

# COSMOLOGY



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# COSMOLOGY

A Class Manual in the Philosophy  
of Bodily Being

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*By*

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B. HERDER BOOK CO.

15 & 17 SOUTH BROADWAY, ST. LOUIS, MO.

AND

33 QUEEN SQUARE, LONDON, W. C.

1941

100 D 511  
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*Second Impression*

*Vail-Ballou Press, Inc., Binghamton and New York*

This little Book is dedicated

to

“A dear and early friend,”

THE VERY REVEREND MICHAEL P. BOYLE,

Pastor, and Official of the Diocesan Curia, Pittsburgh,  
Pennsylvania,

*who, by the tireless exercise of his splendid gifts of priestly zeal and scholarly acumen, has generously added, during many years, to the spiritual and intellectual enrichment of his parish, his diocese, and the Church universal.*





## PREFACE

This volume is the tenth and last in a series of textbooks in philosophy which has had only too kind and hospitable a reception at the hands of critics, teachers, and students. Like its predecessors, the present work is meant primarily for undergraduate pupils in college and seminary. Therefore its main effort is to present, in a clear and orderly fashion, the elements of an important, nay a necessary, science. It entertains no illusions of grandeur; it makes no attempt at learned display; it engages in no intricate discussions of minutiae; it delves into no corners reserved for the seasoned specialist; it usurps none of the tasks properly allotted to the living teacher.

The fact that cosmology was held for treatment until all other departments of philosophy had representation in the series must not be interpreted to mean that the writer of this book had notions about keeping the good wine until now. Rather, if a reason must be discovered and disclosed, the fact indicates a certain diffidence and even,—despite the fine courage which fathered the earlier textbooks,—a certain fear of broaching matters cosmological. For there is

a mood abroad (and vain has been the delay to let it pass) which foredooms any current text in this science to sharp and conflicting criticisms. On the one hand, such a book is sure to be accused of stepping rashly and irreverently upon the sacred field of physical science; on the other, it will inevitably be taken warmly to task for not noticing more fully "the data of modern science." The old problem of Scylla and Charybdis (still unsolved) faces the man who presumes to discuss natural philosophy in today's atmosphere: either he is a foggy who should at least try to get out of the mists of medievalism, or he is a dilettante scientist who mistakenly regards himself as a philosopher. Nevertheless, the importance of cosmology justifies, and indeed demands, continual fresh statement of this science in a form available for young and alert minds. To such minds the present work, conscious of many shortcomings, is proud to present itself.

The book tries steadily to maintain a seemingly *philosophical* character. It seeks (at what risk has just been indicated) to avoid trespassing upon a domain which is not its own. It endeavors to evade the mistakes pointed out by Father Henry Grenier (*Cursus Philosophiae, Vol. I, p. 142*) in a sentence or two which may be freely rendered as follows: "The ancients took certain physical theories as philosophical doctrines. In this they were wrong. Similarly those moderns are in error who accept certain theo-

ries as true in physics and false in philosophy, forgetting that the doctrines in question are entirely experimental (and not philosophical at all). This is the mistake of nearly all modern scholastics.”

The ninth volume of this series, published a year ago, was hailed by more than one kindly reviewer (the wish being doubtless father to the thought) as the last number; and it was said that the series was then “rounded out.” That the present work will make a successful rounding is, of course, a point of doubt; but it is also a matter of earnest and heartfelt hope.

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## INTRODUCTION

1. Name
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### I. NAME

The Greek noun *kosmos* means "order" or "good arrangement." The alert minds of the ancient Greeks were quick to see in this word a suitable expression for the order, beauty, and regularity which they observed in the world around them. For this reason *kosmos* soon came to mean "the world," that is, the bodily universe. It is interesting to notice in passing that the Latins also were alive to the orderliness and beauty of the world; they called it *mundus*, a word which describes something clean, pure, beautiful, ornate. Our English word *mundane* is a direct derivative from *mundus* in the sense of "the world," just as our words *cosmos* and *cosmic* are formed from *kosmos* in the same sense.

The Greek word *logos* means "word" or "speech." Fundamentally, it means the word, speech, or expression which takes place within the mind in the act of knowing. It means thought or knowledge, and, in special, *reasoned knowledge*. And it has come to have the technical meaning of *sustained and connected reasoning*; that is, it has come to signify *science*. In

compound words *logos* regularly takes the English form of *-logy*, which is usually connected with the rest of its compound by the letter *o*. Hence, a term ending in *-ology* usually suggests, by this very fact, its definition as “the science of” something or other.

From *kosmos*, the bodily world, and *logos*, science, we have the term *cosmology*. This name, therefore, by reason of its structure, means “the science of the bodily world.”

The term *cosmology* is a comparatively recent invention. In earlier times, the science (which is a part of philosophy) that we now call *cosmology* was known as *natural philosophy*. It was also called *the science of mobile being* or *scientia entis mobilis*, that is, the science of things subject to physical and sensible movement, motion, change. Now, only bodily things are naturally subject to such modification or movement. Only a body,—in the natural sense, and not in the mathematical sense of pure or abstract quantity,—is *ens mobile*, that is, movable or changeable being. Hence, as is manifest, *natural philosophy* or the *scientia entis mobilis* was, like cosmology, the science of bodily things, the science of the world around us, the science of the material and physical universe. Cosmology deals with *bodies*, as these exist or are existible *in nature*.

## 2. DEFINITION

Cosmology is *the philosophical science of natural*



*bodily being*. We must ponder every phrase of this definition.

a) Cosmology is *a science*. The term *science*, taken absolutely, without the article, is a literal synonym for *knowledge*. It is a direct derivative from the Latin *scientia*, "knowledge," and this word comes, in its turn, from the verb *scire*, "to know." But the word *science* has long been employed to signify a precise type or kind of knowledge: it means knowledge of facts or truths together with their explanations, their justification, their how's and why's, their causes and reasons. Such is the meaning of the term *science* when taken generally or absolutely. Now, any branch or department of such knowledge, which has its own clear-cut limits or determinate scope; which sets forth its data in an orderly, systematic, and complete manner; which justifies each point in its orderly development by assigning causes or reasons, is called *a science*. Cosmology meets the requirements here indicated, and is therefore rightly called *a science*. For cosmology is a branch of human knowledge with definite field or scope; it sets forth, in an orderly, complete, and systematic way, the reasoned truths that belong to its field; it gives, at each step of its progress in manifesting these truths, the reasons and proofs which justify its conclusions. Hence, *cosmology is a science*.

We may add that cosmology is a *speculative* or *theoretical* science. That is, it is a science which aims, first of all, at knowing truth, possessing it, enriching

the mind with it, contemplating it. On this score, cosmology is contrasted with *practical* or *normative* sciences, which have as their first purpose the manifesting of truth to be acted upon. Ethics, for example, is a practical science; it is the science of right human conduct; it is a science which indicates something *to be done* with what it makes known scientifically. But a speculative or theoretical science like cosmology informs the mind and enlarges culture without directly indicating any precise action or procedure to be undertaken in consequence of the knowledge it affords.

b) Cosmology is a *philosophical* science. In other words, it is a department of philosophy. Now, philosophy is the science of all things knowable by the human mind, considered in their *deepest* reasons and causes. Philosophy is a composite science; its departments or sub-sciences (of which cosmology is one) must all have the truly *philosophical* character; that is, each philosophical science must seek out the last, the ultimate, the deepest causes and reasons for the data which it manifests and proves. A philosophical science is, therefore, clearly distinguished from the non-philosophical sciences (among which the experimental sciences hold an imposing place) by the fact that its quest is for *ultimate* causes and reasons, while theirs is for *proximate* or *immediate* causes and reasons. Cosmology pursues an ultimate quest; it seeks to know the last how's and why's, the deepest causes and reasons that can be discovered for the data with which it

deals. Cosmology is, therefore, justly called *a philosophical science*.

But cosmology, a truly *philosophical* science, is not, strictly speaking, a *metaphysical* science. It belongs to *philosophical physics*, not to *metaphysics*. For metaphysics is the philosophical science of non-material real being, whereas cosmology is the philosophical science of material real being. Still, there are many writers and teachers who follow Christian Wolff (1679–1755) in making *metaphysics* a synonym for *real philosophy*, that is, for the philosophy of things or reality, as distinct from the philosophy of thought (Logic) and the philosophy of moral conduct (Ethics). These authorities make a convenient division of metaphysics into *general metaphysics*,—which treats of being or reality in itself and in its most general aspects,—and *special metaphysics*,—which treats of fundamental classifications of reality, viz., God, man, and the bodily world. Thus, the Wolffian division of philosophy stands as follows:

- |                       |   |                                 |
|-----------------------|---|---------------------------------|
| I. Mental Philosophy  | { | Logic                           |
| or Logic . . . . .    | { | Criteriology or Epistemology    |
| II. Real Philosophy   | { | General Metaphysics or Ontology |
| or Metaphysics        | { | Special Metaphysics             |
|                       | { | Theodicy                        |
|                       | { | Psychology                      |
|                       | { | Cosmology                       |
| III. Moral Philosophy | { | General Ethics                  |
| or Ethics . . . . .   | { | Special Ethics                  |

Now, however convenient this plan may be for

teachers and pupils,—and we are not concerned here to dispute its eminently practical character,—it is hardly to be called scientific. A strictly just assignment of departments would limit metaphysics to the field of non-material real being, that is, to the field of being considered in itself, as it is in the mind, and as it substantially exists in God and spiritual creatures. Thus, metaphysics would include ontology, criteriology, and theodicy. To philosophical physics would fall cosmology and psychology. For psychology, the science of life and of living bodies, is, inasmuch as it studies *bodies*, a department of cosmology. True, human life comes from a spiritual life-principle, a non-material real being; and so it seems that the section of psychology which studies the human soul should be assigned to metaphysics. Still, man is a *bodily* composite, and psychology studies the spiritual soul and its faculties in and through bodily and material manifestations. Thus it appears just to assign psychology outright to the realm of philosophical physics or natural philosophy. In our present study we do not insist upon regarding psychology as a chapter or department of cosmology; we follow the fashion which gives to psychology its own place as a distinct philosophical (but not metaphysical) science. In cosmology we study *bodies as such*, without reference to their character as living or non-living. The point we stress with special and repeated emphasis is that cosmology is a *physical*, and *not a metaphysical*, philosophical science.

Another important point: cosmology is philosophical physics, not experimental or laboratorian physics. The cosmologist takes the established findings of the physicist,—that is, the experimentalist,—and seeks to discover in these the larger meanings and ampler truths which the application of philosophical certainties may manifest. The cosmologist must also perform the occasional stern duty of pointing out to the experimentalist the mistaken character of theories which come into conflict with truths philosophically known and unshakably true. But the cosmologist does not invade the laboratory on his own account, nor is he greatly tempted to do so. The laboratorian, on the other hand, is almost inevitably drawn beyond the frontiers of his own proper field into the domain of philosophy. The physicist can hardly help playing the philosopher. For his quest of explanations,—an eager, sincere, enlightened, and wholly admirable search,—runs quickly through the realm of manifest sensible data, and leads temptingly on into the outer, non-sensible region where all final reasons and explanations must ultimately be sought. No explanation is ever entirely positivistic and sensistic. No theory, however bound up with material and testable things, is itself ultimately and completely testable and material. Back of every theory and of every explanation are certain fundamental truths which are self-evident and not subject to experiment,—truths, such as the existence of the investigator, the reliability of his powers, his

capacity for knowledge, and the fact that the world he investigates cannot involve in itself an absolute contradiction. Now, while the physicist is compelled, by his rational human constitution, to accept these and other non-material and philosophical findings, and to recur to them, at least implicitly, in framing his theories, the cosmologist is under no compulsion whatever to accept, or even to be deeply concerned about, the continual new theories (so often quickly proved erroneous) of the laboratorian. Indeed, physical science, in spite of marvellous advances and most valuable achievements, is today in a general condition of instability and uncertainty. We may still say what Sir Arthur Eddington said, a few years since, in his Gifford Lectures: that on the outside of the scientific edifice there should be placed a large placard reading, "No Admittance Except on Business—Structural Alterations in Progress." Hence the cosmologist is not to be contemned as a reactionary, a foggy, a stand-patter, a wistful worshipper of the faded past, if he refuses to warp his philosophy to fit the latest theories of the laboratorian. The cosmologist needs the scientist and works with what the scientist furnishes him; but only with the *established* findings of the scientist, the certainly known facts. He does not work with the probabilities proposed by the laboratorian, nor is he concerned with the quickly cooked-up philosophy which the laboratorian serves with his dish of probabilities. The cosmologist is not a mere trimmer, an

adjuster, a fitter. No, he is a philosopher, and this means that he has a body of known, proved, and indisputable principles. He may not have a finished philosophical edifice, but he has at least some sturdy and unshakable framework for building the edifice. Physical science may bring to light data which will indicate an annex to the cosmological building, or an unexpected cornice or cupola; it will never bring to the scholastic cosmologist an utter change of location or of plans.

There is a point where laboratorian physics and cosmology meet and even overlap. Rather, there is a series of such points, an irregular and intricate frontier. Hence it is not easy to determine, and to express in a few terse words, the distinction which indicates where the physicist should stop and the cosmologist begin. But the difficulty of establishing a clear line of demarcation is no reason for denying its existence or utility, or, as the current fashion is, for ignoring it altogether. In general, it can be said that the physicist deals properly with individual and material data and seeks for these a unifying and organizing explanation that may be called *proximate* or *immediate*; the cosmologist deals with material data in a more general or universal manner than the physicist, and seeks for these data an explanation that is *ultimate* or *root-deep*.

c) Cosmology is the philosophical science of *natural bodily being*. A natural bodily being, or a *nat-*

*ural body*, or a *physical body*, is a body that exists or can exist (that is, it is thought of as existing) in the world of realities around us. It is a body that can be *sensed*. Contrasted with a natural body is a *mathematical body*, that is, bodily extension or quantity considered as three-dimensional-bulk, without reference to its sensible character or to the qualities which are necessarily associated with bodies that can be seen or felt or handled or depicted in fancy. The bodily objects we see around us are natural or physical bodies. Even such as are artificial (like a house or an automobile) are only combinations or modifications of natural bodily substances, and are, at least equivalently for our present consideration, to be classed as natural or physical bodies. The material universe itself, viewed as a single bodily thing, is a natural or physical body. And each individual thing in the bodily universe,—each tree, each man, each stone, each weed; nay, each molecule, each atom, each electron,—is a natural or physical body. But the bodily quantity dealt with abstractly in mathematical problems is a mathematical body. A block of stone in the shape of a cube with edges two feet long is a physical or natural body. But *eight cubic feet* is a mathematical body.

Of any bodily thing, the mathematician asks, “What is its content in terms of abstract units of measurement? How big is it? How long; how wide; how thick?” Of an existing (or existible body), the



physicist asks, "What is its actual and immediate constitution? What elemental bodies, what parts or bodily constituents, make it up?" The query of the cosmologist is, "What makes this body a *body*? What is its *ultimate* constitution as an existing or existible corporeal substance?" Of a gallon of water, the mathematician says it consists of 231 cubic inches; the physicist says it is made of hydrogen and oxygen, elements which may be reduced to atomic and sub-atomic parts; the cosmologist says it is a substance constituted by the union of two substantial co-principles, viz., primary matter and substantial form.

Cosmology deals with the world of natural bodies and employs reason to interpret the deepest-lying facts discoverable in the actual experience of men with the material universe in which they live and of which they are a part. Mathematics, or, more precisely, the philosophy of mathematics, uses reason to interpret the properties and relationships of quantities as such. Of course, cosmology presupposes fundamental mathematics, even as it presupposes fundamental physics. Cosmology cannot discharge its function unless it rest upon a basis of mathematical philosophy and of physics, nor can a treatise in cosmology appeal to a mind wholly uninstructed in elementary physics and mathematics. Therefore, a textbook in cosmology must borrow something from the philosophy of mathematics, and must recognize the physics available to the commonest human experi-

ence and such physical facts as are definitely established by laboratorian science. Such a textbook will inevitably presuppose physical data, and will inevitably take up the consideration of quantity, extension, number, and certain quantity-relationships. Nevertheless, despite this alignment with mathematics and physical science, cosmology has its own specific character as the *philosophical* science of natural bodies. This point will be made more clear in the explanation of the *object* of cosmology, which now follows.

### 3. OBJECT

A science has a twofold object, one *material*, one *formal*. The material object of a science is what is usually called its "subject matter"; it is the thing with which the science deals; it is the field in which the science works. The formal object of a science is the precise end and aim which the science has in dealing with its material object. The material object of cosmology is the bodily world, or simply *bodies*. The formal object of cosmology is discerned in the fact that cosmology studies bodies *as such* (not this or that special kind of bodies) and seeks the ultimate explanation of them.

Our definition of cosmology indicates the material object of this science in the phrase, "the science of natural bodily being." It indicates the formal object of cosmology in the phrase, "the philosophical science."

Manifestly, sciences are distinguished, one from another, by their objects. Two sciences that are not in the same general field (such, for example, as the science of anatomy and of algebra) are distinguished by this fact; that is, they are distinguished and known as different sciences by their respective material objects. But it often happens that several, and even many, sciences are in the same general field, and thus they all have the same material object. Such sciences are distinguished, one from another,—that is, they are seen in their proper place and character, and kept from overlapping,—by their respective formal objects. Thus, cosmology, inasmuch as it deals with bodily being, is at one with all the experimental sciences; it is not marked off from these, and assigned its own proper scope, by its material object. But cosmology is distinguished from every other science by its own formal object. For, of all the sciences that deal with bodies, cosmology alone deals with *all* bodies (that is, with bodies as such), seeks to establish their *ultimate* constitution, and makes known the deepest roots of their observed activities. The other sciences that deal with natural bodily being (that is, the physical sciences) have, each in its respective way, certain kinds of bodies in their purview, or they seek for immediate and proximate explanations of bodies and bodily activity. Cosmology alone levels distinctions among bodies and traces out the ultimate explanation of the material universe. Therefore, cos-

mology is a science distinct from every other science. It is so distinct because of its *formal object*.

#### 4. IMPORTANCE

Philosophy has been described, in a somewhat grandiose fashion, as “man’s ultimate interpretation of the universe of knowable things.” Now, it is surely a matter of basic importance to the philosopher to know all he can about the most obvious part of that universe, that is to say, about the bodily world in which he lives, observes, and experiences; about the material universe which furnishes him the first beginnings of all his knowledge. And philosophers from the earliest times,—from the first Greek cosmogonists, and indeed from the first religion-philosophers of the ancient orient,—have recognized the importance, and even the necessity, of having some philosophy of nature, that is, of having cosmological knowledge.

