision is partly illusory. Until this matter has been cleared up, we cannot tell with any exactitude what any given science is asserting."

In other words, when we say of man that he is a swarm of electrical charges, all appears precise, for we know what we mean by such charges, and we can even count the approximate number of them that go into the make-up of an average man; but when we seek to interpret what this means of man as this particular kind of animal, it turns out that the precision is partly illusory. Now this is to allow a great deal, for if we had to forget what we understood by the name "man" which we learnt in childhood, and to replace it by the apparently more precise knowledge, we would be surrendering our primordial knowledge to a kind which is often in the main "logical fiction" - to use Lord Russell's expression.

However necessary and fruitful these fictions may be, they are no substitute for the thing we wish to probe, such as a stone, a man, or a star. If they were, we would not know what we are talking about when using a word such as "man". To know scientifically would be like killing the goose that laid the golden eggs.

A great German physicist, Werner Heisenberg, tells us substantially the same thing. Some try to persuade us that common language, at times called "natural", as distinguished from the symbolic expressions of science, is a sign of backward thinking. They deride the use of words because these may take on so many different meanings and thus allow fallacies of equivocation. Symbolic expression, it seems, is both more stable and exact. But here is what Professor Heisenberg has to say on the subject in his recent Gifford Lectures: "... one of the most important features of the development and the analysis of modern physics is the experience that the concepts of natural language, vaguely de-

fined as they are, seem to be more stable in the expansion of knowledge than the precise terms of scientific language, derived as an idealization from only limited groups of phenomena. This is in fact not surprising since the concepts of natural language are formed by the immediate connection with reality; they represent reality... On the other hand, the scientific concepts are idealizations; they are derived from experience obtained by refined tools, and are precisely defined through axioms and definitions... But through this process of idealization and precise definition the immediate connection with reality is lost.

(...) Even for the physicist the description in plain language will be a criterion of the degree of understanding that has been reached (...) We know that any understanding must be finally based upon the natural language because it is only there that we can be certain to touch reality, and hence we must be skeptical about any skepticism with regard to this natural language and its essential concepts. Therefore we may use these concepts as they have geen used at all times." In this way [Heisenberg concludes] modern physics

has perhaps opened the door to a wider outlook on the relation between the human mind and reality."

There is, then, no reason to get bewildered at the feats of science and to abandon as of no account those things which we know firmly though vaguely, and about which we communicate in common speech. To see the one and the other in their proper relation and balance requires the ~~calls to mind~~ the wisdom referred to by Born. From the viewpoint of scientific method and philosophy (to which Heisenberg adds Theology as well), the experience just ~~which Heisenberg~~ described - namely, that of the value of basic concepts and the language that expresses what they represent - is no doubt the door to wisdom. This is a most refreshing realization, after all the facetious "skepticism with regard to those concepts of natural language which do not fit into the closed frame of scientific thought..." (Heisenbert). The facile oversimplification which prevailed in the nineteenth century still

fetters the public mind when the word "Science" is used. When carried through, it leads to a nightmarish conception of what man is and of his place in the world; it leads in fact to that Mr. Smith who is quite simply a mere bundle of events, basically no more than a bundle, except that it knows horror, misery, and can do such frightful things, ~~for no reason at all - seeing that he is believed to be "just as much the product of blind forces as is the falling of a stone to earth or the ebb and flow of the tides" (Julian Huxley).~~

Knowledge is not only necessary; it is a most noble pursuit, providing happiness of the highest kind - when it is also wisdom. Meantime it is essential to the wisdom we can achieve in this life that we be aware of the limitations of knowledge, that we dispel darkness wherever we can, and yet realize the limitations of our wisdom itself.

But to bear wisely in mind the limitations of our knowledge is not the same as to rest in them. To the lively intellect, its own limitations are a constant challenge; to

shrink from this challenge would be the very opposite of wisdom. I say this to you as Chancellor of a Catholic University. It was recently pointed out that shcolars of high standing are conspicuously absent among Catholics. If generalized, the observation would be unfair. After all, the founder of the most recent theory of an expanding universe is a priest - l'abbé Georges Lemaître - which of course does not make the hypothesis a Catholic one at all! Still, the observation is in fact true of certain areas. Whatever the historical explanation of this fact, we most certainly cannot blame the Church for it, neither her teaching nor her attitude towards the sciences and the need for interpreting their status.

That the Church should on some occasions take a defensive attitude where the mode of discussing certain problems of science is concerned, this too is historical fact, one that will no doubt be carried on to the end of time. How else can it be when we

are told, in the guise of Science, that man's abode and life-span, being astronomically insignificant, man himself is of no account; that free will is precluded by causality; that the mores of primitive societies prove all norms of conduct to be arbitrary; that humanity as something over and above beast, vegetable, rocks and machines, is a disease of the mind. The Church knows very well that the scientific account of nature leads to no such conclusions; but there are always enough people around who believe that it does. Actually, the Church is simply warning us that to inflate small learning can be a dangerous thing. In this She has been consistently proved right, no matter how much time it may take us to become aware of it. Her attitude, then, is quite the opposite of the reactionary one with which some people choose to invest Her.

So far as the scientist is concerned, Faith and Theology can only widen his perspectives which provide us with ever fresh, stimulating and, I should add, welcome

(end)

problems, no matter how challenging.

This is not a dream but a magnificent program which the old doctors must leave to the young graduates for its realization.

Notes diverses CDK

De Mundo – 3pp. mimeog.

Deux sortes de collections 5pp. mem.

The Basis of the Theory of Limits 6pp.

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Le dénombrement du multiple transcendental 1p.

Cur multitudo et inaequalitas 5pp.

DE MUNDO.

Prooemium: in quo ostenditur theologiam nostram catholicam proprie esse scientiam et principaliter speculativam; item sapientiam cujus proprium sit ordinare; tum de theologia quatenus ut sapientia utitur logica.

Totum dividitur in partes tres:

In prima parte tractatur de distinctione rerum in communi secundum Iam, Q. 47, quatenus distinctio rerum sit opus divinae sapientiae.

In secunda parte tractatur de ordinibus particularibus totius universi creati, ut sunt angeli et mundus, secundum quod de eis agitur in Ia S. Theol.