Before Aristotle (4 century B. C.) the Ionians, the Pythagoreans, the Eleatics, and other schools of philosophers, worked out theories about the ultimate constitution of matter and the nature of the bodily world; at all events, they tried to do so, but they failed to get back to the truly ultimate roots of bodily reality. Aristotle succeeded where his predecessors failed. Maritain says that Aristotle’s philosophical physics (or cosmology) lays down the foundations and principles of every true philosophy of nature.

And even though the same author says that Aristotle's experimental physics is "a magnificent intellectual construction totally ruined by mistakes of facts," we must not fail to give due recognition to the truth that Aristotle did undertake physical science on the experimental side and, despite mistakes, developed it amazingly. Father Tilmann Pesch, S.J., says of him that he made the fullest use of observation and experiment and did all that any man of his times could do, without the service of the special instruments and scientific equipment which only later days have made available.

St. Albert the Great (d. 1280) and his illustrious pupil, St. Thomas Aquinas (1225–1274), as well as Roger Bacon (1214–1292), elaborated the findings of Aristotle with such physical means as their times afforded. After Francis Bacon, Lord Verulam (d. 1626), the natural sciences were developed with great rapidity. In our own day they engage the intense interest of so many able minds that they have, to some extent, outstripped the development of philosophy, which should keep pace with, and offer ultimate explanations of, their established findings. Physical science offers to the cosmologist an orderly field for his labors; it affords him endless items to explain, and it offers him continuously new checks, illustrations, and confirmations of his right conclusions. Yet modern physical science has sometimes about it a kind of feverish self-sufficiency which im-

pels the scientist to turn too quickly into a philosopher, and invites the proclamation of general theories upon the first apparent results of observation and experiment. And, since observation and experiment are continually confronting new facts, and often upsetting facts, the scientist-philosopher is frequently compelled to reverse himself and propound new and emended theories. Sane cosmology must, therefore, move very slowly; it must make perfectly sure that scientific conclusions are truly scientific, and not merely scientific, before it adopts them and applies them to its uses. Hence, cosmology, while acknowledging its debt to physical science, must recognize its own proper work of crowning with rounded perfection the work of the scientist, and so must steadily refuse to become excited with the temper or the tempo of the current age. It must never be stampeded into the adopting of theories which, however attractive, are not incontestably justified and proved by facts. Yet the importance of cosmology is not lessened, but is rather emphasized, by this careful procedure. It is the science of ultimate truth in the domain of bodily reality, and ultimate truth is not established swiftly or by popular acclaim. Its very deliberation and caution is a strong recommendation of cosmology to the sound and scholarly mind.

Following the eminent cosmologist, Father H. Schaaf, S.J., we may mention the following points

as indicative of the fundamental importance of cosmology :

1. Cosmology is a most interesting study, and it answers our natural desire to know all that can be known about the universe in which we live.

2. Cosmology is the science of that bodily world which is the proximate object of the human mind ; as such, this science is of basic importance to students of all branches of philosophy.

3. Cosmology brings a crowning perfection to the physical sciences, which, without the ultimate interpretation of philosophy, must ever be partial, piecemeal, and fragmentary.

4. Cosmology is of inestimable value to the student of theodicy or natural theology. It shows, on the one hand, that God is not to be identified with the bodily world, and, on the other hand, it indicates the existence and boundless perfections of God as manifested in the being, the order, the harmony, and the government of the material world.

#### 5. DIVISION

The ultimate questions that may be asked about the bodily universe are three : *What*, in last analysis, is a body? *Whence*, in the ultimate view, do bodies come? *Whither* do bodies, by their connatural activities, tend?

In accordance with the suggestion of these three

fundamental questions, we frame our plan for the present treatise. We shall study the universe of bodies in its *nature*, its *origin*, its *tendency*. These points are to be discussed in the following Books and Chapters:

### BOOK FIRST

#### *Bodies*

Chapter I. The Character of Bodies

Chapter II. The Constitution of Bodies

### BOOK SECOND

#### *Origin of Bodies*

Chapter I. The Creation of the World

Chapter II. The Development of the World

### BOOK THIRD

#### *Tendency of Bodies*

Chapter I. Finality in the World

Chapter II. Nature and Her Laws



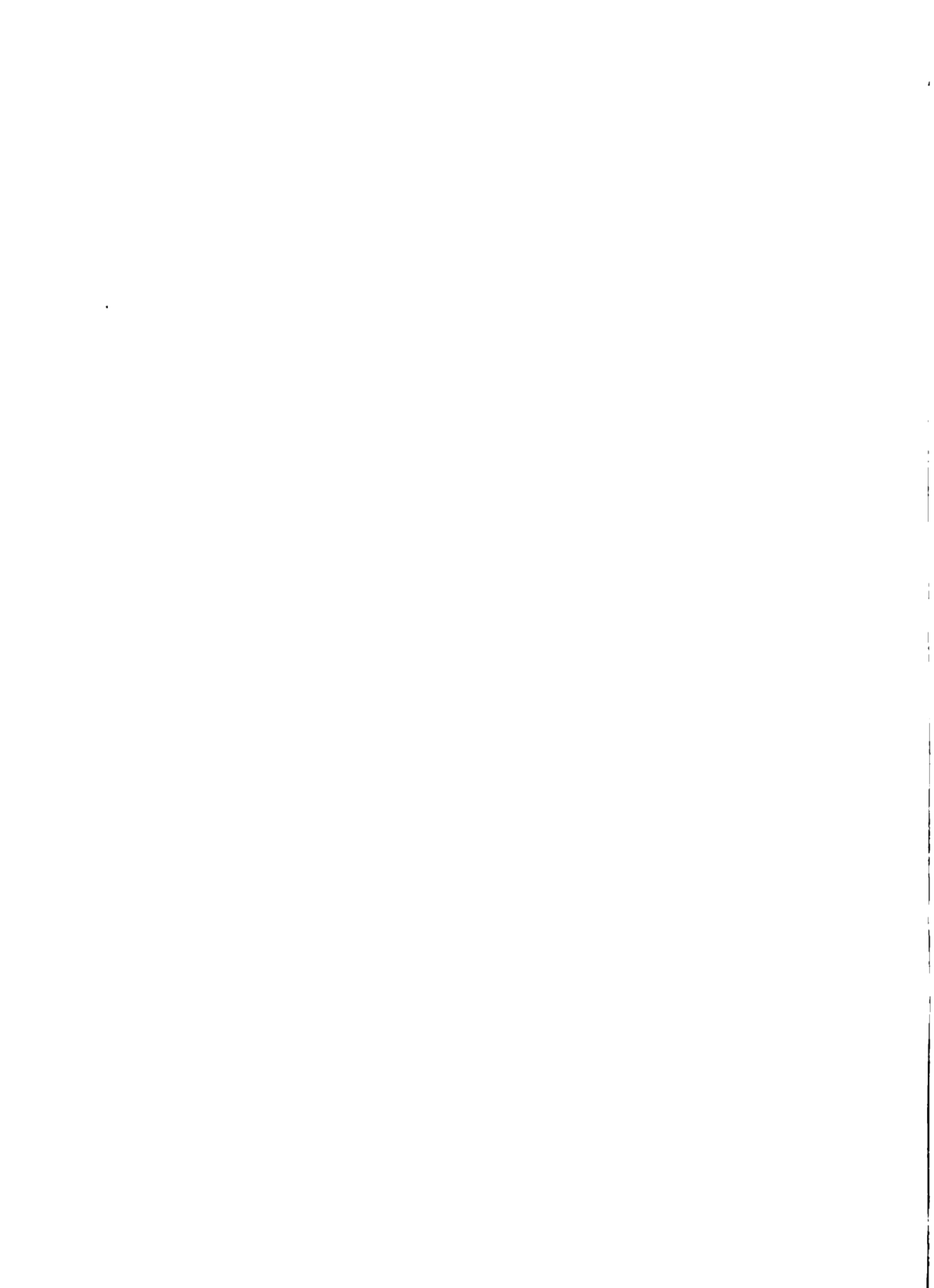
## **BOOK FIRST**

### **BODIES**

**This Book undertakes a study of the nature of bodily being. It discusses the general characteristics of natural bodies, and takes up the questions of quantity and bodily activity. Then the Book sets forth the Scholastic doctrine on the ultimate constitution of matter or bodily being, and offers a refutation of the more notable of opposed philosophies. The Book is divided into two Chapters:**

**Chapter I. The Character of Bodies**

**Chapter II. The Constitution of Bodies**



## CHAPTER I

### THE CHARACTER OF BODIES

This Chapter discusses the *characteristics* of bodily being, that is, the marks which are proper to bodies and give us some understanding of the essence, the inmost being and reality, of the material world. Further, the Chapter studies the meaning of bodily *quantity*, and investigates the *activities* (physical, chemical, mechanical) of quantified bodily substance. These matters are treated in three Articles:

Article 1. The Marks of Bodily Being

Article 2. The Quantity of Bodies

Article 3. The Activity of Bodies

#### ARTICLE I. THE MARKS OF BODILY BEING

- a) Meaning of *Marks* of Bodies      b) Bodies and their  
Characteristics                      c) The World not Divine

##### a) MEANING OF *MARKS* OF BODIES

The term *marks* serves, in the present instance, to indicate those realities which are constantly manifested by the bodily world in which we find ourselves. We learn what bodies are by studying what they consistently present to our notice,—that is, their properties or consistent *marks*. Out of this study emerges our deeper knowledge of what bodies are in themselves.

First of all, we may take for granted (despite the mistaken theories of certain philosophers of unreality) that the world we live in is real, not imaginary or fanciful. In a word, we may, and indeed must, take the world as a collection of *substances*, marked indeed by a multitude of various and changing *accidents*. That the world is substantial is a postulate of cosmology, a truth taken as established or as self-evident. In ontology (the science of fundamental metaphysics) we make a direct study of the nature and reality of substances; in epistemology (the science of true and certain knowledge) we investigate the trustworthiness of our knowing-powers in manifesting the world about us as actual and substantial. Here in cosmology we cannot pause to repeat all related matters that belong properly to other departments of philosophy. But we may, for the sake of clarity at the outset, review some definitions which are necessary as essential equipment for the beginner in cosmology.

When we speak of the *marks* of bodily being, we speak of the marks or properties of bodily *substance*. Now, a *substance* is a reality that is fitted to exist *itself*, and not merely to be the quality or determination or modification of something else. Thus, water is a substance. It is not a thing like its own bulk, or its temperature, or its location. For it would still be water were it more or less, were it hotter or colder, were it here or in some other place. The water is a

thing existible *itself*. The other realities we have mentioned in connection with water (bulk or amount, temperature, place) are not things which are suited to exist *themselves*; they are realities which mark or qualify or modify or determine a substance: and such realities are called *accidentals*, or, in the more ancient terminology, *accidents*. Now, some accidents, while not at all to be identified with the bodily substance which they mark or qualify, are so invariably present in the respective substances to which they belong, that we can but conclude that they belong there by natural necessity, and these we call *proper* accidents or simply *properties*. Properties are most valuable things for the investigator, for they are sure and unmistakable "leads" which give him reliable knowledge of the substance itself in which they appear. Indeed, our knowledge of substances always begins with a knowledge of accidents; for knowledge takes its rise with the action of the senses upon the outer world, and what the senses report is always, in itself, something accidental. Thus, we see, properly speaking, the color and the shape of an apple rather than the apple itself; we feel the solidity or "hardness" of the apple; we taste its flavor; we smell its aroma. And, of course, color, size, hardness, flavor, aroma, are *not* the apple itself; they are not the *substance* of the apple, not an existing actual essence which we call the apple; they are the marks or qualifications or modifications or determinants of the apple; in a word, they are the

accidentals or *accidents* of the apple. But we have a knowing-power superior to that of the senses; we call it the *mind* or the *understanding* or the *intellect*. This power is not satisfied to take the findings of the senses as these are presented; it works upon them, endeavoring tirelessly to know what reality, what truth, lies behind the accidentals which the senses gather and report. And, by the natural resistless drive of the mind or intellect, we inevitably recognize the insufficiency of the accidentals; we recognize the fact that these are not things which give a full account of themselves; that they are not such realities (though realities they surely are) as are naturally suited to exist in themselves and by themselves, but that they indicate a basic or underlying actuality which they clothe, so to speak, and determine, and qualify. We understand this truth because, from earliest youth, we often experience the fact that the accidentals shift and change and vary, while the actuality which they mark and qualify remains essentially unchanged. Thus, we see that the little tree becomes a big tree without undergoing any change as *a tree*; we notice that the green apple becomes a rosy apple without being more or less *an apple* by reason of the change; we understand that the baby as it grows does not become another person, however great and marked are the changes in accidentals like size, appearance, ability to walk and speak, and so on. So the human intellect, by natural necessity, is compelled to notice a

distinction in the fundamental nature of things in the world, and to classify reality as *substantial* and *accidental*. Nor can the intellect be wrong in this natural and necessary act of recognizing the state of things. That the intellect *can* know truth, and that in its first and inescapable recognition of reality as substantial and accidental, it *does* know truth, is something so self-evident that the mere effort to deny it or to doubt it ties one in a knot of contradiction. If a man were to say, "I cannot trust the intellect at all," then he cannot trust that statement at all, or trust as reliable the meaning he wishes to attach to that statement. If a person were to say, "The intellect cannot know truth with certainty," we must point out to this unfortunate individual that he speaks as though *his* intellect knew something with certainty, namely, the thing that he asserts in his statement. The capacity of the human intellect to know truth, and to think and reason upon it, and to reach true and justified conclusions, is *a self-evident truth* which cannot be either doubted or denied. Doubt and denial are always, in this case, self-destructive. Of course, the intellect may be misused; it may be too quick to judge on insufficient data; it may be employed in tasks beyond its power. But the point we make is not that the intellect knows all truth at all times, but that the intellect *can* know some truth, and that it *does* know, with truth and certainty, the fact of existence, and the world about, and its own fundamental reliability; further, it

infallibly knows that truths cannot be contradictory and mutually destructive, and that when a thing is truly known in its essential being, that thing cannot at the same time be something else.

We come, then, to the study of the bodily world with minds that can grasp truth. We come with minds that, from earliest use, have necessarily drawn a distinction between things *substantial* and things *accidental* in the actual world of bodies in which we exist and of which we are a part. We seek now as philosophers to take a new and more penetrating look at this world of bodies, and to notice what precise accidentals are *always* found associated with bodily being. Success in this effort will give us the grasp of the *marks* or characteristics of bodies.

Now, perhaps the very first thing to notice about any bodily substance is the fact that it is extended in space; it has *quantity*. This is indeed a *mark*, and a proper accident or property of bodily substance. So important a property, indeed, is the property of *quantity* that we shall assign to its discussion a special Article of the present Chapter. Postponing, then, for the moment, the study of *quantity*, we ask what other characteristics are found associated with all bodies. We know that all bodies are not pink, all are not alive, all are not liquids, all are not gases, all are not of a size, or alike in their finished structure as sensible objects. But a little study will show us that there are four notable points in which all bodily substances are



at one: all bodies are *compounded* or made up of elements of one kind or another; all bodies are *changeable*, and indeed are undergoing continuous change; all bodies are *contingent* or dependent upon causes which produce them and support them in being; all bodies are *limited* or contained and comprised within bounds. These four marks,—*composition, changeability, contingency, limitation*,—which are found in all bodily substances, call for our present study and investigation.

#### b) BODIES AND THEIR CHARACTERISTICS

We have already learned that, for our present study, the terms *body* and *bodily substance* mean a three-dimensional material reality existing, or at least existible, in the world around us. The terms mean *a natural body*. It is of the characteristics of such a body that we have now to speak.

Modern physics treats of bodily substance and bodily quantities as four-dimensional, bringing into the concept of a reality extended in *space* the necessary note of extension also in *time*. Of this we shall speak later. Here it is our business to notice the marks of bodily being as it presents itself immediately to our investigation, that is, as a substantial reality with length, width, thickness. The characteristics of such reality are in no wise changed by the inclusion of time as an element or “dimension.”

We notice four chief characteristics of the bodily

world and of individual bodies in the world, viz., *composition, mutability or changeability, contingency, and limitation or finiteness*. We must say a special word on each of these.

*1. Composition*—All bodies are *composed* or *compounded*. The Latin verb *componere*, from which our words “compose” and “compound” derive, means literally “to put together.” This root-meaning serves us well. For, when we say that a body is composed or compounded, or that it is “a composition” (or “a synthesis,” if one prefers a Greek word), we truly mean that it is “put together”; that it is a conjoined or assembled reality; that it is a thing made of elements, principles, parts, members. There are five notable types of composition.

*a)* In ontology (the science of fundamental metaphysics) we learn that every existing creature (and hence every existing body) is a union of essence and existence. Such a creature is constituted in its own basic reality or make-up as just such a thing, just that kind of thing (*essence*); and it is actually set out, and holds place among realities that are here (*existence*). Only of God, the infinite and wholly self-sufficing Actuality, can it be known with certainty that His essence and His existence are perfectly identified in His altogether simple or non-composed Being. Now, the union or composition of essence and existence in an actual creature (that is, in an *exist-*

ing creature) is called *entitative composition*; that is, it is the composition by which a creature is constituted in its actuality of being. This type of composition is not of immediate concern for the student of cosmology; it is of importance for ontology. But even here it affords an instance of the truth of our assertion that all bodies are compounded or composed; for each existing body is a composite of essence and existence.

b) The second type of composition is *essential composition*. This is the union of principles, members, elements, or parts which come together to make up an *essence*. The essence of a thing is its inmost fundamental constitution; it is what makes the thing, in its ultimate being, the kind of thing it is. The essence of a tree, for example, is not its size, nor its botanical classification, nor its location, nor its age, nor its fruitfulness. All these the tree *has*, but these things do not *make the tree a tree*. What makes the tree a tree is its *essence*. And this essence is itself a compounded or composed thing: it is composed of *prime matter* (or primary matter) and *substantial form*; that is, it is a *material* thing cast in a definite kind or mould or *form* which gives it actuality as such a specific bodily being. It is a union or composition of matter and form, and this is an *essential composition* since it constitutes an essence. Take another example: that of a human being. A man is not his age, nor his sex, nor his nationality, nor his strength,

nor his culture; a man is a man because he has the *essence* of man, and this essence, physically considered, is a composite of *body and soul*.—Essential composition is often called *substantial composition*. The terms are not strictly synonymous, since even an accident has its essence, and a composed essence. But any discussion of essences, and notably such a discussion as we here undertake as a prelude to cosmological science, is concerned, first and foremost, with substantial essences. This fact justifies the somewhat loose use of terms which makes practical synonyms of *essential composition* and *substantial composition*.—Essential composition is of two kinds, *physical* and *metaphysical*. The physical composition of an essence is the sum or union of those physical parts or elements which come together to constitute the essence as a *physis*, that is, a being in nature, a thing among things. The metaphysical composition of an essence is the sum or union of those realities in it which explain it to the understanding mind, even though these realities be not distinct *things* in the order of nature outside the mind. Thus, the essence *man* (that is, *human being*) is physically composed of body and soul; these are elements which come together to constitute or compose man, as a thing in nature, independently of the understanding (creatural) mind. So we say that, physically considered, “man is a creature composed of body and soul”; we say that body and soul make man’s *physical essence*.

The essence of man is metaphysically composed of animality and rationality; these are realities which the mind lays hold of in knowing what man *means*; for the mind knows man as an animal with understanding and free-will. Animality and rationality are not parts of man in the physical sense (as body and soul are), but they are realities which the mind discerns in man, and they are said to be metaphysical elements or "parts." So we say that, metaphysically considered, "man is a rational animal"; we say that animality and rationality make man's *metaphysical essence*.—It is manifest that natural bodies are metaphysically compounded or composed, for each of them is *a thing* of a certain essential *kind*, and the mind, in knowing such a reality naturally compounds the ideas or notes of "thing" and "of this kind." But it is no less apparent that natural bodies are physically compounded. For we apprehend them as distinct realities, and (as epistemology proves for us) our knowledge is trans-subjective or in accordance with fact; there are distinct, and essentially distinct, realities in the world of bodies around us. But all bodies are at one in the point of being bodily; they are all material; in this they are not distinguished either in themselves or in the view of the investigating mind. Therefore, a natural body must be a composite of *that which it has in common* with other bodies, and *that which it has in special* to make it the actual and precise kind of body that it is. Consider the funda-

mental, the essential difference between a lifeless body and a living body. As *bodies*, that is, as material things, these do not differ; but they emphatically do differ in the *essential kind* of body that each is. We see at once that a natural body is compounded; it is compounded of a fundamental and common *material* or *materiality* and that which gives to this materiality an actual existence in a determinate specific kind. In other words, we see that a natural body is essentially (and physically) compounded of *prime matter* and *substantial form*.

c) Contrasted with essential composition is *accidental composition*. This is the union of accidents among themselves (as of whiteness and sweetness in sugar) or the union of accidents with their substance (as of whiteness and sweetness with the substance called sugar). It is the function of ontology to prove that there are in the world physical accidents which are really distinct from the substances which they mark or qualify. But there is no need here to formulate an elaborately scientific proof of the fact. It is the common experience of all that what we know as substances are *not* their accidents. Substances *have* accidents, but they are not *constituted* by their accidents, and hence their accidents are not to be identified with them. Water, for instance is not to be identified with its temperature; it has, at any given moment, a certain temperature; but it does not change in its essence or substance when the tempera-

ture is changed; it does not cease to be water when it loses coldness and acquires heat. Now, this non-essential, non-substantial, union or composition which conjoins a substance with its accidents is *accidental composition*. So is the collection of accidents which converge in any substance, considered merely as a collection, without reference to the substance which they qualify. Examples of both types of accidental composition are readily conceived: a man with his age, knowledge, degree of grace; a tree with its size, location, number of leaves; the hardness, size, flavor, temperature, of an apple. All natural bodies are composed of substance and accidents. Abstractly, it may be possible to conceive of a finite substance (that is, a creatural substance) with no accidents whatever; but it is not possible to conceive of such a substance *existing as a body* in the world around us. Some accidents a natural body will certainly have, yet it is not to be identified with these. Therefore, a natural body evidences in itself an *accidental composition* of substance and accidents.

d) Another type of composition is that known as *integral composition*. The term *integral* is derived from the Latin *integralis* (a non-classical form of *integer*) which means "untouched; unhurt; having lost nothing; not defective," and hence the word connotes "rounded perfection." The parts or elements (chiefly quantitative, and, so far as cosmology is concerned, always quantitative) which belong to the

rounded completeness of a reality, but do not constitute that reality in its essence, are called *integral parts*, and are said to be united with the reality which they perfect or complement by integral union or *integral composition*. We are all aware, by common experience, of the fact that a reality may be constituted in its essence, and yet lack one or more of the non-essential perfections that normally belong to it. Thus a man may be constituted in his essence,—he may be a man, and a complete man,—and yet lack some bodily member or power that normally and naturally he should possess. For the human essence requires a certain minimum in quantity and bodily equipment, but is normally and naturally fitted with more than this minimum; and the members and powers which are thus naturally superadded to the absolute requisites for essence are things that lend perfection, completeness, beauty, grace, to the essence in its being and its operations. A man who has lost hand or foot, or whose hair has unhappily disappeared, or whose teeth are gone (“in whole or in part,” as the legal phrase has it), or who is short-sighted or hard of hearing, is still a man, still a complete human essence, despite such deprivation. He has lost certain members or powers which normally and naturally belong to his essence, and which bring to that essence a certain rounded perfection when they are joined or compounded with it. When present, such perfections are joined or compounded with the man’s essence by



*integral composition*.—It will be noticed at once that integral composition is a variety of accidental composition. In one sense, integral composition may, at least occasionally, be called *substantial* composition (as, for instance, in the union of hands or feet with the undivided substance of the human body), but it is never *essential* composition. Here we see, for the second time, that the terms *essential composition* and *substantial composition* are not truly synonymous. Essential composition is the union of elements necessary for the constitution of an essence, whether that essence be the essence of a substance or the essence of an accident. Substantial composition, in a wide sense, is the union of elements or members that do, as a fact, enter into the unbroken structure of a substance, whether they are necessary to that substance or not.—It is manifest that natural bodies are marked by integral composition. For natural bodies are marked by quantity; they have parts extended in space; and such parts (quantitative parts) are regularly capable of being changed or reduced without destruction of the bodily substance itself. A stone has a certain size; break off a part, and the stone is still a stone, but it is not so much as it was, nor is it held in the same unbroken bulk; and in so far it has lost something which actualized or perfected it in an accidental way. Now, what a body can lose, in quantitative parts, without loss of its essential or substantial character, is conjoined with it by integral composition. A tree

has many leaves and branches ; take off some of these and the tree is the loser, but it does not cease to be a tree ; it has lost a certain "perfection" which was conjoined with it by *integral* composition, that is, joined with it as an actual perfecting part, member, or element, but not joined with it as something essentially requisite.

e) A fifth type of composition is *numerical composition*. This is the union or assembling of items or elements (which, taken singly, are complete in themselves) to constitute a sum, or a totality, or a collective unity. Thus we speak of a crowd as "composed" of persons ; we speak of a wall as "composed" of bricks or stones. We all know, with R.L.S., that the world is "full of a *number* of things" ; the world is a vast *collection* of kinds and varieties of objects, and of individuals of each variety. Now, each individual, and indeed each part (complete *as such*) of each individual, can be *numbered*, or *counted* as a single item in its group ; and individual groups can be numbered or counted as items or members of larger groups, and so on. The five peas in a pod can be *numbered* (1, 2, 3, 4, 5), and they can be taken collectively as *one podful*, that is, they can be joined or "composed" by *numerical composition* to constitute a single group or collection. And the pods can be numbered as items of a totality called a peck of peas. And so on. It is manifest to the most inattentive of observers that the bodily world is characterized by *numerical composi-*

*tion*.—In itself, numerical composition is a variety of accidental composition. For, although the numbered items or parts of a totality may be necessary for the constitution of an essence or of a substance, the special aspect they present *as distinct items that have come together to make a total* does not include anything further or other; it does not include their possible effect upon one another, such as their affinities, their substantial fusion, their integral or essential union. It includes only the association or collection of numerable items, elements, members, parts; nothing more. And such association or collection is in itself an accidental composition.

It is manifest, then, that the bodily world which is the material object of cosmology is, in every respect, *a thing composed or compounded*. For we have been at pains to point out the fact that any natural body (even the world of bodies taken as a collective unity or numerical composite) is compounded in essence and substance and is inevitably marked by accidental composition. It is certain, therefore, that one constant and ever-present characteristic of the bodily world is its *composition or compositeness*.

2. *Mutability or Changeability*—All bodies are mutable, that is to say, all natural bodies are subject to *change*. Now, change (or mutation) may be defined as the passing from one state or condition to another. In the technical language of philosophy,

change is "the transit from potentiality to actuality." *Potentiality* is the state of a reality with respect to what it may become: thus, the infant is in potentiality with respect to adulthood, and we say that the baby is *potentially* a grown-up. *Actuality* is the state of a reality taken statically *as it is*: thus, the infant is *actually* an infant, while *potentially* it is an adult. In other words, a reality is actually *what it is*; it is potentially *what it may become*, whether the new and unactualized state is a matter of substance or of accidents. A change, therefore, or a transit from potentiality to actuality, is the fact and process of passing from the present state (*actuality*) to another which is to come or to be acquired (*potentiality*). Thus, change is the fact and process of *becoming*; and things subject to *becoming* (as all natural bodies are) are said to be *mutable* or *changeable*, or to be marked and characterized by *mutability* or *changeability*.

There are two chief classifications of change, viz., *substantial change* and *accidental change*. Accidental change is of three notable types: *quantitative change*, *qualitative change*, and *local change*. Of these we must say a brief word.

a) Substantial change is the transformation of a substance (or substances) into a different substantial reality. The change of food into flesh, of a living body into a lifeless body, of hydrogen and oxygen into water, and of water into hydrogen and oxygen,

are examples of substantial change. Substantial change is (in the language of philosophy, which must not be interpreted in the manner of everyday speech nor even in that of laboratory science) *generation* and *corruption*. These are but two aspects of the one substantial change. The generation of a new substance is the corruption of the old. This is expressed in a famous Latin axiom, *generatio unius est corruptio alterius et vice versa*, "the generation of one thing is the corruption of another, and vice versa." When, for example, hydrogen and oxygen become water, the gases undergo *corruption* and the water is *generated*. When a man dies, the human substance is *corrupted* (that is, broken up, not rotted or crumbled slowly away) and the same process is the *generation* of the inorganic substances which compose the corpse. Generation and corruption are two aspects of one *instantaneous* change which removes a substantial form by supplanting it (with absolutely no time-interval) by another substantial form or other substantial forms.—That natural bodies are all subject to substantial change is manifest to any attentive observer. For we see about us, in this world of bodies, no item or individual substance that has not been generated and that is not to be subjected to corruption. Plants, animals, and men, are brought into being, and they die; food is digested; coal is burned up; solid rock is subjected to chemical forces which, in time, transform its substance. There is nothing in the

bodily world which (after a first creation) did not come here by generation; nor is there anything here so wholly indestructible that it must keep its substantial being eternally unchanged. In a word, all natural bodies are subject to substantial change; substantial mutability is their constant mark or characteristic.

*b*) Accidental change is, as the very term indicates, a change or transformation of non-substantial realities. When a quart of milk is half consumed, the remaining pint is still the substance called milk; there has been no change of substance in the milk that remains; only not so much remains; there has been a change of amount or *quantity*. This is *quantitative* change, a type of accidental change. When a baby grows into a youth, the human substance is not changed; the baby and the youth into whom the baby grows are one and the same essence and substance; the change that has taken place is (in point of size or bodily bulk) a quantitative change. Again, when hot water becomes cold, there is a change; a change in *quality*, or a *qualitative* change. Of course, there is quantitative change too, for some of the water (however small the amount) evaporates during the time required to effect the change in temperature; but the change in temperature, considered in itself, is a qualitative change. The baby changes in qualities as well as in quantity as it grows larger; such qualities as its appearance, complexion, agility,

alertness, are changed as the baby grows up, and these changes are, considered solely in themselves, qualitative. Qualitative change is, like quantitative change, a type of accidental change. For the essence and substance of things in which qualitative or quantitative change occurs are not *thereby* changed: the milk is still milk, though its quantity is diminished; the water is still water, though its temperature is altered; the baby is still the same person (human substance) though it undergoes quantitative and qualitative changes. The third type of accidental change is *local change* or change of place; it is perhaps the most manifest of all types of change in the world where everything is "on the move," everything is subjected to motion. The movement of the heavenly bodies, of the earth, of leaves in a breeze, of hands swinging by one's sides, of walking feet, of twitching eyelids, of a revolving wheel, of a growing weed, is, inasmuch as it involves a change of place or position, a local movement or local change.—It is certainly manifest that the world of bodies is subject to constant accidental change. It is a world full of movement or local change, from the coursing spheres to the whirling parts of an atom; it is a world of quantitative change, for it is everywhere marked by the phenomena of contraction and expansion, growth and diminishment; it is a world of qualitative change, for it has temperature, and lights, and shadows. We cannot doubt the truth of the statement that accidental

change is a constant phenomenon in the world of natural bodies, and that, in consequence, accidental mutability is a constant mark or characteristic of such bodies.—In passing, the student will do well to notice that substantial change is never gradual or effected by successive steps; it is always *instantaneous*. Though a lump of coal may be a long while burning up,—and it is substantially changed by burning up,—the time is not consumed by the substantial change, but by the accidental changes which prepare each grain of the coal for that final and instantaneous transformation which destroys it as coal (*corrupts* it) and produces or *generates* ashes and smoke. Accidental change is never instantaneous, but gradual or *successive*, even though it consume a very small period of time.

From this detailed study it is clear that the bodily world is, in every respect, a thing subject to change, *a reality marked by mutability or changeability*. Mutability is a constant and ever-present characteristic of natural bodies, in their substantial as well as their accidental being. Rightly are they called *entia mobilia*, or *mobile beings*.

3. *Contingency*—A contingent reality is one that has in itself no absolute necessity or requirement for existing, but is dependent upon (or contingent upon) the causes that produce and sustain it. There are only



two conceivable kinds of reality from the viewpoint of necessity in existence; for a reality either *has got* to exist or it *hasn't*. If it *must* exist, by its own nature and essence, it is called *a necessary being*; if it involves in itself no necessity for existing, it is called *a contingent being*. A necessary being is *uncaused*; it is wholly self-sufficing; it is itself the perfect explanation and reason for its existence. Now, such a being (as the science of ontology proves in abundant detail) is *infinite, non-material, eternal, non-composed*. And, since an infinite being is necessarily *one*, not a plurality, it is manifest that there can be only one necessary being. This Being we call God, and it is the part of theodicy (the philosophy of deity) to prove beyond question that God actually exists. Now, if God is the one and only Necessary Being, and if there are only two kinds of being (*necessary*, and non-necessary or *contingent*), it follows inevitably that all reality other than God is *contingent being*. We shall show presently that the bodily world cannot be identified with God. For the present, it suffices to point out that *necessary being* is non-material and non-composed, whereas natural bodies are material and, as we have shown above, are marked by the constant and ever-present characteristic of *composition*.—Contingent reality or being is *caused* reality. And the world around us is a tissue of causation. Even the mistaken persons who deny

causality, are forced to admit some sort of continuous succession and contingency as the explanation or reason of the things confronting them in daily life. A foolish man may deny, in theory, that there is any such thing as cause and effect; but he does not fail to put the tea-kettle on the fire when he wants hot water; nor does he depend upon his own philosophy of denial when some careless motorist has barged into him and done him a hurt. Normal reason recognizes causality in the world, and all science and philosophy are built upon this recognition. And contingency accompanies causality as a shadow accompanies a man walking in sunlight. For what is caused (that is, an *effect*) depends upon or *is contingent upon* its cause.—Caused being or contingent being is, as we have said, being that does not *require* existence, does not, by its own nature, *demand* existence; it is a thing that *can* exist, and its capacity for existing is met by the cause or causes that confer actuality upon it by bringing it into existence and holding it there. Thus contingent being is rightly called *ens ab alio*, that is, being or reality which depends on something other than itself. Necessary being, on the other hand, is *ens a se*, that is, being which exists of itself, not depending at all upon anything other than itself.—Now, in this world we find substantial change (*generation and corruption*) which continually brings new substances into existence and takes other sub-

stances out of it. Substances have "their exits and their entrances." In the face of this obvious fact, it would be merely silly to say or to think that bodily substances have no dependency or contingency upon their producing and sustaining agencies. Contingency in the bodily world is inescapably obtruded upon our notice; it is a certain and a universal fact. There is not one bodily being in the world that has not *come* here; there is not one such being that is *unproduced*; in other words, there is not one natural body that is not *contingent*. Consider the point in a somewhat larger or more abstract way: there is not in the world a single natural body that can be called *necessary*, for what is necessary cannot be clearly conceived of, or accurately imagined, as *non-existent*. And we can easily conceive of any natural body as non-existent, for the complete and adequate concept of any such being does not involve the point of actual existence. What bodies we behold around us are here; but we know, and with certainty, that they *might not* be here. Now, any reality that *might not* be here is a contingent reality; that is, it *is* here by reason of something other than itself which has produced it, which sustains it, and which therefore accounts for its being here. Any reality that *might not* be here, *would not* be here if existence had not been bestowed upon it by something other than itself. This is saying that any such reality is *contingent* reality. Therefore,

we are completely justified in the statement that all natural bodies, without exception, are marked and characterized by *contingency*.

4. *Limitation or Finiteness*—A *finite* reality is one that has limits or boundaries. It is a reality that can (in one way or another) be *measured* as to content, place, power, or activity. An *infinite* reality has no limits or limitations, no boundaries or borders; it is boundless in all perfection, non-material, non-composed, necessary. There is only one infinite Being (and ontology proves to demonstration the absolute impossibility of a plurality of infinities or infinite beings); this Being we call God. And, since God is not identified with the world (as we shall shortly prove), it is certain that the world, and worldly bodies, are not infinite; in other words, they are *finite*; they are marked with the characteristic of *limitation* or *finiteness*.