In tertia parte tractatur de mundo rerum generabilium et corruptibilium in specie. Haec tertia pars iterum dividitur in duas partes:

In prima parte tractatur de mundo rerum generabilium et corruptibilium secundum naturam suam absolute, quatenus tamen a theologo attingitur. Quae consideratio duplex est:

Prima est de mundo nostro quatenus propria ejus et essentialia dialectice derivari possunt ex superioribus partibus universi. In qua etiam ostenditur quare scientia de rebus naturalibus differt ab aliis scientiis.

Secunda est de mundo nostro secundum duplicem statum:

Primus est status motus et formationis. Ubi ostenditur quod mundus naturaliter fornabilis est:

primo quantum ad ipsam naturam. Et circa hoc ostenditur:

primo in quo consistat ratio formabilitatis;

secundo quod mundus noster formabilis sit quantum ad ipsa naturalia;

tertio quid sint rationes seminales apud S. Augustinum et D. Thomam.

secundo quantum ad gratiam, quatenus homini secundum naturam suam intellectualem inest imago creationis, quae est proximum fundamentum elevabilitatis. Et circa hoc tria:

primo de imagine et vestigio in communi;

secundo de imagine absolute;

tertio de vestigio ut ordinato ad imaginem.

Secundus est status termini. Et circa hoc duo

primo de ipso homine in statu termini, ubi ostenditur quomodo evidens ratio suffragatur resurrectionem carnis;

secundo de statu termini totius universi corporei et circa hoc duo:

primo quid D. Thomas sentiat de motu coeli et de elementis in isto statu.

secundo quod in isto non amplius erunt generatio et corruptio, nec plantae nec bruta animalia.

In secunda parte tractatur de mundo nostro secundum quod in finem supernaturalem ordinatur, iterum secundum duplicem statum.

Primo de statu formationis. Quae consideratio iterum duplex:

Prima est de formatione mundi secundum Augustinum et quatenus de ea tractatur in Ia S. Theol., post tractatum de angelis. Et circa hoc tria:

primo de angelorum cognitione matutina et vespertina;

secundo de ipso opere sex dierum;

tertio peculiariter de formatione primi hominis.

Secunda est de formatione mundi secundum ordinem reparationis, et quatenus opus misericordiae. Et circa hoc quatuor:

primo de gradibus manifestationis secundum gratiam;

secundo de peculiari hominis formabilitate et elevabilitate ratione imperfectionis.

tertio de Matre Dei quatenus habet rationem primi principii.

quarto de Christo et B. Virgine quatenus habent rationem originalis. Et hoc dupliciter:

primo respectu mundi nostri quatenus secundum naturalia formabilis est ad originale etiam ordinis supernaturalis;

secundo respectu totius creationis.

Secundo de statu termini quantum ad ordinem universi qui sequitur Redemptionem. Et circa hoc duo:

primo in quo differt ab ordine rerum secundum conditionem naturae absolute

secundo in quo differt etiam ab ordine rerum secundum quod de eis tractatur in Ia Summae Theol.

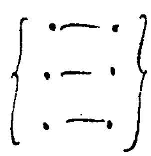
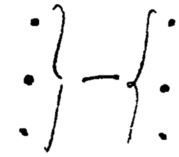
1. Deux sortes de collections:
{ homogènes C
{ hétérogènes C'

Quid commun? Chacun des éléments des deux collections est un et divisé de l'autre. On peut, sous ce rapport, comparer les éléments entre eux, et établir ~~si pour chaque~~ si pour chaque élément de C il y a un élément de C'.

S'il y en a autant dans C que dans C', l'on dira que les deux collections sont égales.

Quid égalité? relation des choses qui sont unes selon la quantité.

Or, les deux collections ne sont pas nombres quantitatifs. Où est alors l'égalité? Elle n'est pas entre les collections en tant qu'elles seraient nombre ou nombre, mais entre les collections en tant que collections: c.à.d. entre les éléments des collections:

sic  et non pas 

~~Le, il y a~~

La première comparaison fait abstraction de l'homogénéité ou de l'hétér. des éléments: elle s'appuie sur la seule unité ~~matérialité~~ de chacun des éléments ~~[illegible] des éléments~~. Elle fait abstraction de la différence des éléments.

Quel est le nombre qui fait abstraction des différences des éléments? C'est le nombre qui est même pour les deux collections.

Or, ~~le nombre~~ il y a trois éléments dans chaque collection. Sont elles par conséquent le même nombre trois? Sont-elles le même trois? Si elles sont le même trois, les deux collections sont identiques: donc il n'y a qu'une collection: identique = "unum in substantia".

Donc, le nombre qui est même pour C et C' est autre que 3 de C et autre que 3 de C': il est une classe autre que C et C': il est la classe qui est même pour C et C'.

$\mathcal{U}$ est la classe des classes qui sont égales entre elles (au sens défini).

Trois signifie alors la classe ~~de~~ qui est la même pour toutes les collections qui ont trois membres.

Mais qu'est "3 nombre"? cf. P. M., Phys. IV, lect. 23, n. 13.

Quel est le nombre prédicable avec identité des espèces ou des collections individuelles entre lesquelles il existe une égalité?

Cette question est-elle bien juste?

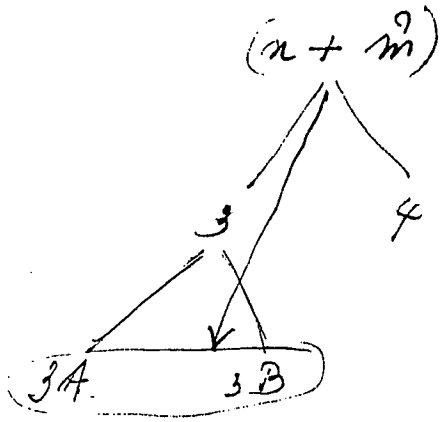
Animal est prédicable avec identité de Platon et de Socrate.

Puis-je demander: Quel est l'animal qui est 2 pour Socrate et Platon?

Pourtant, ce n'est pas n'importe quel nombre qui est 2 pour 3 hommes et trois chevaux?

La prédicabilité avec identité est fondée sur l'égalité des espèces ou des collections. Quand elles sont inégales, on ne peut pas dire qu'elles sont le même nombre. Le même nombre ~~de deux~~ n'est pas séparable de cette égalité. Elles ont le même nombre dans un rapport au genre ou au genre éloigné, mais la détermination du même nombre est corrélative par ce rapport: il est en lui-même indéterminé: Même nombre peut se dire de toutes les espèces ou collections égales. Puis ~~il y aura~~ autant de fois ~~prédicable avec identité~~ ~~de mêmes nombres~~ qu'il existe de rapports déterminés pour les différentes espèces d'espèces et de collections égales.

Donc, on ne peut pas demander "Quel est le nombre qui est 2 ....?"
mais "Quand le nombre est-il prédicable avec identité ....?"
Il y aura des fois autant de rapports d'identité qu'il existe d'espèces ou de collections égales. Les différenciations ne sont pas absolues: elles n'existent que dans les rapports.



C'est à cause de cette relation qu'on peut "ajouter" l'identité.

Nous avons vu que l'on peut savoir que deux collections ont le même nombre, sans savoir quel est leur nombre: i.e. sans savoir combien d'éléments il y a dans chaque collection. sans connaître le nombre nombré ou sans savoir le nombrant.

~~On peut donc savoir~~

Dès lors notre connaissance ~~du même~~ de la prédicabilité avec identité est fondée non sur la conn. de l'espèce de nombre, mais sur le rapport d'égalité des éléments.

Nous pouvons maintenant demander "quel est le nombre des éléments qui fonde la prédicabilité avec identité?" A cette question on ne répondra pas par "un trois" ou "un quatre" etc., mais par trois, quatre, etc. C'est à dire on répondra par le nombre de la collection comme collection: le nombre qui exprime l'appréhendat: c'à d. l'unité accidentelle des éléments, et rien que cette unité.

~~Donc, le même nombre n'est pas une classe de classe~~

de ce nombre on peut dire qu'il est "la classe de toutes les classes qui ont le même nombre." Mais ici n'est pas "le même nombre". C'est le nombre nombrant.

Il est applicable à toutes les collections qui ont le même nombre, ~~il n'est pas identifié à ces collections~~ ont le même nombre, Ces collections dont on peut mettre les membres en correspondance biunivoque. La correspondance biunivoque s'appuie sur la seule unité transcendantale des éléments laquelle est antérieure au nombre ~~le nombre~~ prédicamental. Le nombre antérieur au n. n.: le nombre transc.

Pourquoi avons nous fait intervenir la notion de même nombre pour aller au nombrant? Pcq le nombrant demande seulement que des classes aient le même nombre; et le même nombre fait abstraction des différences. L'unité du nombre nombrant n'exprime pas une unité en soi.

~~Quel est ce nombre prédi~~

Comment définit-on ce nombre prédicable avec identité? En effet l'identité est ajoutée au nombre dans la prédication. Mais qu'est-ce que c'est en soi que ce nombre avant que n'y ajoutions l'identité? Est-ce le nombre prédicamental? Non, si l'identité est fondée sur l'égalité des collections comme collections. Néanmoins le n préd. peut être m nombre, pourvu que les collections soient au nombre préd.

Le m nombre dont nous parlons ici fait abstr. du pr pr. et du n nombrant): il est nombre qu'on pourra définir une multitude finie, qui se divisera en "numerata per unum", et intentio qua numeramus.

~~Il suffit de noter~~
Notons seulement que la notion de m nombre fait elle-m abstraction du n préd. et du n nombrant.

The Basis of the Theory of Limits

The foundation of the theory of limits is given in Aristotle and St. Thomas. But it remained dormant until the modern development in Mathematics. The moderns, forsaking classical mathematics, arrived at their concept of number in a different way from the ancients. For the ancients, number was a multitude measured by one. Describing the origin of number, they said that number arises from the division of the continuum.

The moderns have a different approach to number. For them the notion of number is given. More than that, number for them is given in an intuition which confusedly imagines number as a series of actual points on an infinite continuum. Then, with this intuition, they lay down rules of operating with numbers. The more significant of these rules for our purpose are the following:

There is a number c such that:

$$a + b = c$$

and another number d such that:

$$ab = d$$

also there is a number x such that:

$$a + x = c \qquad (\text{or } c - a = x)$$

and a number y such that:

$$ay = d \qquad (\text{or } \frac{d}{a} = y)$$

There is a fifth rule that is used but not always stated, namely:

there exists a number x such that:

$$x^n = b$$

Given these rules the mathematician proceeds to "construct" his

"system" of numbers. These rules are respectively: the rule of addition, of multiplication, of subtraction, of division and of extraction of square root. But when the mathematician begins his "operations" with these rules he finds that after the first two he begins to find limitations in his system of numbers. With subtraction he is forced to have recourse to negative numbers, because otherwise there is not a number such that for any x - y we have an operation. Similarly in the case of division, he is forced to add fractions to his number system. Thus, at this point, the number "system" contains:

a) the natural numbers 1, 2, 3, ... n.

b) the negative numbers -1, -2, -3, ... -n.

c) the fractional numbers $\frac{1}{2}, \frac{1}{3}, \frac{1}{4}, \ldots \frac{1}{n}$ and their negatives.

Proceeding with the above system and the first four rules the mathematician gets along quite well. But when he begins using the fifth rule and tries to perform the inverse operation of extraction of roots, he is faced with a new difficulty. In division the fraction could always be expresseed as an integer (decimal) whose last digit was undetermined but determinable. For example: with some fractions as $\frac{1}{2}$ or $\frac{1}{4}$ we have .50 or .250 (these would be determinable and determined). With others, however, as $\frac{1}{3}$ we have the integer .333333... and this, while the last digit is always determinable, it is undetermined. But now in the extraction of roots, he is up against a difficulty; not only is the last digit, in some cases, undetermined, but it is only determined by further operations which are often of a very complex nature. He finds it difficult to see that there is a "number" in this case. For example $\sqrt{2}$ can be determined to 1.4142135 but unless he continues his laborious extractions of the root he cannot know what the next numbers are going to be; he can never add "..." as he did in the others and take it for granted that all will be

able to fill in the dots. Now the question arises: Is this last number determinable? It seems that it is but one could never say unless he had performed all the operations, because it is not "evident".

To get out of this difficulty the mathematician uses a trick. It is not a new trick but one which he had used before. However, in its previous use we missed it completely because of the way in which it was performed. For the moment we shall leave the analysis of this legerdemain until later. Possibly the reader will catch on when he sees it in a more obvious fashion.