Sometimes we use the word "infinite," and the word "infinity," in a figurative manner. When, for example, we are told that focussing our camera in a certain way will give us a field for photography "from 100 feet to infinity," we understand that the phrase means merely "100 feet or over." When a mathematician speaks of infinity or even of an "infinite number," he means a number *indefinitely* large. For a distance or a number, to be *actually* infinite, would be such that it could not, even in thought or

imagination, be made larger or smaller. And there is no distance and no number that cannot be instantly imagined as cut in half, or as multiplied by two. Distance or number (or size, in general) can be called *potentially* infinite (or *indefinite*), inasmuch as there is no point at which one must stop in imagining its extent; one can go on multiplying a number by itself without ever reaching a point where further multiplication is impossible; but, at *any* point in the process of multiplication, the number (whether it be abstract number, or square yards, or cubic miles) is actually *finite*. Hence the use of the term "infinity" in mathematics, or in the art of photography, or in the science of astronomy, is a figurative or metaphorical use; the term means "indefinitely large."

We assert that all natural bodies are *finite*. Of the *finiteness* of the material universe itself we shall speak again in another place, but even here we may notice that since the material universe is made up of limited bodies, it is itself limited; for finite added to finite can never equal actual infinity. However, our immediate purpose here is to indicate the fact that any and all of the natural bodies observable in the world are limited or finite. It may seem unnecessary to stress so obvious a fact, yet it is important for us to pause upon the point for a moment and to conceive it with the greatest clarity.

The world is filled with many *individual* things, one of which is not another, and each of which is

manifestly bounded and limited within the extent of its own quantity. Now, when two things are so really distinct that one is not the other in any sense, then there must be limitation *on the part of at least one* of the two things concerned. And, unless there be question of marking the distinction between a contingent being and the Necessary Being, there will be limitation *on the part of both* beings concerned. But we have already seen that natural bodies are *contingent*, and hence, each individual of them is distinct from every other individual, and, by that distinction, is strictly *limited*; all natural bodies are, therefore, *finite* realities. In other words, finiteness or limitation is a universal characteristic of natural bodies.

In the world of bodies, we notice more than individual differences among single bodily beings; we notice differences of *kind*, differences among species and genera of natural bodies. A person is not likely to confuse a lifeless clod and a living body, or a plant like a vine with an animal like a dog or cat; these are not only bodily things that differ as individuals, but they differ in essential constitution so that they are known as different *kinds* of bodies. These bodies are different in kind because each of the kinds (class, genus, species) is contained, so to speak, within its own definitely determined character; each is *limited* to its class or kind. Again, we notice limitation or finiteness as a characteristic of natural bodies.

Again, the world is, as we have seen, marked and

characterized by *composition*. Natural bodies are made up of distinct elements, parts, members, one of which is not another. Each element or part is of a certain kind, scope, power, character; further, each element or part is one part. In other words, each element or part is a finite or limited thing, and a body made up of limited parts is itself limited. Once more we conclude inevitably that limitation or finiteness is a characteristic of the bodily world.

There have been philosophers and scientists who held that the world is not limited. Such, for instance, were Friedrich Büchner (1824–1899) and Ernest Haeckel (1834–1919), German materialists. We shall deal with the error of such teachers when we come to the consideration of the actual extent of *space*. Here it must suffice to repeat what we have already noticed, to wit, that a world made up of natural bodies which are limited must be itself limited.

One final proof of the limitation of natural bodies: in every contingent reality we mark a clean distinction between existence and that which has existence, that is, between the actual *existence* and the physical *essence* of the existing thing. We say that a contingent reality *receives* existence, and every receiver limits what it receives, just as a cup limits the liquid poured into it, or the hand encloses with limitation the object that lies within its grasp. Existence in a contingent reality is limited to *this thing which ex-*

*ists*, and this received and limited existence is what accounts for the thing being actually here. Further, that which exists, the existing *essence*, is (as we have seen above) a thing of definite scope, power, or kind. On the score, then, of both existence and essence, a contingent reality is a limited reality. Now, all natural bodies are contingent realities. It follows inevitably that all natural bodies are limited or finite bodies, and that *finiteness or limitation is a universal characteristic of the bodily world*.

To sum up: All natural bodies are composed, made up, compounded; all are subject to change or mutation; all are contingent or dependent upon causes; all are finite or limited. We have here the four outstanding and unmistakable characteristics of the world of bodies, that is, of each and every natural body. And from these characteristics of natural bodies we are able to proceed to a better understanding of what such bodies are in their inmost being, their nature and essence.

Even now, without further study, we are in position to discuss that interesting doctrine called cosmological *optimism* which asserts that this world is the best of all possible worlds. The philosopher Wilhelm Leibnitz (1646–1716) was one of the many who proposed such a doctrine. Now, we have seen that the world is marked by certain universally present characteristics, each one of which indicates a kind of lack, a want of self-sufficiency, an *imperfection*.



But the best of all possible worlds would be a *perfect* world. Manifestly, then, the world is not the best of all possible worlds. But we must not leave the point with such a blunt assertion. We must make a distinction in the meaning of the word *perfect*. When is a reality to be called *perfect*? It is to be called *absolutely perfect* (that is, unconditionally, unlimitedly perfect) when no further perfection can even be imagined as added to it; when it is eternally and wholly self-sufficing; when it is boundlessly perfect so that it involves in itself the actual fulness of being. Obviously, only the one infinite Being is absolutely perfect. But a reality may be *relatively perfect*, that is, perfect in *relation* to, or *relative* to, the purpose it serves or the nature it bears. Thus we say (relatively speaking) that the new coat is "a perfect fit," or that a work of art is perfect, or that we are in perfect health. Similarly, we may say that this world is *perfect*, meaning that it is marvellously well suited for the purpose it serves; that it is wondrously beautiful in the structure of its bodies, in the harmony and balance of its parts, and so on. In this sense, it is *the best world*, but only in this sense. For God's power is boundless, and is therefore not exhausted in the creating and preserving of the world as we find it; and, on the other hand, we have seen that the world is made of bodies that have manifest and characteristic imperfections. Therefore, *absolutely speaking*, this world is not to be called "the best" or "the best

possible"; *relatively speaking*, it may be called so.

An objection is sometimes posed in this form: Is not God forced by His boundless goodness to give to every creature of His hands all the perfection that it could possibly have? The answer is that God is not forced at all. God (whose power and goodness are one in infinite identity with the divine essence itself) freely chooses to create, and creates most wisely, that is, creates things so that they will serve their purpose in a marvellously perfect way. Indeed, one might go to the extent of saying that God's creatures are always such as serve their purpose in the best way possible. But this is not at all the same thing as saying that creatures, in themselves, have all perfection possible. Indeed, the imperfection of one creature may be a help to the perfection or the perfective action of others. Thus the world, which was physically hurt and rendered imperfect by the Fall (consider the points of harsh climate, unfriendly animals, noxious plants, destructive storms), serves the needs of fallen man far better than an unspoiled Eden could do. For were man (dull, and stupid, and inclined to evil, since the Fall) free of the hardships inflicted upon him by the imperfections of the bodily world, he would inevitably make his heaven upon earth and fail to work out his eternal destiny.

If we cannot accept *cosmological optimism*, neither can we subscribe to *cosmological pessimism* which asserts that the world is wholly evil, and that no per-

fection whatever is to be found in it. The doctrine is absurd upon the face of it. For the imperfections of worldly or natural bodies (and we are not concerned to deny them; quite the contrary) are truly imperfections, that is, they are deficiencies *in existing perfection*. They are, so to speak, points where existing perfection breaks off, or breaks down, or falls short. Evil or badness is always a negative thing; it is a *lack*; it is an *absence* of reality that should be present. Now, in the face of a real world, an actual world, a world that is *here*, the assertion of pessimism is as silly as the denial of the existence of the world,—and indeed that is what the assertion amounts to.

### c) THE WORLD NOT DIVINE

The doctrine that the world is *divine*,—that is, that the bodily universe is somehow identified with God,—is called *pantheism*, a word which derives from the Greek *pan* “all; everything,” and *theos* “God.” There are two fundamental forms of pantheism, viz., *real* pantheism and *idealistic* pantheism. Idealistic pantheism holds that the bodily world is only a skein of images or ideas in the mind of God and has no real existence of its own. Such a pantheism is latent in the teachings of Immanuel Kant (1724–1804) and was developed openly in the doctrines of Kant’s followers, Fichte (1762–1814), von Schelling (1775–1854), and Hegel (1770–1831). The error

of this form of pantheism is shown in the science of criteriology (the philosophy of true and certain knowledge), and need not concern us here; cosmology necessarily accepts the bodily universe as trans-subjective and real. The second form of pantheism, that is, *real pantheism*, is of two distinct types: the first of these asserts that the bodily world is *an actual part* of the substance of God, that it is an extension or an "outpouring" of God's real being and substance; the second type of real pantheism asserts that the world is *a real manifestation* (rather than a real part) of God, as, for example, a smile is a real manifestation of benignity or amusement, rather than a real *part* of the face on which it appears. The first type of real pantheism is called *emanationism*, from the Latin *emanare*, "to pour out"; the second type is called simply *pantheism*, or sometimes, *phenomenalism*, from the Greek *phaino*, "to show; to manifest."

*Emanationism* and *phenomenalism*, inasmuch as they identify all things in God, teach that there exists *one single substance*, viz., the divine substance. Hence, these types of pantheism are *monistic*, or forms of *monism*, a term which derives from the Greek *monos*, "single; one; only."

*Emanationism* cannot be true. In ontology (or fundamental metaphysics) and also in theodicy (or natural theology) we have the clear proof that God is the all-perfect, necessary, non-composed, changeless, infinite Being. But, as we have already seen,

this bodily universe is indelibly and universally marked with the characteristics of imperfection, contingency, composition, mutability, finiteness. Hence, to identify God and the material world is a contradiction in thought and in terms. It is absolutely impossible for such a contradiction to have existence as an actual fact; one might as easily conceive a thing as simultaneously *existing* and *not existing*.

The same argument avails when we come to consider *phenomenalism*. For the one infinite substance which the phenomenologists admit is said to manifest itself in the bodily world, to show itself in what we mistakenly call bodily being, but which is really a series of divine modes, or moments, or determinations, or aspects. But such a series is manifestly a limited thing (whereas the one substance is unlimited or infinite); it is changeable (whereas the one substance is necessarily immutable); it is a complexity of various things (whereas the one substance is simple or uncomposed).—Further, the pantheism of manifestation conflicts with the findings of consciousness which are the elements and basis of all knowledge. If I cannot know that I am myself, not some other person or all other persons and all other things; if I cannot know that my actions are mine,—my breathing, my eating, my walking, my thinking, my choosing,—then my knowledge is wholly untrustworthy, and I can know nothing with certainty. For there is no clearer certitude than that which makes

me certain of my own individual being and function. But if I can know nothing with certainty, I can surely not know with certainty that phenomenalism is true. I can only lapse into the silence and the self-contradiction of absolute skepticism. Reason bars the way to such an evil lapse. Phenomenalism is therefore in conflict with reason. And what is in conflict with reason must be rejected as false by all men, and first of all by the scientist and the philosopher.—Again, pantheism (emanationism or phenomenalism) would lead to impossible consequences. For if the world is God, then all activities in the world are divine; all are therefore equally good. Thus sin and virtue are made one; responsibility is wiped out; morality ceases to be; crime is an impossibility. Now, normal human reason is unprepared to accept such horrible, such blasphemous, such chaotic consequences. On the principle of causality,—which may here be expressed as “by their fruits you shall know them,”—we must conclude that a doctrine productive of such impossible “fruits” is itself impossible.

Closely approximating pantheism is the vague doctrine (or complexus of many doctrines, variously propounded) known as *theosophy*. Theosophy acknowledges the existence of real finite worldly realities, but makes them *immanently divine*; it holds that God is indwelling in every creature in such a way as to make all creatural activity the directly exercised activity of God Himself. Manifestly, this sort of doc-

trine is pantheistic, if it may not be reduced to plain pantheism, and it is to be rejected for the same reasons that compel the mind to reject pantheism in its more open and defiant forms.

#### SUMMARY OF THE ARTICLE

In this Article we have undertaken the study of the world of natural bodies by focussing attention upon the *characteristics* or *proper marks* of such bodies. After a brief review of the truths learned in ontology about *substance* and *accident*, and after assigning for later and special consideration the question of *quantity*, we have discussed in detail four outstanding marks which natural bodies always and everywhere manifest, viz., *composition*, *mutability*, *contingency*, *limitation*. We have learned that natural bodies are characterized by both *essential* and *accidental* composition; that they are subject to change, both *substantial* and *accidental*; that they are essentially dependent upon causes in point of their production and maintenance; that they are necessarily finite. We have noticed that the characteristics of bodily reality are proof positive that *cosmological optimism* is fallacious doctrine; and we have seen, on the other hand, the impossible character of the doctrine called *cosmological pessimism*. Rejecting these extremes, we have found that the world is *relatively*, but not *absolutely*, perfect or "the best." We

have found,—in the characteristics of bodily being, in the requirements of reason, in the evidence of consciousness,—a complete refutation of the mistaken and debased theory of *real pantheism* (both *emanationism* and *phenomenalism*), and with pantheism we have rejected the vague doctrine known as *theosophy*.

## ARTICLE 2. THE QUANTITY OF BODIES

- |                          |                           |
|--------------------------|---------------------------|
| a) Meaning of Quantity   | b) Properties of Quantity |
| c) Varieties of Quantity | d) Space and Time         |

### a) MEANING OF QUANTITY

The Latin word *quantum* is fundamentally an interrogative word and means “how much?” Anything of which the question “how much?” can be rightly and literally asked, has *quantity*. Quantity, therefore, involves, fundamentally, a notion of *amount, extent, bulk, size, content, parts, number*.

Notice, in the description just given, the important words *rightly and literally*. For quantity, properly speaking, *is referable only to bodies*. When we ask “how much?” or “how many?” of things other than bodily substances, we use the terms of our question in an extended or metaphorical sense, and the answer to those questions has the same character,—that is, it is not *literal*, but *analogical*. Thus when we speak of an *amount* of learning, or of a *number* of ideas, or of the *extent* of wisdom or piety, we are



using words that express *quantity*, but not *literal quantity*. Quantity, literally taken, is a proper mark (a proper accident) of bodily substance and of no other thing whatever.

We notice in the world around us that many bodily realities are *present*. These have their respective *places* here. And we notice that a bodily substance *extends* itself, so to speak, to fill its place; we see that it is "part here, part there." Now, the property which spreads out or extends a bodily substance so that it is "part here, part there" is called *external quantity*. External quantity has been defined as "the property whereby a bodily substance has parts outside of parts, with reference to its place" (*accidens extensivum substantiae corporeae in partes locales, or, proprietas qua fit ut partes corporis sint extra partes in ordine ad locum*).

Now, external quantity is not "the heart and soul" (that is, the very essence) of quantity itself; external quantity is the complement and external manifestation of the inner, essential thing called *internal quantity*. And we learn what internal quantity is by considering closely the character of external quantity or external extension. We must notice that a bodily substance could not spread itself out to fill its place (that is, it could not have actual external or local quantity) unless, as a fact, it possessed some inner aptitude for such extension. In a word, a bodily substance must have parts *in itself* (or must be internally quantified)

if it has parts *in a place* (or is externally quantified). The inner extension or *internal quantity* of an existing body consists in “the position of parts outside parts in the substance.” Now, internal quantity is quantity in the strict sense. It is important that we remember this fact. For when we speak of bodily quantity we usually think of external quantity,—in fact and effect,—and we are apt to be led by this common thought into the assumption that the very essence of quantity lies in externals. And so we may be ready to conclude, upon this mistaken assumption, that certain phenomena (such as *multilocation* and *compenetration*) are absolute impossibilities.

We may define *internal quantity* as “the property whereby an existing bodily substance has, in itself, parts outside of parts,” or “the property whereby an existing body has actual parts in itself”; (*accidens extensivum substantiae corporeae in partes suiipsius; or positio partium extra partes in ordine ad se*).

Quantity is a *proper mark* or *proper accident* or simply a *property* of existing bodily substance. It is not to be identified with bodily substance itself. It is something which a bodily substance *has*, not something which such a substance *is*. A bodily substance is constituted by the union of its essential substantial parts, its matter and form, its physical and elemental constitution; and these are not quantity-parts (or quantitative parts), even though quantity is a *requisite condition* for their natural existence in the com-

pleted and existing body. A drop of water and a gallon of water, are alike in their essential parts, that is, in their constitution; each is a body made of prime matter and substantial form; each is the same *kind* of bodily substance; each is truly and completely *water*; but the drop and the gallon are different *quantities*. Quantity, then, is not the constituting element, the basic essence, of a bodily substance itself. It is something in the order of *accidents*, not of *substances*. Quantitative parts are, therefore, not *essential* parts; they are *integral* parts and even *substantial integral* parts inasmuch as they belong to the unbroken and undivided substance and bring it a kind of "perfection." The point to remember is that they are not *substantial essential* parts. Even where definite quantities effect the physical essence of a reality (as, for example, two parts hydrogen and one part oxygen effect the essence of water) it is never the quantities themselves or *as such* that constitute or effect the essence; it is the quantified *substances* concerned that do the work, even if they must be *conditioned* by such and such quantity.

The history of philosophy, and of science, lists many erroneous theories about the nature of quantity; and costly errors these have often been; for a mistake in so fundamental a matter as the quantity of bodily substance is sure to lead to further errors in other fields. René Descartes (1596–1650) taught that the essence of a natural body is its extension or

dimensions; thus he identified bodily substance and its quantity. Others,—like Babenstuber (1660–1726) and de Aguirre (d. 1699),—taught that a bodily substance has *essentially* a spread of parts, and that the accident called quantity merely sets these in order. The great Suarez (1548–1617) made a clear distinction between a bodily substance and its quantity, but he held that a body, antecedently to the effect of quantity upon it, has *in its own being* distinct substantial parts, and that it is the function of quantity to render these *impenetrable*. These erroneous views come of failure to hold clear concepts of what is meant by substance as distinct from accident (and from proper accident), and from a confusion of mind on the distinction between internal extension and external extension.

We may sum up sound doctrine on the nature of quantity in the following sentences. A bodily substance is not identified with its quantity; for substance is substance, and quantity is an accident. A bodily substance has not, *antecedently to its quantification* (that is, *before* it is affected by quantity) any entitative extension of distinct integral parts; but it is *one* reality, integrally uncomposed though radically requiring parts and extension. When a body is actually affected by quantity, *then* it has substantial integral parts in itself (that is, it has internal extension or internal quantity), but the formal cause of these parts is *the substance itself* which has them, and

with this substance the accident of quantity concurs *as a required condition*.