But back to our performer. He shows quite easily that for the $\sqrt{2}$ the values of 1.4 and 1.5 are limits, i.e., $(1.4)^2 < 2$, and $(1.5)^2 > 2$ Thus, he says, there is a point somewhere between these two which is the value of $\sqrt{2}$. He then proceeds to determine the point. He denominates the upppr series y and the lower series x. These two series coming together, he says, form "nests of intervals" which he proceeds to call J_1, J_2, J_3, ... , or for convenience (J_n). Now he says, (J_n) is a "real" number; and all our previous numbers are "real" numbers also because we can arrive at any of them in the same way. For example: to arrive at the natural number 5 we have only to begin from 4 and 6; taking $4 + \frac{1}{2} + \frac{1}{4} \ldots$ and $\ldots - \frac{1}{4} - \frac{1}{2} - 6$

Thus, since our way of writing a number makes no difference (we write $\frac{3}{8}$ or $\frac{21}{56}$ or 0.375), we can just as well express all our numbers as $(J_n)_n$

Now our mathematician is prepared to go along his way. He has all, or almost all, the numbers necessary for any calculation. Also, he can now "see" his numbers stretched out before him. (The one slight difficulty is with the even roots of negative numbers, which roots do not "exist" according to the rule that no number multiplied by itself an even number of times, or better no even powers of a number $n^2, n^4, n^6, \ldots$, will give

a negative number. But this difficulty is taken care of in much the same fashion as the one on roots in general; and we have "imaginary" numbers. And the mathematician hastens to add that these numbers are not really imaginary. To avoid this connotation he begins calling them "complex" numbers. What this "really" means, we cannot imagine!)

Now, to understand how ~~our modern magician --- pardon, mathematician~~ --- attains these effects, let us look at his props. He had one very interesting gadget with him when he came on the stage. He had a "series of actual points on an infinite continuum". With this gadget which he had "constructed", he was able to perform all the tricks that we have been entertained with. Let us examine this thing more closely.

If we go into the world of "reality" we will find only a series of points (number numbering?) or an infinite continuum; but not both together. With our points we can do quite a bit. With our infinite continuum we can do a little more. In the latter, for example, we can fractionate indefinitely. When we put the two together, however, we get a "divider"; perhaps it should be called a "humerator", though, because with it we actually "make" numbers, as we saw above.

Now let us run this gadget slowly and see just how it makes numbers. In the process of division we ordinarily come to some least number, beyond which we cannot go in our division. As St. Thomas says in III Phys. Lect. 12 n. 3, "Dicitur enim quod in numero invenitur aliquis terminus in minus, quem non est dividendo transcendere." But that doesn't stop us if we have a "divider". We just take the points along with our infinite continuum and "make" a number. If the number refuses to come up by itself as the number 2 comes up when we start with 1 and then divide with $\frac{1}{2}$ and $\frac{1}{4}$ ... We simply divide above it and below it as in $\sqrt{2}$ and thus get our number.

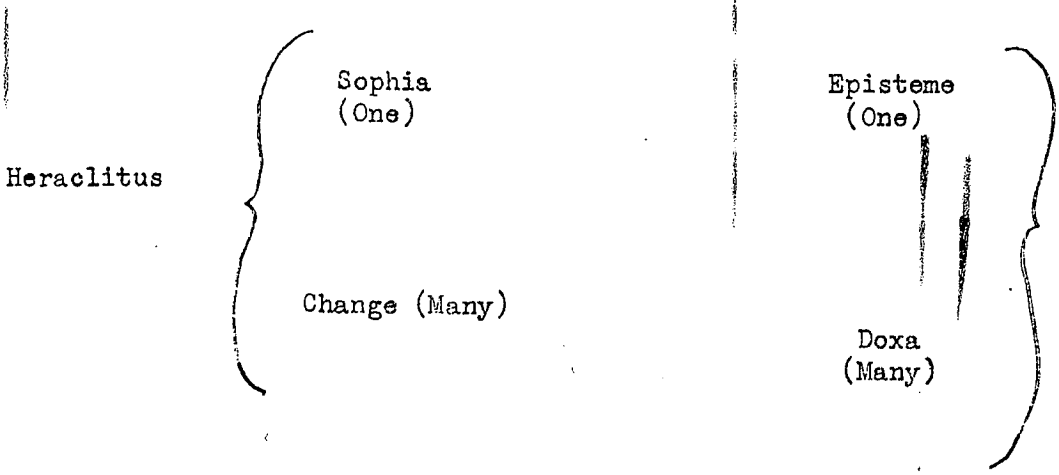
With our "divider" and the "numbers" made with it, we have a very powerful instrument. We produce "series" which do some very wonderful things. We can construct series (afterwards designated in general by Σa_n , where Σ indicates the "sum" or term of the series, a indicates the variable and the sub n indicates that an operation has been performed an indefinite number of times). By using the "complex" numbers we find that "The 'range of summation' of a series Σa_n of complex terms--i.e. the set of values which may be obtained as sums of convergent rearrangements of Σa_n -- is either a definite point, or a definite straight line, or the entire plane." (Theory and Application of Infinite Series, Knopp, pg. 398) Translated this means: given a body, we can reduce it to a surface; given a surface we can reduce it to a line; and given a line, we can reduce it to a point.

The point to remember in all this is that without our "divider" we would not be able to do this. Thus we do not really (and I mean really) do it. Just what is done, and how division does this is explained by St. Thomas Ibid., n. 5: (He has just said in the last line in n. 4: "Sed hic numerus, qui sic in infinitum multiplicatur, non est numerus separatus a decisione magnitudinum.") "Circa quod sciendum est quod divisio, ut dictum est, multitudinem causat. Est autem duplex divisio: una formalis, quae est per opposita; er alia secundum quantitatem. Prima autem divisio causat multitudinem, quae est de transcendentibus, secundum quod ens dividitur per unum et multa: ded divisio continuae quantitatis causat numerum, qui est species quantitatis, inquantum habet rationem mensurae. Et hic numerus multiplicabilis est in infinitum, sicut et magnitudo divisibilis est in infinitum: sed multitudo quae sequitur divisionem formalem rerum, non multiplicatur in infinitum; sunt enim determinatae species rerum, sicut et determinata quantitas universi.

Et ideo dicit quod hic numerus, qui multiplicatur in infinitum, non separatur a divisione continui. Neque tamen hic numerus sic est infinitus, sicut aliquid permanens, sed sicut semper in fieri existens, inquantum successive additur supra quemlibet numerum datum; ..."

And now, abstracting from mathematics, we can take this same "divider" and apply it to other concepts besides "point and line", "line and surface" and "surface and body". In so doing we will "see" one in the other and thus have a better knowledge of our world.

Parmenides and Heraclitus



Both opposed knowledge of phenomena (the Kantian term applies here) to knowledge of the thing in itself. The many was not an illusion for Parmenides but an appearance. He thought that beneath the things in the state of change and of becoming there was the one which was the object of ~~existence~~ episteme -- (cf. theory of limits) one species, etc. The one is simpliciter. The many is not simpliciter, but is becoming. The many of Heraclitus is often contrasted with the one of Parmenides; but Heraclitus also held that there was sophia of the one. For Parmenides a thing in movement is not in so far as it has not reached its "is" -- the term.

Zeno wanted to show that it was impossible to reduce the world of movement to the one. The world of the many of Parmenides has reality but no "being", since he restricts being to that which already "is"; (qui est, which we apply to God). Zeno was trying to prove that movement was impossible if motion was static, if distance was made of discrete points. Zeno's arguments were dialectical to protect the notion of Parmenides. (Cf. Plato: Parmenides)

The moment we try to apply to the second world (the many) the principles of the first (scientific), the attempt ends in contradictions.

Heraclitus:

Said the world is many, becoming; therefore we can have only opinion in this respect. However, he does speak of Sophia, Logos, which is above the phenomenal world.

Plato:

His theory of two worlds is very similar to this in so far as the universe of the demiurge is intelligible, it is mathematical. See Timaeus, also Taylor: Numbers, Forms, Ideas.

Notes on the interpretation of the Ancients:

We are usually interpreting the Early Greeks as mediocre because we interpret them in terms of the distinctions made later. Thus by bearing on one aspect as distinguished, they are made to look quite superficial. Thus we see how difficult it is for us to understand these because we have dissociated so much of what was fundamental to what they supposed.

E. g. When Thales says that everything is full of Gods, he gave to things more than their single aspects. Water has many more properties than we give it. There is a proper wonder for the philosopher in the face of water, etc. When this is lost, philosophy is lost.

Que faut-il penser des tentatives de démontrer de manière très rigoureuse que 2 et 2 font 4 ? La saine scolastique n'y voit-elle pas un indice très évident de la folie de la pensée moderne? Cette proposition n'est-elle pas le type même de l'évidence, de la certitude et de la rigueur parfaite? La question se présentera sous un tout autre jour dès lors que nous nous demandons comment cette proposition pourrait être rendue plus évidente, plus certaine, plus rigoureuse. La connaissance d'objets aussi distincts et aussi simples que le nombre 2 ou le nombre 4 peut-elle être plus distincte et plus pénétrante que celle que nous en avons originellement? Telle est la question à laquelle nous nous efforcerons de répondre.

(IV) Le dénombrement du multiple transcendental.

1. Les choses hétérogènes ne peuvent être en nombre prédicamental. Nous disons néanmoins que les Personnes Divines sont trois; que les esprits purs Michel, Gabriel, et Raphael sont trois; une maison un marteau, et un homme sont trois. Quel est ce trois que nous leur appliquons et qui doit faire abstraction de l'hétérogénéité des termes qui constituent ces trois groupes de trois, lesquels constituent à leur tour un groupe de trois? D'après ce qui a été dit déja, il serait un nombre nombrant. Mais il nous faut l'analyser davantage.

2. Bertrand Russell (voir TC The definition of mathematics) définit le nombre d'une classe: une classe des classes qui ont le même nombre.— Il s'agit donc bien du nombre d'une classe ou collection envisagée comme collection. Si la définition est bonne, "nombre d'une classe" et "même nombre" doivent être des notions distinctes, et la dernière doit être plus connue que la première.

3. M. Russell emploie les termes "similar" et "same" d'une manière très équivoque. Par "similar" faut-il entendre "semblable", "égal", où "même" ("identique")? Par "same": "semblable", ou "même"? Ce sont là en effet trois notions bien distinctes.

"...ad unum consequitur idem et simile et aequale. Nam idem est unum in substantia, simile unum in qualitate, eaquale vero unum in quantitate. Ad pluralitatem vero pertinent contraria horum, scilicet diversum et dissimile et inequale. Nam diversa sunt quorum non est substantia una, et dissimilia quae non habent qualitatem unam, et inaequalia quae non habent unam quantitatem." In X Metaph., lect.4, nn.1999-2000

"...identitas est unitas vel unio; aut ex eo quod illa quae dicuntur idem, sunt plura secundum esse, et tamen dicuntur idem in quantum in aliquo uno conveniunt. Aut quia sunt unum secundum esse, sed intellectus utitur eo ut pluribus ad hoc quod relationem intelligat." In V Metaph., lect.11, n.912.

7. La classe des classes doit être autre que les classes: la classe des classes n'est pas identifiée à ces classes. D'autre part, la classe des classes doit être ~~un~~ Même: et en tant que même pour les ~~xxxxxx~~ classes différentes, elle ne peut pas être divisée par ces classes. Elle doit être à la fois même et autre. ~~Les classes de deux chevaux et les classes de deux chiens~~ Deux chevaux et deux chiens ne sont pas le même deux. Néanmoins, ~~étant~~ ayant un nombre égal, deux chevaux et deux chiens sont le même nombre. Quel est ce nombre égal? Deux. Quel le même nombre? Non pas deux.

le grande Σ } m̂ genre
le genre du Pl. }

Chev. ≥ Homme sont la m̂ classe.

Cur multitudo et inaequalitas — note

1° Cg. II 45 ~~[illegible]~~
Cg. III 97.

2° de Pot. III 16

3° I 47, 1 2.

4° Comp. Theol. 72, 73, 102.

(b) Non esset perfecta similitudo Dei in universo, si unus gradus tt.
Agentis potentia secus non ita complete reduceretur in actum.

(c) Perfectius universum si creaturae etiam bonitatem diffundunt.
Hoc autem requirit inaequalitatem.

(d) ~~Plura bona uno bono finito meliora. At divina bonitas infinita.~~

(e) Magis addit ad bonitatem universi multitudo specierum quam individ.

(g) Summa perfectio, bonum ordinis ~~universi~~, non debuit deesse. Bonum
ordinis formale respectu singularium.

III Cg. 97

~~(x) In divinam bonitatem ordinat... ut similitudo ejus imprimatur in rebus.~~
~~Hoc non nisi per diversa possibile est. Exemplum verbi.~~
~~Unde quod in Deo unite et simpliciter.~~

~~(x.x) Prima ratio in creaturis est earum numerositas.~~

II CG. 45

(a) Deus, perfectissimum agens, perfectissime suam similitudinem omnino naturae [creatae] convenit.
At non secundum unam solam speciem, quia quod in causa simpliciter et unite... Creatura non aequalis Deo.