To put the matter in another, and perhaps simpler, way: The essence of quantity consists in *internal extension*. For the external extension of a body is consequent upon its internal extension; a body cannot have parts in a place unless it have parts in itself; therefore, internal extension and not external extension is the root and essence of quantity. Now, while the essence of *quantity* (which is an accident) is found in internal extension, the essence of the quantified substance (that is, of the body which has quantity) is *not* constituted by extension, internal or external. Indeed, the essence of bodily substance is, in itself, independent of extension (for it is, in itself, integrally one and non-composed), although it has a natural requirement for extension; extension is a *condition* required for the natural existence of a body in the world of actual substances. When the body actually exists in the natural way, it has internal extension; it has integral parts which are parts *of itself*; the bodily substance itself constitutes these parts (that is, the parts consist of the substance), and this is saying that the substance itself is the formal cause of its integral parts.

In the world around us, we see that bodies have external as well as internal extension. External extension renders bodies impenetrable, measurable, divisible, and determines their location. Now, as we have

noticed, external extension is a *secondary* effect of quantity; a body must have internal quantity in the *first* place or it cannot be externally extended in the *second* place. But it is at least conceivable that the secondary effects of quantity might be prevented or removed without destroying the actuality or the primary effects of quantity in its essence. In other words, a body might conceivably exist with its internal extension (that is, its internal quantity) even if it had no external extension. Nature, of course, offers us no instances of such a thing, and our natural knowledge of bodies is always bound up with their external extension. But reason sees no contradiction, no impossibility, in the existence of a bodily substance without external extension. Philosophy has nothing further to say on the point; it merely indicates the truth that such an existence is not intrinsically impossible or unthinkable. Implicitly, philosophy concludes that, if a bodily substance is to have existence and internal quantity without external extension, more than *natural* power or forces will be required to give it actuality. For purposes of illustration we may borrow from our Faith an actual example of the thing of which we are speaking. In the Blessed Sacrament, Christ is present,—not only as God, but as Man with His true Body. The Body of Christ in the Eucharist has actuality; it has integral parts internally extended; that is, the Body has internal extension or quantity. But the Body has no external extension or quantity. The parts of the

Body are not codimensional with corresponding external parts of the host; we cannot say that part of Christ's body is in one part of the host, and another part of the Body in another part of the host, and so on. Nor can we say that the Body is dwarfed, or held in miniature, within the actual external dimensions of the host. Nor can the Body of Christ be locally confined by the quantity of the host, nor measured or divided with the measurements or divisions of the host. The entire Body of Our Lord is present (in mature and perfect being) in each host and in each part of each host. In the Eucharist, the secondary effect of quantity,—that is, external extension,—is blocked out by supernatural power, and the Body of Christ, with its true internal quantity, is here present without external extension or external quantity. It is plain, then, that the essence of quantity lies in *internal extension*, and that the actual extension of a bodily substance in a place is a secondary effect of quantity and not its essential expression.

#### b) PROPERTIES OF QUANTITY

We now come to consider quantity, not only in its essence, but in its normal and natural actuality involving extension both internal and external. In a word, we consider bodily substances as they naturally exist in the world.

We seek to determine the *properties* of quantity, or of quantified bodies. Now, a *property* (that which is

*proper to or belongs to*) is something that belongs to a reality by natural necessity, so that, when the reality is fully and naturally constituted, this "something" will always be found in it. A property is said to "flow from" the fully constituted essence of a reality. Thus, the power of speech is a property of a human being. When a man's nature is fully and completely constituted; when all its essential, and all its integral elements are present in full development; when nothing interferes or intervenes to block or thwart their normal function; then, inevitably, the man will have the power of speech. This power is not a constituent *part* of a man (for he would be a man in essential completeness even if he lacked the power in question) but it comes from or "flows from" the nature of man equipped with all essential and integral parts and unhampered in their exercise. Thus it is something proper to man; it belongs to him by normal and natural necessity; it is called a *property* of man. Again, to illustrate further: infallibility is said to be a *property* or an *attribute* (a word synonymous with *property*) of the Church. The Church is an institution established by the Almighty and Infallible God to lead men to truth; it follows of necessity that the Church cannot lead men to error. Being what it is, that is, having a divinely given nature and commission for the teaching of truth, the Church possesses infallibility. We do not call infallibility a *part* of the Church, or a constituting element of the Church; in-



fallibility “flows from” the rounded and perfect nature of the Church, and is therefore a property or an attribute of the Church.

When we seek to determine the properties of quantity, or, in more precise terms, to list the properties of bodies *as quantified*, we look for those characteristics which belong by natural necessity to quantified matter. We find that these properties are four, viz., *external extension, incompenetrability, divisibility, mensurability*. We do not include *internal extension* among the properties of quantity, for, while it is a property *of bodily substance*, it is the essential constituent, and not the property, *of quantity itself*. We must say a brief word on each of the four properties :

1. *External extension* belongs by natural necessity to bodies, and will always be found in bodies unless *supernaturally* excluded, as, for example, it is excluded in the Body of Our Lord in the Holy Eucharist. External extension is that property of natural bodies by which they are extended in space and occupy *place*. The *place* of a body consists in its external extension or location in space. Place is discovered or determined by the distance-relation of an externally extended body to surrounding bodies. If there were only one body in existence, we could not properly speak of its *place*; of course we could speak of the place of its *parts*, considering each of these as a body, and viewing each with reference to the sur-

rounding parts. But the existence of many bodily realities is a manifest fact of experience, and we inevitably notice that this body is "here" and that body is "there"; the same fact is observed when we consider the distinct parts of a single body. Now, the "here" and "there" relationship of existing bodies is what makes manifest their *place*; and the fact that bodies have external extension accounts for their being "here" and "there" in the natural sense of these terms. Place is *proper* or *common*. The proper place of a body is its position with reference to the body or bodies that immediately surround it and come in contact with it at every point. Consider a sphere or ball poised motionless in the air. The ball is surrounded by air; there is a perfectly fitting pocket of air, the inner concave surface of which is codimensional with the outer convex surface of the ball. This inner and concave surface marks the *proper place* of the ball. A ball that is flying through the air is not *properly* located or placed; the notion of place suggests immobility; but *at any given instant* of its flight, and considered statically in that instant, the ball has its place determined by the immediately surrounding body (in the example, the atmospheric air) which perfectly encloses it and is codimensional with its outer bulk or external extension. Thus bodies in the world have their *proper* place. But what we have been considering so far is the proper *external* place of

bodies. Now, a body has also its proper *internal* place, and this consists in its being enclosed in *its own dimensions*. A baseball flying through the air may be said to pass through a continuous series of places (considering it statically at each instant of flight) and, in this sense, the proper external place of the ball is constantly changed,—or rather, the ball passes from one to another of places which do *not* change. But the baseball (as long as its bulk and external extension remains the same) does not pass from one *internal* proper place to another at all; wherever it is in its flight, its proper *internal* place is the same and is wholly motionless.—In addition to proper place (internal and external) a body has, by reason of its external extension, a *common* place, that is a place shared with other bodies. Thus, a book is on the shelf, in the bookcase, in the library, in the house, in the town. Shelf, bookcase, library, house, town, indicate *common* locations or *common* places, for these may be assigned to more objects than the one book in question. A body shares its proper place *with no other* body; it shares its common place with one or more bodies. External extension is the property of natural bodies by which they are said to occupy proper and common place in the normal and natural sense of these terms. Now, even a body without external extension, as well as bodily powers which are not in themselves immediately subject to exten-

sion, are also said to be *placed* or *located*. This leads us to the consideration of the question: how may a reality be in a place? The answer is fourfold:

a) A body with external location is said to be in its place, or to be localized, in a *circumscriptive* manner. The term *circumscriptive* is from the Latin *circumscriptum* which means "written around" or "marked round about." Just as a coin placed on paper may be "written around" by drawing a sharp pencil about its circumference, so a body in the world is enclosed by surrounding bodies. A natural body in the world is *circumscriptively* located, first in point of its *proper*, and then in point of its *common, place or location or ubication*. This latter term, ubication, is from the Latin *ubi*, which means "where," and the term may therefore be translated as "whereness" or "having its whereabouts."

b) Any determinant of a body (size, shape, beauty, temperature,—or the essential and substantial determinant which makes the body an *actual* body of this *specific kind*) is called a *form*. A determinant which makes a body the actual substance that it is, is its *substantial form*; a determinant that marks or characterizes a body as to size, temperature, or other accident, is an *accidental* form. Any existing natural body is a single substance, and has only one substantial form; it usually has many accidental marks, qualifications, characteristics, (in a word, *accidents*) and thus it has many accidental forms. Now, the form

(substantial or accidental) is said to be present, to be *located* or *placed*, in the substance that has it, whether the substance be constituted in actuality by the form (*substantial form*) or be merely marked and qualified by the form (*accidental form*). And the form,—substantial or accidental,—is manifestly present in some manner *other* than that in which a body is in its place in the world of bodies. A form is not present *circumscriptively*. For beauty is not present in a beautiful object as a coin is in a purse or a baseball in the air. Nor is the temperature of a body in the body in the same sense as the body is in the house or in a corner or in water. We define the presence or location or place of a form as *informative* presence, for the determinant (or form) is said to in-form the substance which has it and in which it is thus located. Thus, the soul (the substantial form of the human substance) is in the body *informatively*; thus beauty or coldness or shape or flavor is in a bodily substance *informatively*; thus knowledge is in the mind *informatively*, and, indeed, we speak more accurately than we realize when we call knowledge by the name of *information*.—A substantial form is not, in itself, dependent upon external extension, although a natural body normally requires some quantity of externally extended matter for existence in the material universe. Some accidental forms require for their existence a substance externally extended; indeed, all sheerly *bodily* accidental forms require such

a substance.—In passing, we must notice that when we say that each single substance has only one substantial form, we do not consider substances as *single* in virtue of their mere external appearance. A bar of iron or a block of marble is one kind of substance, but the bar and the block are really collections or amassings of *particles* or *minimum-amounts* of iron and of marble. And each minimum-amount (that is, the amount requisite for the natural existence of iron or of marble) has its substantial form which makes it that kind of substance, actually existing. The greater or lesser number of particles caught together to make a bar or a block is something *accidental* to the iron or the marble *as such*; it is a point of their *quantity*.

c) A form (substantial or accidental) may be a *working force* or *active power*, and it is said to be located in, or have place in, the bodily substance which operates by its means. This type of form is present (or located or placed) not only informatively, but *operatively*. And, if the operative power is capable of activity in but one place at a time,—that is, within one substance at a time,—it is said to be there *definitively*, that is, its activity is limited or *defined* by the limitations of the one substance which it affects. All the active forces or powers of natural bodies are located in their respective substances *informatively, operatively, and definitively*, but not, of course, *circumscriptively*. The power of seeing, for

example, is thus present, or thus has *place*, in a man. The substantial form of a man (that is, the spiritual soul) which in-forms the human substance (and is thus present there *informatively*), is active or operative, and each soul operates only within the individual man whose substance it makes human; thus the soul is present in a man, or in a man's body, *informatively, operatively, and definitively*. Of course, the soul, having no extension of its own, is not present *circumscriptively*. The infinite power of God (creating, preserving, providing) is exercised in the world, and is said to be present in the world, *operatively*; but it is not present *definitively*, for the infinite power is in no wise limited but operates everywhere. Nor is the divine power present in the world *informatively*, for God is not the form or soul of the world (as the old Stoics thought), nor is He the accidental form of anything in the world; God does not enter into creatures as a substantial constituent (*substantial form*) nor as an accidental determinant (*accidental form*). We say that God is present everywhere *operatively, ubiquitously (or non-definitively), and essentially*.—For the normal exercise of powers that belong to natural bodies, some minimum of externally extended matter is required; external extension or external quantity is thus *a requisite condition* for powers operatively present and naturally active in bodily substances.

*d*) A fourth mode of presence (that is, a fourth

mode or manner in which a reality may have place or location) is exemplified in the presence of Our Lord in the Holy Eucharist. This is called *sacramental* presence or location. It may be described as a mode of presence in which one substance has place through the mediation of the dimensions (or external extension) of another substance, but without making these dimensions its own. Thus Our Lord is present in the consecrated host *sacramentally*; He uses the external quantity and dimensions of the host as the medium, so to speak, of His actual presence, but He does *not* make the dimensions of the host His own dimensions.

2. *Incompenetrability* or *impenetrability* is that property of a natural body (consequent upon its external extension) which prevents another body from occupying its place while it is present there itself. The simultaneous location of two or more bodies in one and the same place is called *compenetration*. In the natural order, no compenetration of bodies is possible. Of course, one body may be inside another, as contents in container (thus water is in a glass); and one bodily substance may interpenetrate with another (as ink in a blotter or water in a sponge); but externally extended bodies cannot *compenetrate*, or occupy *exactly* the same place at the same time. However, reason sees no intrinsic impossibility in the very idea of compenetration, and therefore the thing



might be a fact under the action of supernatural power. The Body of the Risen Savior passed through the great stone that closed the Sepulcher, and also, on at least two occasions, it passed through the doors of the chamber where the disciples were gathered together. True, the Body of Christ is a glorified Body, but it is a true body, an actual bodily substance. It cannot, indeed, be known whether the obstacles (the stone, and the doors) were miraculously and momentarily withdrawn, or rendered tenuous so as to admit the passing of a body through their interstices. Thus we cannot point to the miraculous passing of the Lord through bodily substances as a certain example of *compenetration*. If the cases mentioned were true instances of compenetration, we may say that, at the moment of compenetration (that is, at the moment when the Body of Christ and the substance of stone or doors actually occupied the same place), these diverse substances were not present *in the same way*. One of the substances could have had its normal and natural circumscriptive presence, consequent upon its external extension; the other must have lacked, at least momentarily, its own external extension, and must have been extended internally only. In the concept of compenetration under these conditions, there is no absolute or metaphysical impossibility.—The topic of compenetration suggests to the mind the question of *multilocation* or the simultaneous presence of one and the same body in a plurality of places.

Here, as in the question of compenetration, we must affirm that nature affords no instances of such a phenomenon. And again, the mind sees in multilocation of bodies no intrinsic or absolute impossibility if causes beyond nature be set to work. After all, the natural location of bodily substances is a thing consequent upon external extension, and this, in turn, is a *secondary* effect of bodily substance. But a supernatural power might suspend secondary effects, leaving essence and primary effects intact. Thus, there is no contradiction or conflict in the very thought of a single body being in several places at the same moment. Such multilocation is more readily conceivable under the condition that the body be present in different places *in different ways*,—circumscriptively in one place, non-circumscriptively in the others. Indeed, our Faith affords us a certain instance of multilocation in the presence of Christ in the Blessed Sacrament. The Body of the Lord is present in an extended manner in Heaven, and in an inextended manner in every consecrated host (and in each part of every host) and in every drop contained in the consecrated chalice.—Sometimes we read, and notably in the lives of certain Saints, of the simultaneous presence of a man in two or more places. But perhaps this is no example of multilocation, but of a real presence in one place and an apparent presence (or *apparition*) in the other places.

3. *Divisibility* is that property of a natural body (consequent upon its extension) which renders it capable of being "taken apart" or divided into an indefinite number of parts. We say, *an indefinite number*, for the parts of any body can be divided and subdivided without coming to a point where further division is unthinkable. Of course, *physical* partition has its limits; the instruments by which we cut and divide a body into parts are clumsy tools at best, and their work is soon done. But *mathematically* there is no definite point at which further division becomes impossible. Suppose one should say, "Yes, there is such a point. Here we have the last possible division or part of a substance." Might we not reply, "Let us consider an amount just *half* of the bulk of this so-called indivisible part"? Yes, and if we chose we might consider *one-millionth* of the so-called ultimate part, or *one-billionth* of it, for that matter; and we might consider the billionth part of that billionth part, and so on endlessly. Does this mean that the number of parts conceivable in any bodily substance is actually *infinite*? No, the word is *indefinite*. Or, if you prefer, you may say *potentially infinite*, but never *actually infinite*. Actual infinity is absolute boundlessness; it involves impossibility of increase or diminishment. If we could think of a number so great that it could not be increased no matter how many times we multiplied it by itself, and could not be diminished

no matter how we halved and quartered it, then we should have the concept of an infinite number. But the very idea of number is the concept of a thing actually made up of units, and increasable and decreasable by units. In a word, the very idea of number involves limitation or finiteness, and, conversely, blocks out the possibility of actual infinity. But a number is *potentially* infinite (or *indefinite*) in the sense that it can be increased or divided and diminished, and that the process never comes to a point where further increase or diminishment is unthinkable. You may go on for a lifetime multiplying a large number by itself, and the result by itself, and so on; you may bequeath the task to your heirs and assigns; the work may run through centuries and cover continents of paper. But, at any instant in the process of multiplication, the number is *finite*, and, after centuries of labor, the vast result is still as finite a number as that with which the whole process started. The point is, however, that *further* multiplication is always possible, and this is the sense of the term *potentially infinite*. Manifestly, the case is the same if we consider division of a number into smaller and smaller fractions. Number cannot be actually infinite. This being so, numbered *parts* cannot be actually infinite. And thus we say that the divisibility of a body is a property which renders it resolvable into an *indefinite* (or *potentially infinite*) number of parts. Divisibility is, in other words, a property of naturally existing bodies,

consequent upon extension, and, normally, upon external extension.

4. *Mensurability* is that property of a natural body (consequent upon its external extension) which renders it capable of comparison with the extension of other bodies, and so discerned as greater, or lesser, or equal; further, mensurability renders a body capable of being comparatively *numbered* in the extent of its divisible parts. Indeed, mensurability is seen to be a kind or aspect of *divisibility* itself. The noting of divisible parts in the terms of units of extension, and the numbering of such parts, is the basis of the mensurability or measurability of a bodily substance. Length, width, thickness, units of bulk or content, units of surface, weight, specific gravity,—these are familiar terms which indicate measurements (and mensurability) of bodily substances.

### C) VARIETIES OF QUANTITY

Quantity in natural bodies is either *continuous* or *discrete*.

Continuous quantity is unbroken, undivided quantity. A bodily substance which has continuous quantity is called *a continuum*. A continuum is either *perfect* or *imperfect*. A perfect continuum has no pores or interstices or vacuoles between or among its parts. An imperfect continuum has pores, interstices, or intervals, but its own unbroken substance com-

pletely surrounds them. If we suppose for the moment that a plate of polished steel is a perfect continuum, then the same plate with several small holes bored through it is an imperfect continuum.

Discrete quantity is broken or divided quantity; it is non-continuous quantity. A drop of water on a pane of glass is, or at least illustrates, a continuum. Three drops, lying separately on the glass, but considered as one quantity or amount of water, are a discrete quantity. A grain of sugar illustrates a continuous quantity; a spoonful of sugar illustrates a discrete quantity. Discrete quantity is *contiguous* if the items that make it up come into immediate contact with one another; if there is no such contact, the discrete quantity is non-contiguous or *separate*. A few pebbles held closely in the hand, each pebble touching one or more of the others, make a discrete contiguous quantity; they constitute *a contiguum*. The same pebbles held loosely on the palm so that none of them touches any other, make a discrete separate quantity.

Each of the pebbles is a continuum, perfect or imperfect. But is it truly so? The science of physics tells us that a bodily substance is made up of ultimate particles caught up in a kind of amalgam. If the bodily substance is chemically simple, that is, if it is one of *the chemical elements* or chemically uncompounded substances (of which ninety-four are now recognized), its ultimate particles are called *atoms*. If

the bodily substance is a chemical compound, its ultimate particles are called *molecules*. The smallest existible particle of water (that is, the smallest body existible *as water*) is a molecule of water. And, since water is composed of two parts hydrogen and one part oxygen (hydrogen and oxygen being chemically simple or elemental), it is manifest that the molecule of water consists of three atoms, two of hydrogen and one of oxygen.

Now, suppose our pebbles are limestone pebbles. Limestone is a chemically compounded substance, the chief elements of which are calcium and carbon. Ultimately, then, limestone consists of atoms of calcium and atoms of carbon. Would it be correct to say that each molecule of each limestone pebble is a contiguum, a discrete contiguous quantity consisting of atoms of calcium and atoms of carbon lying closely together? No; for the structure of the pebble resembles rather the sieve-like plate of pierced steel than the spoonful of sugar. Though there be interstices or intervals in the limestone substance, one can "go around the holes" without stepping off the continuous substance of the stone; and, indeed, the imponderable matter which fills up the intervals or vacuoles (improperly called so) is itself to be regarded as part and parcel of the structure of the substance called limestone. Thus we are justified in regarding each pebble as a continuum, and perhaps as a perfect continuum. Limestone is a substance with its true substantial

character; it is not a mere heap of atoms of calcium and atoms of carbon mingled together as sand might be mingled with salt; the atoms which ultimately compose limestone are *substantially* united to constitute a substance which is neither calcium nor carbon, but a third thing called limestone. Thus, each pebble and each molecule of each pebble must be regarded as *continuous* quantity, whether perfectly so or imperfectly so.

An imperfect continuum must contain in itself, and of itself, a reach of perfect continuity. Consider the plate of pierced steel,—or the metal top of a salt-shaker,—as an illustration of an imperfect continuum. The substance that “lies between the holes” is not an imperfect, but a perfect, continuum. Hence, the basis of quantity in bodies is always perfectly continuous matter.

Is the atom perfectly continuous? Formerly it was universally thought to be so, for the atom, before the present century, was regarded as perfectly unified and physically indivisible. Indeed, the name *atom* is a direct derivative from a Greek word which means “that which cannot be cut.” But now it is known that the atom can be cut. Thus it loses its strict right to the name *atom*, although we continue to call it so. The atom can be, and has been, divided or split into its parts. Indeed, the atom is not only a thing made up of parts, but it has a kind of porosity, so that the sub-atomic parts are held, not in perfect solidity and



compactness, but with relative looseness. The atom has its core or *nucleus* which consists of a particle of matter, or several welded particles, bearing an electrical charge; indeed the nucleus itself may have some of its constituent particles charged negatively (*electrons*) and some positively (*protons*). Around the nucleus, and spatially distinct from it by a greater or lesser reach of imponderable matter, are other electrons.\* Thus it appears that the atom itself *may* be regarded as an imperfect continuum; but *it is a continuum*, since protons, electrons, and imponderable matter all unite in its unbroken structure; and indeed, so truly unbroken is this structure, that it seems more just to call the atom a perfect continuum than to regard it as an imperfect one.

Ultimately, then, whatever the future discoveries and achievements of the scientist may be, matter consists, in the quantitative aspect, of fundamental *continua*. And, as we have observed, continua are radically *perfect* continua, even though any tangible

\* Modern physics distinguishes a good many different particles of charged matter which may have place within the atom. These particles differ from one another in charge or in mass or in both. The particles are sometimes called, poetically, "the building-stones of the atom." Some of these are listed as follows: electron, positron, negatron, proton, neutron, deuteron, alpha-particle. But, in a briefly descriptive account of the atom, all these particles may be classed with sufficient accuracy as *protons* and *electrons* according as they bear, respectively, positive or negative charges of electricity. Perhaps special mention should be made of the *neutron* which has both a positive and a negative charge which balance each other. Or it may be said that the neutron lacks electrical charge altogether.

quantity of them be regarded as constituting an imperfect continuum.

Mathematically, we may carry on our division of matter to an indefinite extent. Even the minimum-quantity of matter has extension and hence has divisibility. Therefore a continuum, even though it be the smallest existible amount of a material substance, is not only *one* in itself; it is also potentially multiple or *many*. For the smallest continuum may be regarded as two halves of its quantity, and one hundred hundredths, and so on indefinitely. The physically existible minimum of any kind of matter has, consequently, a capacity for endless mathematical division into fractions or parts; it is said to have these parts not *formally* or *as such*, but *fundamentally*; not *actually*, but *potentially*.

To illustrate: Let us suppose that each of five slates in a blackboard is a perfectly continuous quantity. The whole blackboard, viewed as a totality or unit, is a discrete and contiguous quantity; for the slates are so aligned that they "touch"; each slate comes in contact with one or two of the others. But each individual slate is a continuum, and we are supposing, for purposes of illustration, that it is a perfect continuum, a stretch of substance with absolutely no intervals or interstices in its quantity. Manifestly, the slate can be divided; it can have its parts *designated* (as, for instance, "the upper portion," "the central area," "the lower left section," "the four square

inches in the upper right corner”), and it can be subjected to *actual physical partition*: the slate may be cut into quarters, tenths, sixty-fourths, hundredths, or it may be broken up with a hammer into thousands of irregularly shaped parts, or it may be ground into millions of tiny grains. Now, each of the parts (designated or broken off) is itself a continuum; and as such it is capable of division into further parts, each of which will be a continuum. The original and unbroken slate can, therefore, be discerned as made up of designatable parts, and the slate can, as a fact, be divided into actual parts. Therefore, even while yet unbroken, the slate may be said to *have* these parts in some manner. For the designating or breaking off of parts does not add anything substantial to the slate, or bring an increase or diminishment of its total original quantity. The substance of the divided parts is neither a new substance nor a new total amount of substance. Still, the unbroken slate does not have its parts formally or *as such*; these come with designation or actual partition. The slate has rather the capacity or capability for distinction and division into all its possible parts. In a word, it has these parts *potentially*, not *actually*.

The illustration just offered should help clarify the definition of a continuum, viz., “An extended quantity which has no parts *in itself*”; or “An extended quantity which has *within itself* no limits or boundaries of (actual) parts.” Further, the illustration

should help to explain the statements: (*a*) That a continuous quantity is actually one and potentially multiple; (*b*) That a continuous quantity is made up of divisible components; (*c*) That the division of a continuum (or continuous quantity) results in other and smaller continua; (*d*) That a continuum is capable of indefinite division. Much of all this is summed up in the terse sentences of Aristotle (*Physics*, *vi*, *c* 1; and *v*, *c* 3): "It is not possible to form a continuum out of indivisibles"; "It is clear that a continuum is divisible into parts which are themselves divisible."

The following points, adapted from the philosopher Lepidi and others, are worthy of note in this place:

1. In every extended reality there must be some *continuous* quantity. If, in natural bodies, there were no perfectly continuous quantity, we should be forced to accept one of two impossible conclusions: (*a*) we should be compelled to deny the actuality of extended matter (as Sir James Jeans seems to do in his *The Mysterious Universe*); or (*b*) we should be forced to conclude that actual extension is the product of inextension, that is, that extended bodies are made up of non-extended parts. Consciousness, experience, and reason concur to make us reject both conclusions as self-contradictory and absolutely false.

2. While the ultimate quantitative parts of an extended body must be perfect continua, it is plain that

a complex body in its larger portions as well as in its full structure may be only imperfectly continuous. There is a kind of porosity in bodily substances. Some bodies are manifestly marked with interstices or open intervals,—a sponge, for instance, or a piece of coke or of slag,—but even those bodies in which human vision can detect no break are seldom perfectly continuous. In many cases, the microscope reveals “holes” in substances we normally regard as perfectly compact, solid, smooth, and continuous. Indeed, we have noticed that the atom itself has intervals between and among its parts. If the porosity of matter were denied we should have great difficulty in explaining the phenomena of expansion and contraction, and the absorption of one substance by another (as ink is absorbed by a blotting-pad or water by dry wood). Further, we could hardly explain the vibration of particles of matter which give rise, under due conditions, to perceptible sound, color, or heat. However, we must be careful not to confuse the truly *substantial unity* of a quantity of bodily substance with the mere aggregation of molecules or atoms, particularly in *living bodies*. A living body is a manifest continuum throughout its organic structure, a fact that is proved by its unified vital character and function. Hence, though Sir Arthur Eddington says, in *The Nature of the Physical World*, “The atom is as porous as the solar system. If we eliminated all the unfilled space in a man’s body and collected his pro-

tons and electrons into one mass, the man would be reduced to a speck just visible with a magnifying glass," it is pertinent to remember that this microscopic man would be just as truly a continuum, involving components in perfect continuity, as he is in his normal and natural state as a bulky human adult. Nor, indeed, is it right to "eliminate the unfilled spaces," since such spaces are not, properly speaking, "unfilled" at all; there is, at least among the smallest ponderable quantities of a substance, an imponderable matter which may justly be regarded as "constituent" of the substance, together with the ponderable components.

3. Though physical science knows nothing of the so-called "open spaces" between and among the subatomic particles of matter, and pays no direct attention to them, it is certain that these vacancies are not perfectly empty. They are not *vacua*, in the strict sense. For a *vacuum*, strictly speaking, is absolute absence of all bodily reality; a vacuum is, in the material sense, a complete *nothing*. But the bodily world, throughout its structure, appears to be always a *something*, and not *nothing*. When we speak casually of a vacuum (as, for example, when we say that there is a vacuum under a laboratory-bell, or when we speak of "vacuum-packed coffee") we use the term *vacuum* in a relative sense, not in an absolute one. We indicate the absence of atmospheric air; we do not indicate the absolute absence of all material

substance. It is universally admitted that no such thing as *an absolute vacuum* is known within the limits of the bodily world. Scientists agree that the holes or pores or interstices in the most compact quantities of bodily matter (such as the atoms or molecules of matter) are perfectly filled with some tenuous and imponderable matter, even as the holes in a dry sponge are filled with air and those of a submerged sponge are filled with liquid. Whether this imponderable matter is properly to be called "aether" (as was the fashion until recently), or whether it is an amalgam of various unknown substances that should have a better and more accurate set of names, is a question for mere academic discussion. Whatever the imponderable matter may be called, it is undoubtedly true matter; it is truly a bodily substance, truly extended. For bodies act upon one another, and material action requires a material medium of activity. The particles of molecule or atom adhere closely together, yet it is recognized that their ponderable quantities do not come into *immediate* contact. Nor can we, in our present state of knowledge, apply any force sufficient to produce such immediate contact. Between and among the most closely adhering ponderable particles there is a film of imponderable matter which is the medium and channel of the contact and adhesion. And there must always be such a medium or channel for the activities or influences which bodily quantities exercise upon one another;

bodily activity cannot leap the void; it cannot be exercised across an absolute vacuum. Such phenomena as the transference of light and of sound, radioactivity, gravitation, chemical affinities, physical attractions and repulsions, indicate the truth that there are actual channels of media-of-contact among interacting bodily quantities, and that these channels or media are *material*, and are *continuous* all along the line of influence or interaction. We are thoroughly justified in the assertion that there neither is nor can be *actio in distans*, that is, action upon a material object by a material object *across an absolute void*. Just as there can be no flowing of a river without a river-bed, so there can be no flowing of material influence or activity from body to body without some material medium or channel of communication between the bodies. And the medium must be *material*; that is, it must be proportioned to its function which is a material influence or activity. The science of ontology (or fundamental metaphysics) discusses the question of *actio in distans* as to its metaphysical or absolute possibility; cosmology merely indicates the physical impossibility of bodily interaction without a bodily or material medium-of-contact between the interacting bodies. We must conclude that our bodily universe, which manifests such close-knit and constant complexities of bodily influences and interactions, presents no true vacua to our knowledge. It appears to be strictly true that "nature



abhors a vacuum." We do not say that no tiniest vacuum *could* exist within the limits of the material universe; we say that, so far as we can make out, no such vacuum does exist. It might be possible to defend some theory of vacuum-intervals which would be skirted by corporeal action and interaction, and this might be done without any appeal to current theories of curved space or bent light. But no such theory is exacted by the phenomena observable in the world. It is the general agreement of philosophers and scientists that vacua do not exist in the world, or, at least, that they are utterly unknown.

4. Our bodily universe is a vast *contiguum* made up of a multitude of bodily substances which are, at least in their essential existible elements, respective true *continua*, perfect or imperfect. Each living body is a perfect continuum throughout its actual organic structure. Each quantity of non-living substance appears to be an imperfect continuum, with its ultimate quantitative components perfectly continuous.

#### d) SPACE AND TIME

Quantity means extension, first *internal* and then *external* extension. Now, the quantified world,—that is, the world of natural bodies,—is characterized by external as well as internal extension. For a body to exist in a purely natural manner, external extension is a requisite condition, even though *in itself* it is a secondary effect of bodily substance. A natural body,

then, has external extension. And by virtue of this a body occupies a *place*. Now the sum-total of all *places*,—or, in other words, the sum of all actual external extension,—constitutes *real space*.

We might put the matter the other way about and say that space is the extent of the bodily universe, and that each place is a part of space. But, whether we describe space as the sum of places, or say that space is the unit of which places are fractions, we mean that space is the whole sweep of extension included within the boundaries of the existing bodily world.

An externally extended body is always characterized by change or motion. The world about us, and all bodily substances in it, are constantly “on the move,” not only in the sense of *local movement* (although this type of motion is universal and continuous, and we have instances of it everywhere, from speeding stars and galaxies to swirling atoms and electrons) but in the sense of *mutation* or *change*. We have already seen, in our study of the outstanding characteristics of bodily substances, that these are always *mutable*, and that they may be described with accuracy as *entia mobilia* or “mobile beings.” Everything in the bodily world evidences a procession and succession; things come into actuality and pass on to new actuality; bodies act and interact, running through a ceaseless series of influences received and influences imparted. Motion or change is a constant

phenomenon in the world of bodies. Now, motion or change is essentially a matter of succession (not in the sense of gradualness as opposed to instantaneousness, but in the basic sense of *one thing*,—being, state, condition,—and then *another*), and even in things that we speak of as *lasting* or *enduring* we find a succession of items, points, elements, or instants of lastingness or endurance itself. In a word, the world is a world marked universally by motion. And, since motion necessarily involves *this* state or condition and then *that*, it is a thing that can be somehow measured or *numbered*. The mensurable or numerable motion in the bodily world is the entitative basis of the thing called *real time*.

The description of real space and real time just given should be diligently studied as a preliminary to the more detailed discussion we are now to undertake.

1. *Space* is, as we have said, the actual external extension of the bodily world viewed as a whole. Thus it is something *real*. But the human mind inevitably makes its own contribution in forming the concept of space, and regards it as a kind of *receptacle*, as a sort of *container of all bodies* and as *the field which encloses bodily movements*. Literally, however, space is not a container, for a literal container is always really distinct from the thing it contains, just as a sack is distinct from the sugar that is

in it, or as the glass is distinct from the wine which it holds. But space, while it is thought of as holding or containing all bodily extension (that is, external quantity) is not really distinct from that extension; it *is* that extension regarded in totality.

Immanuel Kant (1724–1804) stressed too forcibly the mind's contribution to the concept of space, and came to deny all reality to it. He said that space is *all* in the mind; that it is an inborn "form" of the mind, a kind of mental groove through which a person is forced to pour the findings of the senses. But, as Kant's followers quickly demonstrated, one cannot deny all reality to space without soon coming to a denial of the substantial reality of the world itself. "That way madness lies"; the madness of skepticism, which is an utterly impossible doctrine.

Modern physicists like Albert Einstein (1879—) and Arthur Stanley Eddington (1882—) find difficulty in the objective concept of space, but their difficulty is bound up with the actual *measurement* of space, which does not concern the cosmologist at all. It is not space, but distance (which is a *partial* space) and the difficulty of defining distance in extent and "shape," which has upset, to a considerable degree, both Euclidian measurements and Newtonian physics. Now, the physicist, like every scientist, is forced by his very nature as a rational being to step across the frontiers of his science and invade the field of philosophy. Unfortunately, most

scientists, while rightly sticklers for accuracy (“religious in it”) in their proper domain, are given to the loosest sort of generalizing as philosophers, and do not seem to be conscious of their presumption in tossing off definitions that do not define and in making conclusions that do not conclude. Thus Professor Eddington, that wholly admirable scientist, bogs down when he philosophizes on space. He says (in *The Nature of the Physical World*, p. 13), “Space is an empty void; or it is such and such a number of inches, acres, pints.” Of course, space is nothing of the sort. It is not an empty void, else the world is not here; in which case, Professor Eddington is not here, and his statements are not made. Nor is space “such and such a number” of units of measurement. Space (that is, real space) is the actual extension of the material universe. If our units of measurement are relative things; if they hold no absolute value; if they give us faulty notions about the size of things or their distances from one another, it by no means follows that the reality we try to measure by their means is not a reality at all, or that there is no size and no distance to be measured. The cosmologist is not concerned with measurements as such, while the physicist and the mathematician undoubtedly are concerned, and properly so, with these things. What the cosmologist asserts is that the universe is *extended*, and that it is *finite*. In these fundamental points the cosmologist finds, with much happiness, that the

physical scientist perfectly agrees with him. He knows that the bodily world is extended, for he cannot otherwise avoid the self-contradiction of skepticism, and the imbecilic silence which it imposes upon all theorists, scientist and philosopher alike. And he knows that the bodily world is finite, not infinite, because it is made up of finite realities, and the sum of finite things can never reach to actual infinity. But when the physicist says, "We have different *frames of space* to which we refer the location of objects. The frame of space used by an observer depends only on his motion. Observers on different planets with the same velocity will agree as to the location of objects in the universe, but observers on planets with different velocities have different frames of location," the cosmologist answers, "Go your way in peace, and God be with you. We have no quarrel. But our roads part here. Go on, follow your own path, do your own work, and may success attend your efforts. I, meanwhile, must be getting on with mine." For whether the bodily universe be capable of accurate measurement or not so capable; whether the universe be expanding or contracting or holding to a constant size; whether bodies in the universe can be absolutely located or only relatively placed; whether distances between bodies, and rates and directions of moving bodies, can be determined with rigid correctness or are incapable of such determination, it still remains a fact that the bodily universe is *here*,

that it is *extended*, that it is *finite*. Now, the finite extent of the universe (whether it changes or remains constant) is the cosmologist's concept of *real space*.