(b) Non esset perfecta similitudo Dei in universo, si unus gradus tt.
Agentis potentia secus non ita completa reduceretur in actum.

(c) Perfectum universum si creaturae etiam bonitatem diffunderet?
Hoc autem requirit inaequalitatem.

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Pot. 16, —

Ex ipso ordine universi, ratio ~~multipl~~ diversitatis, quae in Deo simpliciter est indistincte. Unde a Sapientia.

ad 1: Deus unus unum produxit { – unumquodque in se est unum
– omnia sunt unum perfectum.

ad 2: Creatura assimilatur Deo in unitate in quantum { unaquaeque in se una est
in quantum omnes unum unitate ordinis

ad 5: Deus propria causa uniuscujusque creaturae .... Quando idem non potest esse plurium proprium, hoc modo fit propriatio per adaequationem

ad 7: Similitudo creaturae ad Deum non adaequatio. Unde creatura non debet carere omni multitudine.

ad 10: Non oportet unius modi unitatem esse in creatura et in Deo, licet creatura Deum in unitate imitetur.

ad 12: Quando exemplatum perfecte repraesentat exemplar, ~~ab~~ tunc ab uno exemplari non est nisi unum exemplatum, nisi per accidens, in quantum exemplata materialiter distinguuntur.... Creaturae non perfecte imitantur... Perfectus modus imitandi unus tantum. Filius.

ad 13: Forma intellectus divini, una secundum rem, multiplex ratione.....

ad 18: Deus facit creaturam propinquissimam fini quantum potest. Unde non nisi unum produxit. Arecsatio tenet de eo quod adaequato.

ad 22: Unitas creaturae non removet omnem multitudinem, sed manet illa cujus unum est pars.

Ia 47/1

Quia per unam creaturam sufficienter repraesentari non potest. Homines quae in Deo simpliciter et uniformiter, in creaturis multipliciter et divisim

2. Divisio materialis propter formalem. — Divina sapientia causa distinctionis rerum propter perfectionem universi, ita et inaequalitatis.

Comp. Theol.

Comp. 72:

Omne agens agit sibi simile secundum quod possibile est.
Non autem possibile erat quod similitudinem divinae bonitatis res a Deo productae consequerentur in ea simplicitate, secundum quam invenitur in Deo.
Unde oportuit quod id quod est unum et simplex, repraesentaretur in rebus causatis diversimode et dissimiliter.
Necesse igitur fuit diversitatem esse in rebus a Deo productis, ut divinam perfectionem rerum diversitas secundum suum modum imitaretur.

Item, unumquodque causatum finitum est, solius enim Dei est essentia infinita.
Quodlibet autem finitum per additionem alterius redditur majus.
Melius igitur .....

Comp. 73

Deus autem, non tantum in se bonus est, sed etiam alia in bonitate excellit et ea ad bonitatem adducit.
Ergo, ut perfectior ... (a) ut quaedam alia meliora
(b) ut quaedam in alia operent, ea ad perfectionem inducendo.
Prima diversitas principaliter in diversitate formarum consistit.
Et haec coniar. – unde ordo.

Comp. 102

(a) Propter distantiam uniuscuiusque creaturae a Deo, necessarium fuit ut per multa, ut quod deest uno, suppleretur ab alio. Nec & hoc aequiparantia.

(b) Item, illud quod inest causae universali simpliciter et unite, invenitur in effectibus multipliciter et distincte. Igitur multitudo et distinctio non casualiter sunt factae, ...

(c) Est enim multitudo rerum et distinctio ab intellectu divino excogitata et instituta in rebus, ad hoc quod diversimode divina a rebus creatis repraesentetur, et eam secundum diversos gradus diversa participarent, ut sic & ipso diversorum specierum rerum ordine quaedam pulchritudo resultet in rebus, quae divinam sapientiam commendaret.

Comp. 102

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Quatrième conférence, le mercredi à 3 hr. p.m.

Philosophie et Mathématique

I

Mathématiques et Introduction à la Philosophie

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1. La logique — méthodologie générale: "... quia diversi secundum diversos modos veritatem inquirunt; ideo oportet quod homo instruatur per quem modum in singulis scientiis sint recipienda ea quae dicuntur. — Et quia non est facile quod homo simul duo capiat, sed dum ad duo attendit, neutrum capere potest; absurdum est, quod homo simul quaerat scientiam et modum qui convenit scientiae. Et propter hoc debet prius addiscere logicam quam alias scientias, quia logica tradit communem modum procedendi in omnibus aliis scientiis. Modus autem proprius singularum scientiarum, in scientiis singulis circa principium tradi debet." (S. Thomas, In II Metaph., lect. 5, édit. Cathala n. 335)

2. Réponse à une difficulté pédagogique: "... in addiscendo incipimus ab eo quod magis facile, nisi necessitas aliud requirat: quandoque enim necesse est in addiscendo non incipere ab eo quod est facilius, sed ab eo cujus cognitione cognitio sequentium dependet: et hac positione oportet in addiscendo a logica incipere, non quia ipsa sit facilior scientiis caeteris, habet enim maximam difficultatem, cum sit de secundo intellectis: sed quia aliae scientiae ab ipsa dependent, in quantum ipsa docet modum procedendi in omnibus scientiis. Oportet enim primo scire modum scientiae quam scientiam ipsam, ut dicitur II Meta." (S. Thomas, In Boetium de Trinitate, Q. VI, a. 1, ad secundam quaest., ad 3)

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Notre indifférence ne peut pas s'expliquer par la seule difficulté de ces questions.* Le manque d'initiation y est pour une part, mais la raison principale me paraît être la suivante: alors que "sapientis est ordinare", nous n'avons aucun désir de voir de l'ordre dans les choses et dans la connaissance. ~~Ces problèmes ne nous intéressent guère.~~

Plus que jamais les mathématiciens savent que leurs principes propres ne peuvent pas adéquatement fonder leur science. ~~Pouvons-nous~~ Savons-nous leur montrer où chercher les principes communs? Il faudrait d'abord connaître leurs problèmes. Les connaissons-nous? Savons-nous pourquoi les mathématiciens modernes identifient logique et mathématique? pourquoi ils ont détrôné Euclide? pourquoi de principes contraires l'on peut déduire des géométries également valables? pourquoi l'on considère les mathématiques comme ~~un~~ un art purement dialectique?** Le Sage ne doit-il pas connaître ces problèmes proprement métaphysiques? La sagesse peut-elle s'exercer dans le vide?