*Real space*, then, is the relation of extent in, between, and among actually existing bodies. If we conceive of this space as the actual *container* of all bodies, we are well aware that we do so as a matter of mental convenience, and that space, in this view, takes on the character of *ens rationis* or *ens logicum* (that is, of *rational* or *logical* being as contrasted with *real* being). We do not deceive ourselves, and project our concept of "space the container" into the world of nature as though it were actually there like a great bag full of stars. No, we are clear upon the point that real space is the relation of extension (not the *measurement* of extension) among actually existing bodies, and that it is coterminous with the external limits of these bodies. So space, while a logical being inasmuch as it is viewed as a container, has its basis in reality; it is an *ens rationis cum fundamento in re*.

*Ideal space* is the concept of possible space. It is the intellectual grasp (not the attempted picture in imagination) of the fact that the actual limits of the bodily world might be indefinitely extended. The world has its limits, and these are the limits of *real* space; but the Creator might create any number of new worlds, thus expanding the limits now really imposed. The idea or concept of such a possible new

expanse of space, is the idea or concept of *ideal space*.

*Imaginary space* is the space which fancy pictures as extending beyond the limits of the actual bodily universe. Imaginary space is manifestly not to be confused with either ideal space or real space. Yet such confusion is not infrequently found, even among men of real prominence in the scientific world. Sir James Jeans (1877—), for instance, has this to say, in *The Mysterious Universe* (p. 166 f): “Anyone who has written or lectured on the finiteness of space is accustomed to the objection that the concept of a finite space is self-contradictory and nonsensical. If space is finite, our critics say, it must be possible to go out beyond this finite space, and what can we possibly find beyond it but more space, and so on *ad infinitum*?—which proves that space cannot be finite. And again, they say, if space is expanding, what can it possibly expand into, if not into more space?—which again proves that what is expanding can only be a part of space, so that the whole of space cannot expand. The twentieth-century critics who make these comments are still in the state of mind of the nineteenth-century scientists; they take it for granted that the universe must admit of material representation. If we grant their premisses, we must, I think, also grant their conclusion—that we are talking nonsense—for their logic is irrefutable. But modern science cannot possibly grant their con-



clusion; it insists on the finiteness of space at all costs. This of course means that we must deny the premisses which our critics unknowingly assume. The universe cannot admit of material representation, and the reason, I think, is that it has become a mere mental concept." This lengthy citation calls for comment on several points, and we may as well list these under numbers:

(1.) Sir James Jeans, mistakenly judging the logic of the critics as irrefutable (whereas it is really non-existent) is like a timorous man who rolls under the bed to escape purely imaginary burglars, and then calls out loudly, "Go away; there's nobody here!" In terror because of a little meaningless noise, he is ready to deny his own reality and reduce himself to the status of a mental concept—in whose mind, one wonders?

(2.) Sir James is correct in affirming the finiteness of space, that is, of *real* space, but he loses his right to be correct when he assigns the mere stubbornness of scientists as the reason by which we must regard space as limited. Further, he cannot logically hold to material finiteness, when he asserts in the same breath, that the world of space is not itself a material thing, which must be the basic meaning of the phrase "does not admit of material representation." For a material thing *can* be materially represented. But that which admits of no material representation

surely *may*, for all we can know, be actually infinite; indeed, the presumption must be that it is actually infinite.

(3.) Sir James thinks the logic of his critics irrefutable. That is because he, like the critics, makes a muddle of the concept of space, and mixes up *real* space with *imaginary* space and *ideal* space. The critics say, "If space is finite, it must be possible to go out beyond this finite space, and what can we possibly find there but more space, and so on *ad infinitum*?—which proves that space cannot be finite." It proves nothing of the sort. If space is finite (and real space, being the actual extension of real bodies, is certainly finite), it is possible to go out *in thought* or *in fancy* beyond the limits of space. Granted. But the thought of space beyond the real limits of the universe is merely the thought that further extension of these limits is always possible, and this is true; this is a question of *ideal* space. And the fancy or imagination-picture of space as extended beyond its finite and real limits to farther reaches (still with limits) is a matter of *imaginary* space. What *really* lies beyond the actual limits of space (that is, beyond the actual limits of all bodily creation) is *nothingness*, that is, nothingness in the material sense. The mind can understand this, but the concept of it cannot be made with the adequateness and clarity of positive concepts; for we only get at the idea of nothing by removing the idea of everything, and there is

admittedly a mental difficulty in conceiving absolute negation. Yet the mind can have a sufficient understanding of material nothingness to know that such a thing can be, and even that such a thing must be. The mind that can conceive of a limited vacuum within the confines of the material world, cannot be said to be powerless to represent an unlimited vacuum outside it. If the mind confuses the mere *possibility* of farther space (beyond the confines of the bodily world) with the *actuality* of space; or if the mind takes the imagination-picture of extended space as a *real* extension of space, then we have not "irrefutable logic" but only muddled thinking. And of this sort of thinking, Sir James Jeans and the critics he quotes must, in all charity, be flatly accused.

(4.) If it be said that Jeans, in declaring that the universe does not admit of "material representation," is only saying that we cannot form a wholly adequate and comprehensive concept of the actual extent of the material universe; or if it be said that Jeans means merely that the extent of the world cannot be set down in definite measurement-units, and that the effort to express the size of the world in cubic miles or cubic inches is always bound to be a failure; then we are prepared to assent, and to say that Sir James is right. But such an interpretation of his words appears to be an unwarranted expanding of the limits of charity, and even of common logic. From the terms of his expression, it appears that Jeans is not

far removed from the position of the idealistic pantheist who makes the material universe only an unfolding concept (or image or dream) in the mind of the Deity.

(5.) The concept of finite real space is no more self-contradictory and nonsensical than the concept of a finite real elephant, or of a sparrow, for that matter, or an amoeba. But if I allow myself to become confused about the *actual* quantity of the elephant and its *possible* quantity, or if I permit myself to become foggy about the real elephant because I persist in imagining him to be much bigger than he is, then I may rightly conclude that it is nonsensical (in my state of befuddlement) to attempt to say just where the limits of the elephant are, or even to assert with certitude that he has any limits at all. Ideal space and imaginary space are potentially infinite, or indefinite,—which only means that I may go on thinking the elephant larger and larger, and may go on imagining him bulkier and bulkier, and I never reach a point where I must stop my thought or my fancy, even though my ideal or imaginary elephant should block out the sun with his head and scratch his back against the remotest stars. But real space is definitely finite—which only means that the real elephant has his real quantity or extension, no matter what my thoughts or imaginings about him may be. And if the universe is expanding, this can be no more puzzling than the fact that the real elephant is growing. He

does not lose finiteness or even dimensions by growing; only his dimensions are progressively larger. There is no occasion for wonder or worryment about what the universe is expanding into, if it is expanding. It is expanding into nothing; it is increasing its size; it is getting bigger; it is widening its outer limits. But it has, throughout the process, an extension that is definitely finite, and, had we the instruments to measure it, and a stable position in which to apply them, we could *measure* the universe at any instant, and *express it* in terms of measurement. To say that the expanding of the universe disproves its finiteness, is to say that the baby-elephant is infinite because he is growing bigger.

(6.) The critics mentioned by Jeans are talking nonsense and are guilty of self-contradiction in their assertion that an expanding universe "can only be a part of space," which, in their view, is infinite. For the concept of *a part of infinity* is a simple absurdity. What has parts is finite, and necessarily so. If infinity could have parts, then (a) either these would be finite and their sum-total would be finite; thus the infinite would be both infinite and finite at the same time—a neat contradiction: or (b) the parts of the infinite would be themselves infinite, that is, each of the parts would be infinite; thus each part would be equal to the whole; nay, each part would be identical with the whole, since a plurality of infinities is impossible. This would mean that the bodily world and

each of its parts would be infinite, and each part would be infinitely identified with each other part. Each stone and tree as well as each galaxy and nebular mass would be infinity, and would be the same infinity. In other words, objects which are admittedly finite would be also infinite,—again, we have a nice contradiction in thought and terms. And these objects would not be individual objects at all, but all *one and only* infinite object,—and this plumps us right into a world of illusion, a negation of the very reality with which the critics come to such confident grips.

(7.) That the bodily world is of tremendous size, no one will deny. But we must not be overpowered by mere size. A sight of the lordly Alps does not distress the school-boy to such an extent that he is unable to pick up and measure a stone; nor does it befog his mind to the truth that enough stones of the size he can handle would make a heap the size of the Alps. After all, size is truly a relative thing. Professor Einstein, with his doctrine of *relativity*, has upset many minds and many theories; yet he is far from teaching that there is no absolute value in anything material; he asserts the existence of certain “invariants” or absolutes; he does not make *everything* relative. And although we cannot go along with his philosophy we cannot brusquely deny the value of much of his scientific work. But, long before Einstein, the human mind recognized many things as

relative, and *size* is just such a thing. If there were only one bodily object in existence, it would be neither big nor little; it would have no size. You must have at least two things to compare before you can speak of size, even if one of the things is the Matterhorn and the other a foot-rule. Bishop John Vaughan says (somewhere in *Faith and Folly*) that if the material universe were suddenly contracted in size; if there were a general reduction *in strict proportion* throughout the world, so that, for example, everything from the remote heavenly bodies to the ash-tray on the desk were reduced *by half*, there would be no means available to the human mind for knowing that a reduction had taken place at all. Nay, if the whole universe were reduced to such a size that it could be enclosed within a tea-cup,—keeping the reduction strictly proportionate in every detail,—no human being would notice any change in the world at all. Everything would go on precisely as it goes on now. And there would be no change whatever in our true concept of real space. Real space, then as now, would be the actual extension of the bodily universe, neither more nor less. And all the scientists would be busy, then as now, in computing the “light years,” in millions and billions, required to bring us the light of those stars out near the rim of the tea-cup; other scientists, then as now, would be peering through microscopes, and working with expansion-chambers, to find out the internal economy of the myxomycete,

and to observe the activity of electrons. No one would be conscious of any change, because the change took place all along the line, in strictly proportionate reduction of *everything*. And philosophers, then as now, would labor over the difficulties of disentangling, and aligning true relations of natural philosophy and natural science, cosmology and physics. But, clear of all entanglements and doubts, philosophers, then as now, would assert the ringing truth that real space is the actual extension of the bodily universe, whether this be "big" or "little," expanding or contracting or standing constant.

2. *Time*, as we have seen, is entitatively based upon the fact that there is motion in the world, and that one motion can be compared with another, and *numbered* in terms of the other. (Similarly, the size of things is a matter of comparing one with another, and of taking one size as a unit in which to express the size of other things.) But, while the basis of time is real motion in the material world, the complete concept of time involves the mind of man making comparison of motion with motion, and *measuring* one by another. So also with size. If one little block of wood rests upon a larger block, these are not measured until someone notices *how many times* the smaller block can be placed on the surface of the larger until it has rested on all the completely separate, yet contiguous, area-spaces of the larger: only



thus, for instance, could it be discovered that the smaller block has an edge that must be set to the edge of the larger eight times before exhausting its length; then if we call the smaller block an inch on each edge, the larger is eight inches on each edge, and the area of any face of the smaller block is one square inch, and the larger (expressed in terms of the smaller, as of a standard) is sixty-four square inches on each face or surface. Measurement, which gives size, is a matter of an intelligence making comparison and of adopting one object, in any or all dimensions, as a standard for expressing other objects in their corresponding dimensions. Thus with time. It is a matter of intelligence noticing motion or movement, and of laying hold of some regular movement as a standard by which to *measure* other movements. Hence, the ancient saying is true: "If there were no mind, there would be no time." Still, as we have seen, *time* is not wholly a projection of the mind (an *ens rationis* or *ens logicum*, simply); it has an entitative basis in real motion in the real bodily world; it is an *ens rationis cum fundamento in re*, that is, *as a measure* of motion, it is "a logical being with a foundation in reality."

Immanuel Kant, as with *space*, erred in his concept of *time*. He made time *a form* in the knowing-power of man, a kind of mould or groove, through which the findings of the senses are necessarily received and by which these are "conditioned." Modern physicists

often make time a "fourth dimension," and distinguish in bodily objects not only the directions or dimensions of *up-down, right-left, forward-backward*, but they add the direction of *before-after*. It is a convenient device for science to deal with a four-dimensional universe; just so, it is a convenience for the statistician to multiply a thousand men by the hours each works each week, and so present a compact account of 40,000 "man hours" of labor as the week's tally for that group. But, after all, men and hours are different things. Whatever the physicist may find useful is surely within his right to employ; but he must not turn muddled philosopher and declare that his device for practical simplification represents the inmost nature of things. There is much in the current talk of time as a dimension to suggest the loose descriptions one reads in newspapers about "visible sounds." Sound, of course, is audible, not visible. But the effect of sound upon a vibrating surface can be recorded electrically, and this, in turn, can be expressed visibly; but the fact remains that the sound as such is never visible. When the visitor to Radio City is told to speak or sing into a microphone, and to watch the movements of lines of light in a box placed conveniently for his entertainment, he is told that he "actually sees his voice." But, as a fact, he doesn't. He sees the lines of light, and these are affected in their movements by the vibrations which his voice sets in motion; that is all. He sees

what is visible, not what is audible. But the convenient and startling phrase "you see your voice" is intriguing; it is good "salesmanship"; it has the attraction-value of modern advertising. But it leads the unwary to muddled thinking. This, in some measure, is also the case with time as a dimension or direction. Of course, the box that stands in the corner is not only two feet long, one foot wide, and one foot deep; it is also in the corner *now*. But the dimensions of the box, and the time of its existence or its measurement, are in different categories of things.

Space and time have something in common: they are *quantities*. Space is a matter of what is called *permanent* quantity (that is, all the quantified reality is present at once), and time is a matter of flowing or *successive* quantity (that is, its parts follow one another into being in a continuous series that carries one in as another is carried out and none lingers). In passing, it should be noted here that space and time, being quantities, are, in their literal meaning, strictly confined to the universe of material things. When we apply the terms of space or time to things non-material, we use these terms in an extended or analogical way.

Three elements enter our concept of time: past, present, future. The present, that is, the *now*, is an indivisible instant. If it could be divided (which it cannot) it would fall into three parts,—part would be past, part future, and between them still would lie

an indivisible *now*. Thus no further division of time, beyond the threefold division mentioned, is even thinkable. The *now* is indivisible and cannot be confined or captured, for even as we name it, the *now* becomes *then*—what was the *present* moment is aligned with the *past*. Our concept of infinity, of boundless perfection boundlessly *present*, is thus seen to exclude time; an infinite being is necessarily *eternal*, without past or future, without flow of time. God is *outside* time; He is timeless, eternal. But our concept of finiteness is inescapably bound up with time, and even the endlessness of what we call the “eternal life” for which we hope, does not include beginninglessness, nor the *simultaneous possession of boundless life*, which is the definition of eternity in strict sense.

We may describe time as the spread or extension of an unbroken series of motions. Further, our mind persists in regarding time *as a measure* of these motions. The manifest movement which we call,—unscientifically, and indeed incorrectly, but with sufficient practicality,—the “movement of the sun across the heavens,” was taken at a very early date in human history as a *standard* movement. It is a regular movement, dependable, recurrent. It was but natural that men should use it with reference to other movements, changes, events. It was inevitable that man’s inventiveness should produce mechanical devices to indicate regular portions of this regular movement. Yet

the measurement of time is not the essence of time. This essence is in the actual movement and in the mind's recognition of the movement as progressive, as not all there at once, as consisting of what has gone before, what now is, and what is to come. This essential time is called *intrinsic time*. Time expressed in terms of measurement; time that we read from our watch-dials; time that we call "lunar" or "sidereal"; all *measured* time, is called *extrinsic time*. Extrinsic time is either *general* (as solar time, sidereal time, lunar time) or *particular* (as hours, minutes, seconds).

But the most important division or classification of time (as of space) is that which distinguishes it as *real time, ideal time, imaginary time*.

*Real time* is the actual succession (in unbroken series) of movements, events, changes,—in a word, *motions*,—which a finite intelligence can recognize in the material world. *Ideal time* is the mind's understanding of the possible duration of real time. *Imaginary time* is the duration of successive motion as depicted in the human fancy or imagination.

*Real time* is necessarily finite. Since it is (in strict literalness) referable only to material motion in a material world, and since the material world is necessarily a world which had *a beginning*, time had a beginning. That is, time had an initial boundary, and is not infinite. Further, while the material world may be thought of or imagined as indefinitely enduring,

as "reaching on unto eternity," this is a matter of ideal or of imaginary time, not of real time. Even so, such time is only potentially endless, for each instant of it finishes it "so far"; each instant is a point, a *now*, a *then*, a limitation. Even should the material universe with its time-movements be continued endlessly in existence, each instant of it would be a point for beginning or ending measurement; thus, while relatively or analogously eternal, it would still be finite. Indeed, more noticeably than in the case of space, time is a matter of parts (of numerable successive motions); and what has parts is, by definition, a thing finite and limited.