Dire ~~que~~ qu'une sérieuse ~~solide~~ formation mathématique est ~~inutile en philosophie~~ sans utilité spéciale en philosophie, qu'elle est indigeste tant qu'il s'agit d'étudiants en philosophie, ~~ce n'est nier la philosophie~~ ce n'est pas compromettre la philosophie, c'est la nier. Considérer la philosophie comme une science parmi les autres, comme une science ~~[illegible]~~ isolée et fermée sur elle-même, c'est ~~[illegible]~~ accomplir la ruine de la sagesse. Un enseignement ~~Nous n'ignorons pas les diff~~ imbu de cet esprit manque, pour le plus grand nombre des élèves, le but de leur cours de philosophie; ~~Il encourage~~ ~~Il formera des pédants~~ il encourage les pédants pour lesquels la philosophie est une étiquette qui donne le droit de "se prononcer sur tous les problèmes sans les avoir jamais étudiés".

Charles De Koninck

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* Cependant, les éléments de mathématique tels qu'on peut les présenter aujourd'hui sont plus ~~faciles~~ simples et plus faciles qu'ils ne l'étaient autrefois.

** Voici quelques ouvrages d'initiation: ~~[illegible]~~ A. N. Whitehead, Introduction to mathematics, The Home University Library, Thornton Butterworth Limited, Londres ~~[illegible]~~ 1re impression. 1911. – Bertrand Russell, Introduction to mathematical philosophy, Londres – George Allen & Unwin, New York – The Macmillan Co., 2e édit. 1920. – T. Dantzig, Le nombre langage de la science, Payot, Paris 1932. – R. M. Eaton, General logic, Charles Scribners' Sons, New York 1931. (Part III).

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sensu cadunt, et imaginationi subjacent: ut linea, figura, numerus, et hujusmodi:* et ideo intellectus humanus a phantasmatibus accipiens, facilius eorum cognitionem accipit et certius quam intelligentiae alicujus, vel etiam quidditatem substantiae, potentiam, et actum, et hujusmodi: et sic patet, quod mathematica consideratio et facilior et certior quam naturalis et theologica, et multo plus quam aliae scientiae operativae, et ideo ipsa maxime dicitur disciplinabiliter procedere..." (S. Thomas, In Boetium de Trin., Q. VI, a. 1, ad secundam quaest. — Voir aussi, In II Metaph., lect. 5).

* Les mathématiques modernes soulèvent à ce sujet une difficulté à laquelle je tenterai de répondre au parag. III.

II

Mathématiques et Philosophie de la Nature

La physique et la biologie expérimentales, bien qu'elles soient formellement mathématique ou dialectique, ~~en tant qu'elles répondent~~ ne sont qu'une extension de la philosophie de la nature (a) en tant qu'elles répondent au même désir de connaître la nature, (b) en tant qu'elles restent matériellement et principalement naturelles, (c) en tant que la philosophie de la nature est une sorte de sagesse par rapport à ces connaissances.

1. La physique expérimentale, subalternée à la mathématique, et formellement mathématique: Aristote, Post. Anal. I, c. 13; S. Thomas, ibid., lect. 25; In Boetium de Trinitate, Q. V, a. 3, ad 5 et seq. *

2. Mais elle reste principalement naturelle: Aristote, Physic. II, c. 2, 193b22 - 194a7; S. Thomas, ibid., lect. 3.

3. La logique des sciences expérimentales, telles qu'on les conçoit aujourd'hui, n'est pas la "judicativa" de la démonstration, mais la dialectique: en effet, ~~les lois dites scientifiques~~ aucun savant ne le conteste aujourd'hui, "les lois" scientifiques ne sont ni vraies ni fausses, mais approchées", les théories toujours provisoires. Voir Aristote et S. Thomas, Physic., et de Coelo, "rationes logicae" ou "dialecticae", passim.

4. Bien qu'elle ne soit pas la première, la philosophie de la nature est une sorte de sagesse: Aristot, Metaph. IV, c. 3, 1005 b1. — Comme science démonstrative la philosophie de la nature ne peut atteindre qu'un aspect des êtres naturels. ~~En tant qu'elles~~ De là la nécessité des sciences expérimentales ~~et~~ expérimentales parce qu'elles ne peuvent pas dépasser la matière sensible individuelle — leurs généralisations posent des formes dialectiques et provisoires. Dans sa fonction de sagesse la philosophie de la nature surmonte cette division et établit l'unité. L'exercice de cette fonction suppose la connaissance des sujets, des principes et des conclusions

* Après les récentes critiques, l'assimilation que fait monsieur Maritain entre la physique mathématique et les scientiae mediae me paraît toujours parfaitement fondée.

qui lui sont soumis, d'autant plus que nos philosophes de la nature n'ont pas contesté ce droit. Au contraire. Très modernes sous ce rapport, ils insistent fortement sur leur droit.

5. D'ailleurs, une philosophie de la nature qui perd contact avec l'active recherche expérimentale (même avec celle qui ne conduira jamais vers la science démonstrative) se nie et dégénère en verbiage: Aristote, de Gener. et Corrupt. I, c. 2; S. Thomas, ibid., lect. 3.*

Les sciences expérimentales soulèvent des problèmes, quand même ils seraient posés par des théories provisoires, qui relèvent proprement de la philosophie de la nature. Par exemple, la définition des grandeurs en physique relativiste, les relations d'incertitude de la théorie des quanta, l'identité de matière et d'énergie, la formation casuelle des systèmes planétaires, l'évolution, etc. On ne demande pas tant au philosophe de juger — les jugements n'ont pas fait défaut; on demande qu'avant de juger ils sachent de quoi il s'agit. Dans la plupart des cas nos arrogantes récusations ~~manifestent~~ ont révélé une regrettable ignorance de notre propre matière.

Il ne suffira pas toujours de répondre avec prudence: "Il s'agit là d'autres choses!" Quel est le rapport entre ces "autres choses" et les choses qui ressortissent immédiatement et exclusivement au philosophe de la nature? La nature serait-elle averroïste à sa manière? Dire que la physique est l'affaire des physiciens, et la mathématique l'affaire du mathématicien, n'est-ce pas encourager ~~l'anarchie~~ une anarchie déjà fortement enracinée? Certaines séparations sont le fait de grandes confusions.

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* De même qu'au de Anima I, c. 1 (S. Thomas, lect. 1 et 2), Aristote reproche aux platoniciens l'abus de la dialectique et l'insuffisance de l'expérience. Le dialecticien définit les choses naturelles par la forme; le philosophe par la matière. Considérons ce passage d'Eddington: "The relativity theory of physics reduces everything to relations; that is to say, it is structure, not material, which counts. The structure cannot be built up without material; but the nature of the material is of no ~~importance~~" (Space, Time and Gravitation, Cambridge 1929, p. 197). Il y aurait

Mathématique et Métaphysique

Nous sommes bien d'accord pour dire que la métaphysique et sagesse proprement dite, "inquantum scilicet de omnibus (scientiis) judicat, et non solum quantum ad conclusiones, sed etiam quantum ad prima principia." (Ia IIae, Q. 57, a. 2, ad 1) cela veut dire qu'elle est aussi philosophie des mathématiques, qu'elle juge non seulement leurs conclusions, mais aussi leurs premiers principes.

Nous rendons-nous bien compte des inflexibles exigences de la sagesse? Il suffit ici de démontrer en général qu'elle soit philosophie des mathématiques, c'est une grande vérité. Mais en quoi consiste-t-elle? Que nous dit-elle donc sur la nature des mathématiques? sur les problèmes métaphysiques posés par les mathématiques modernes? A en juger par les leçons que nous avons reçues et par les traités de métaphysique modernes que l'on dit fidèles à la tradition aristotélicienne, ces questions ne nous préoccupent guère: elles sont guère objet de nos préoccupations.

Où peut-on trouver cette philosophie des mathématiques? Une très large part a été accordée dans les Métaphysiques d'Aristote, dans sa critique du mathématisme platonicien. L'on y trouvera au moins les éléments fondamentaux. Quant au mathématisme platonicien, il n'est pas chose du passé, il vit plus que jamais.

Les principaux problèmes soulevés par les mathématiques modernes, lorsqu'elles débordent les cadres de la mathématique classique, sont d'ordre métaphysique. Mais en fait ce sont ces problèmes touchant la nature même de la mathématique. Les philosophes des mathématiques contemporains proposent soit un mathématisme de couleur platonicienne, soit un relativisme sophistique. La confusion en ce domaine est proportionnelle aux progrès accomplis dans les mathématiques. Et, une confusion qui touche la nature même de la science la plus humaine des sciences, la plus proportionnée à notre intelligence, est affaire de conséquence. ——

L'on a publié ces dernières années un certain nombre d'ouvrages de vulgarisation, vraiment accessibles au grand public[x], où cette confusion ainsi que notre indifférence sont exploitées par nos plus redoutables adversaires avec un succès réellement inquiétant.

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[x] Mentionnons le prodigieux succès de Librairie Mathematics for the million de L. Hogben (trad. française), ouvrage ouvertement marxiste. Il doit en partie son succès aux éloges dont il a été comblé par des mathématiciens très éminents: de T. Dantzig qui nous avait donné Number, the language of Science (trad. française: Le nombre, langage de la science) il a paru Aspects of science, ouvrage contenant ~~contre la Logique, mais qui n'en critique pas moins~~ des réflexions fort suggestives sur la nature des sciences physiques et mathématiques, mais rempli d'attaques contre la religion.

Notre indifférence ne peut pas s'expliquer par la seule difficulté de ces questions.* Le manque d'initiation y est pour une part, mais la raison principale me paraît être la suivante : alors que "sapientis est ordinare", nous n'avons aucun désir de voir de l'ordre dans les choses et dans la connaissance. ~~Ces problèmes ne nous intéressent guère.~~

Plus que jamais les mathématiciens savent que leurs principes propres ne peuvent pas adéquatement fonder leur science. ~~Pouvons-nous~~ Savons-nous leur montrer où chercher les principes communs ? Il faudrait d'abord connaître leurs problèmes. Les connaissons-nous ? Savons-nous pourquoi les mathématiciens modernes identifient logique et mathématique ? pourquoi ils ont détrôné Euclide ? pourquoi de principes contraires l'on peut déduire des géométries également valables ? [pourquoi l'on considère les mathématiques comme ~~[illegible]~~ un art purement dialectique ?]** Le Sage ne doit-il pas connaître ces problèmes proprement métaphysiques ? La sagesse peut-elle s'exercer dans le vide ?

Dire ~~que~~ qu'une sérieuse ~~solide~~ formation mathématique est ~~inutile en philosophie~~ sans utilité spéciale en philosophie, [qu'elle est négligeable tant qu'il s'agit d'étudiants en philosophie,] ~~[illegible] la philosophie~~ ce n'est pas compromettre la philosophie, c'est la nier. Considérer la philosophie comme une science parmi les autres, comme une science ~~[illegible]~~ isolée et fermée sur elle-même, c'est ~~[illegible]~~ accomplir la ruine de la sagesse. Un enseignement ~~Nous n'ignorons pas les diff~~ imbu de cet esprit manque, pour le plus grand nombre des élèves, le but de leur cours de philosophie ; ~~Il encourage~~ ~~Il formera des pédants~~ il encourage les pédants pour lesquels la philosophie est une étiquette qui donne le droit de "se prononcer sur tous les problèmes sans les avoir jamais étudiés".

Charles De Koninck

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* Cependant, les éléments de mathématique tels qu'on peut les présenter aujourd'hui sont plus ~~faciles~~ simplifiés et plus faciles qu'ils ne l'étaient autrefois.

** Voici quelques ouvrages d'initiation : ~~[illegible]~~ A.N. Whitehead, Introduction to mathematics, The Home University Library, Thornton Butterworth Limited, Londres ~~[illegible]~~ 1re impress. 1911. — Bertrand Russell, Introduction to mathematical philosophy, Londres — George Allen & Unwin, — New York — The Macmillan Co., 2e édit. 1920. — T. Dantzig, Le nombre langage de la science, Payot, Paris 1932. — R.M. Eaton, General logic, Charles Scribners' Sons, New York 1931. (Part III).

Philosophie et Mathématique

Ces notes ont été preparées comme sujet de discussion entre professeurs de philosophie Scolastique. Nous posons l'hypothèse de deux catégories de professeurs : l'une soutient ~~qu'il n'existe aucun rapport~~ que les rapports entre la philosophie et la mathématique sont tels que cette dernière est négligeable dans qu'il s'agit d'étudiants en philosophie; l'autre soutient le contraire. ~~Nous pensons~~ Dans ces notes nous signalons les fondements de cette dernière position.

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La mathématique et la formation de l'esprit scientifique.