To certain philosophers, like Stephen Alexander (1806–1883) and A. N. Whitehead (1861—), the world is a single reality called *space-time*. What we know as bodily substances in the world are merely *events* which evolve out of the bosom of *space-time*. Thus the substantial character of the world is denied. The space-time philosophy (not the science with time as fourth dimension, which is sometimes referred to as the theory of space-time) is a lamentable development of Einstein's *relativity*. It tells us that we move in a world of illusion; it sets our feet directly in the path to monism and idealistic pantheism. It spells futility and silence; it is the suicide of philosophy and of science. Consider the dismal summary of this situation, as it is presented in the words of Sir James Jeans (*The Mysterious Universe*, p. 135 f): "A soap-

bubble with irregularities and corrugations on its surface is perhaps the best representation, in terms of simple and familiar materials, of the new universe revealed to us by the theory of relativity. The universe is not the interior of the soap-bubble but its surface, and we must always remember that, while the surface of the soap-bubble has only two dimensions, the universe-bubble has four—three dimensions of space and one of time. And the substance out of which this bubble is blown, the soap-film, is empty space welded on to empty time.” When more meaningless words are to be coined, we may count upon the scientist-philosopher to coin them!

#### SUMMARY OF THE ARTICLE

In this lengthy Article we have studied the meaning of *quantity* in a substantial and bodily world. We have distinguished *internal* and *external* quantity or *extension*. We have seen that quantity is not to be identified with bodily substance, but that it is a requisite *condition* for the existence of bodily substance, and is formally constituted by the substance itself. We have discerned the essence of quantity in *internal extension*. We have listed and discussed the *properties* of quantity, viz., *external extension*, *impenetrability*, *divisibility*, *mensurability*. In this discussion, we have studied *place*, and the different ways in which a reality may be located; we have considered

the possibility of *compenetration* of bodies; we have found that number (and size as well) is capable of *indefinite* increase or diminishment, and in this sense is *potentially infinite* but never *actually* so. We have distinguished quantity as *continuous* and *discrete*, and have dwelt upon the nature of the *continuum* and the difficulties suggested by its concept. We have concluded our study of quantity with a detailed investigation of the quantities called *space* and *time*.

### ARTICLE 3. THE ACTIVITY OF BODIES

- a) Meaning of *Activity*      b) Classification of the Activities  
of Bodies                      c) Nature of Activity of Bodies

#### a) MEANING OF ACTIVITY

To *act* is to be effective, to produce a result or an effect, or to react to a force received, to undergo or experience an effect. When we speak of the *activity* of bodies in the material universe, we discuss their natural equipment and tendency to produce results, to be effective, to "do things," and to react to what is done to them. Familiar instances of what we mean by *bodily activity* are discerned in the movement of a body from place to place; in the fact that bodies *impress* our senses as we apprehend them; in the leaping of flames; in the combining of chemical elements; in the diffusion of heat or light; in the operations of living bodies, such, for instance, as digesting, growing, sensing. We also discern *activity* in the response



of bodies to gravitation, inertia, cohesion. No one who acknowledges the actuality of the material world is in any doubt about *the existence* of the activity of bodies; he has only to look around him to find it. But many who lay claim to the name of scientist or philosopher have faulty notions about *the nature* of bodily activity. We must look into this question. First, however, it will be well to set out a classification of the activities of bodies.

b) CLASSIFICATION OF THE ACTIVITIES OF BODIES

The bodily activity manifest in the natural world around us may be fundamentally classified as *immanent* and *transient* activity.

Immanent activity is an activity which has its chief effect in the reality which exercises it. The word *immanent* literally means "remaining in," and immanent activity remains in the agent or doer which produces it. Immanent activity is always vital activity or *life-activity*. A living body, by its vital activity (such as nutrition, growth, sensation, appetite), tends, first of all, to actuate and perfect *itself*; the activity *remains in* the living body which produces it, and achieves its main effect there. And, while vital activities often have effects that reach out beyond the agent (that is, the doer, performer, producer), such effects are secondary and non-immanent effects. In a word, vital activity is always immanent activity (and, indeed, it is the only immanent activity) but it

is regularly associated with non-immanent secondary activities. Thus the vital activity of growth is immanent in the growing body; but the same activity inasmuch as it means external enlargement and expansion brings a change in spatial relations with surrounding bodies, and this change (or activity) is non-immanent in the growing body. The tree that grows outside my window will, in another year or so, cut off my view of the garden. But it is manifest that this spread of branches (considered as an *outer* effect of growth) and its effect upon the open view are non-immanent activities of the growing tree. The immanent activity is the growing process, as it goes on *in* and *for* and *by operation of* the tree itself. In the bodily world, immanent activity is the activity exercised *in, by, and for* the active body; non-immanent activity is exercised by body on other body, or by bodily part on other bodily part.

Transient activity is non-immanent activity. The term *transient* means "going over" or "going across." Transient activity goes across from the body that produces it to something else and produces its effect there. When the apple fell on Newton's head (if the interesting legend be true) the effect of the falling (which is an activity) was, first and foremost, not within the apple, but upon the startled scientist. All activities of lifeless bodies are transient activities; and, as we have seen, all non-vital activities of living

bodies are transient activities. The people we see in the street are exercising a vital and immanent activity called *locomotion*, but what we see is the outer and transient (secondary) effect of this activity. The movement of feet upon the pavement, the contact of fingers in a hand-clasp, the pursing of the lips, the stroking of the beard, all these (considered in themselves as *outer* activities or as the action of body on body or part on part) are transient activities. Nor does it signify that transient activity often goes on *inside* the active body; this fact does not make immanent activity of it. The activity of the electrons in a non-living atom is an activity inside matter, but it is transient activity none the less; it is the activity of particle on particle, of body on body. To be *immanent*, a bodily activity must be vital; it must take place not only inside the living body, but it must be *in* and *of* and *for* the living body by a spontaneous connatural operation that is unified and organic. Briefly then, immanent activity is vital activity; transient activity is non-vital activity, whether it is exercised by living bodies or by lifeless bodies.

Transient activity is of three classes, viz., *mechanical, physical, chemical*. (a) *Mechanical activity* is the activity of *local movement*, such as the turning of a wheel, the flowing of water, the rising of steam, the whirling of an atom, the drive of a piston, the revolving of the earth, the swing of bat against ball. (b)

*Physical activity* is the activity of *qualitative change*, such as the increase or diminution of temperature, the brightening or dimming of illumination, the intensifying or fading of sounds, the activity of an electrical charge or shock. (c) *Chemical activity* is the activity of *substantial change* in bodies, such, for instance, as the activity of gases combining to produce water, or the activity which changes coal to smoke and ashes. Suppose we may bring together two substances which combine to produce a new substance, and in the process of combining they generate heat and manifest a visible agitation or bubbling. Here we have all three types of transient activity: the moving together of the substances and their bubbling agitation is *mechanical* activity; the production of heat is a *physical* activity; the generation of a new substance is *chemical* activity. Consider another example or illustration in the transient activities which accompany the exercise of the immanent activity of digestion. Food is taken and mingled with juices; the mixture is actively stirred about; its temperature, color, and other qualities undergo a change; a new substance called chyle is produced. Here again we have all three types of transient activity. Chemical activity, strictly, is the activity *which affects a body in its very nature*, rather than the active production of a new substance, although such a production usually follows.

## c) THE NATURE OF THE ACTIVITY OF BODIES

There are two truths to be established in this place. First, we must show that bodily activity is not to be identified with the substance of the body which exercises it. Second, we must notice that bodily activity is really various, and is not to be summed up as always and everywhere a matter of local motion or mechanical activity.

1. The activity of a body is something which the body exercises; it is not something which the body *is*. Therefore we must not confuse *substance* with *operation*. Nor must we confuse *substance* with the *power or capacity* to operate. We do not identify the substance that we call a boy with the movements of the boy's body nor with the power he has to execute such movements. We do not define the boy as a sum or complexity of movements, nor as a collection of powers or forces for bodily function. There have been, and indeed are, scientists and philosophers who present such a definition. But it is manifest that we cannot agree with them without denying the actuality of the world in which we live and move. As we have mentioned elsewhere, the proof of the actual substantiality of the world, and the proof of the reliability of our knowing-powers in reporting the existence of actual bodily substances, are undertaken in other parts of philosophy,—in ontology and criteriology,—

but cosmology must take the world as an actual world, not a dream world, nor can it discuss at length the actuality of substances or the value of knowledge. We say, with scientific precision even in casual speech, that the boy is a substance which *does* certain things,—walks, digests, appetizes,—but we do not say that the boy *is* any of these things or a complexity of them all. With like accuracy, we say that the boy *can* walk and digest and appetize; we say he *has* the power or capacity to do these things; we do not say that he *is* such a power or capacity. And what we say here of the boy we must say of bodies in general. Bodies are substances endowed with capacities (or powers, or forces, or faculties) which they employ with true causal effectiveness in exercising certain functions or operations, that is, in exercising *activities*.—There are certain philosophers called *occasionalists* who deny the manifest fact that bodies have activities of their own, that is to say, that bodies exercise their own powers or forces in the activities we observe in them. The occasionalists declare that creatures are only the stage-setting, so to speak, of bodily activity, and that God directly produces all their activities; bodies are not the *cause* of their activities, they are merely the *occasion* which God uses to produce operations in them. This strange theory is in conflict with both conscious experience and with reason. That it goes flat against experience must be admitted by all; for it is manifest that the tree does

its own growing, the dog does its own barking (not to mention biting), the horse actually runs, fire actually destroys the fuel, hydrogen and oxygen actually combine to produce water. That the theory of occasionalism conflicts with reason is no less manifest; for how could Infinite Wisdom produce a world of beings manifestly equipped for certain functions (consider, for example, the complex and elaborate structure of the simplest plant or animal) when such equipment is utterly meaningless? No, we must admit the necessity of the *creative* and *preserving* and *concurring* and *governing* activity of God in the existence and activity of all creatures. But we cannot admit that creatures (produced, preserved, and subject to constant divine concurrence) have no proper activities of their own.

Bodily activity is exercised by means of bodily powers. No body (indeed, no creature, bodily or spiritual) is *immediately* operative; it exercises its connatural operations through *the medium* of forces, faculties, capacities, or powers with which it is equipped. Hence we distinguish three things in the active body: the body as such; its power for activity; the activity itself. The body as such, that is, the substance called body, is *the fundamental principle* or source of its activity; it is the *principium quod operationis*, the principle which operates. The power or capacity for operation (and this in most bodies is multiple) is *the proximate principle* or source of the

bodily activity; it is the *principium quo operationis*, the principle *by which* the body operates. The function or operation itself is manifestly distinct from the principles or sources whence it comes. Of these principles, the bodily substance is the *mediate* or *remote* principle; the power or capacity for operation is the *immediate* or *proximate* principle.

2. Bodily activity cannot be regarded in every instance as some phase or variety of *local movement*. Certain scientists have said that it can; these, in consequence, deny the value of our distinction of *mechanical*, *physical*, and *chemical* activities, and assert the existence of *mechanical activity* alone. Some of them go so far as to deny the existence of bodily substance, saying that this is merely an illusion due to mechanical action; which is much like saying that there is no ocean but that the waves are dashing high.

Local movement is movement in *place* or *location*. But there are bodily activities which produce not only new locations but new qualities, and there are bodily activities which work a change in the very nature of the bodies concerned in them. Local motion will suffice to explain the external circumstance of location; it will not suffice to explain the more intimate matter of inherent qualities, nor the truly internal fact of substantial change.

It is freely granted that physical and chemical activities are regularly *accompanied by* local motion,



may, that such activities are often *dependent upon* local motion. But this is not saying that physical and chemical activities are *identified* with local motion. Rubbing the hands rapidly together will produce heat, but we cannot say that the movement of the hands is their heightened temperature.

The doctrine that the world is made up of *matter and motion* is called *mechanicism* and sometimes, less felicitously, *mechanism*. Many modern theories in science are more or less purely *mechanistic*. But mechanicism is always a theory that simplifies reality out of existence; it is a simplification that amounts to falsification. It does not cover the ground; it leaves unexplained most of the activities of bodies observed in the world of everyday experience. In special, it fails on these points: (a) It does not explain the origin of motion, which is never self-originating. (b) It does not explain the transfer or propagation of motion, for a moving body (small or large) does not move another body without coming into contact with it, meeting a certain resistance, experiencing a certain resiliency in the moment of contact. Now, resistance and resiliency or elasticity are surely activities of bodies other than the motion which manifests them. We call them physical activities, but the mechanist has no name or explanation for them. (c) It does not explain the conservation of motion, which is never self-sustaining, but demands a motor-force different from itself.

Sometimes mechanism takes on a modified character as *energeticism*. Physicists speak of bodily powers as *energies*, and distinguish these as *kinetic* (actual; due to motion) and *potential* (ready; due to position). Kinetic energy is exemplified in the falling body or the swinging pendulum. Potential energy is exemplified in the poised body ready to fall, in the coiled spring ready to loose its force and make the pendulum swing. Further, physicists say that all energies are subject to certain "laws," chief of which are the law of *conservation*, the law of *intensity*, and the law of *entropy*. The law of conservation of energy holds that no energy is wasted; expenditure in one activity means acquisition elsewhere, so that the sum of energies in the world is always the same. The law of intensity or of equilibrium says that one body cannot affect another except there be a difference in the intensity of their energies; when there is such a difference, the higher intensity is lowered, the lower is heightened, until equilibrium is reached and the effect is stopped. The law of entropy says that all energies tend to turn into heat-energy, and this tends to diffuse itself in space, and so is rendered "unavailable." This tendency will continue until the world reaches an equilibrium of uniform temperature, and energy reactions will cease: thus "the world is running down."

We have no quarrel with the handy distinction of

energies as kinetic and potential. But we fail to find in these energies and in their "laws" a sufficient explanation of the activities of bodies. First of all, we cannot accept the position of the extreme energeticians who deny the substantiality of the world, deny true matter, and explain the universe in terms of a complexity of energies. We declare that energies or forces are non-substantial things, and that they cannot exist unless as the possession or equipment of actual substances. Nor can we accept the position of the more moderate energeticians who admit the existence of substantial matter but make it a poor battered subject of floating energies which have apparently no source, no support in being, no explanation for their intensity or weakness, no conceivable reason why they should act as they do. Against the energeticians we assert the claim of reason, that energy, like motion, requires a source, a motive force, a sustaining and transferring power. And, without appeal to the supernatural or preternatural, we find the required explanation in the actuality of substance (that is, of bodily substance) equipped with true forces or powers for diverse operations or activities; and we indicate such substance as the true *fundamental cause* of bodily activity, and the forces or powers of bodily substance as the true *instrumental causes* which serve to bring bodily activities into existence.

## SUMMARY OF THE ARTICLE

In this Article we have defined *activity* as it exists or is existible in the world of bodies. We have classified bodily activity as *immanent* and *transient*; we have distinguished transient activity of bodies as *mechanical, physical, chemical*. We have seen that bodily activity is a reality truly distinct from the *substance* of the body which exercises it; and that it is not to be identified with the bodily *powers* by means of which it is exercised. We have learned that bodily activity is really of three distinct types, and that the effort to reduce all these to the one type of mechanical activity is futile and ends in falsity. We have briefly discussed the errors of *occasionalism, mechanicism, and energeticism*.

## CHAPTER II

# THE CONSTITUTION OF BODIES

This Chapter discusses the *essential* constitution of bodies. It asks what makes any natural body *a body*, and what makes it an actual or *existing* body of its definite *specific kind*. Theories on the ultimate constitution of matter,—that is, of bodies and of the material universe,—may be listed under three heads, viz., *atomism*, *dynamism*, and *hylomorphism*. Before studying these systems and weighing their value, it will be well to consider the doctrine called *monism* which is hardly deserving of the name of a distinct philosophy of matter, but is rather a foggy theory of unreality which sometimes enwraps doctrines which are otherwise atomistic or dynamistic. The present Chapter discusses monism and the three philosophies of matter in the following Articles:

Article 1. Monism

Article 2. Atomism

Article 3. Dynamism

Article 4. Hylomorphism

### ARTICLE I. MONISM

- a) Meaning of Monism
- b) Tenets of Monism
- c) Estimate of Monism

#### a) MEANING OF MONISM

*Monism* is a term derived from the Greek adjective *monos*, which means “single” or “alone.” By its etymology, therefore, monism means a theory of a

world which is "all of a piece," a single substance or a single cloud of unsubstantiality; it stands opposed to diversity, real plurality, and real variety.

In this world of bodies, we are aware of *multitude* or *number*; that is, we see that there are many bodily objects round about. And we are aware of diversity *in kind* or specific nature, and of *variety*. That is, we see that bodies are not only numerous, but that they are of different fundamental kinds, and that there are many differences in externals among bodies of the same fundamental kind. We agree that all bodies are at one in point of *bodiliness*, but we do not find in bodiliness alone a complete or existible essence; a body cannot exist merely as a body and nothing else; it must be a body of a definite specific or essential kind, and, indeed, it must, to exist, be an individual body of that kind. Men and brutes and trees and stones are different, not only in point of individuality or number, but of essential kind; and within the limits of each kind we find great variety in size, color, shape, and so on; and we notice that variety extends into the most trivial of accidental differences among distinct individuals of each kind. Now, monism will not admit the actuality of fundamental diversity; it admits no *kinds* of matter, but only matter which is *one kind*. It explains the world we live in, either as illusory, or as presenting only an apparent diversity; at most, it will never concede that diversity is fundamental, that is, *specific* or *essential*.

## b) TENETS OF MONISM

There exists only one actuality, one existing kind of reality. What this reality is, is variously explained by monists. The materialists call it *matter*, and the cruder materialists understand by *matter* a three-dimensional (or, modernly, a four-dimensional) substance,—the bodily world of our experience. They say that the world is one great lump of stuff out of which various things are shaped; this stuff is “all there is”; there is nothing non-material in existence, nothing but a matter-world accidentally differentiated. In a word, the world is one pan of dough; the different things in the world are merely differently-shaped biscuits, but all are of the same dough. More: there is no cook or baker. The dough is self-shaping. In last analysis, then, the solely existing matter must be the Necessary Being or God. Thus, *materialistic monism* is always *pantheism*. Indeed, all types of monism are more or less perfectly *pantheistic*.

Monism has a great variety of expressions, even though it is in itself the foe of real variety. The one actuality is called *substance* by Baruch Spinoza (1632–1677), and it is endowed with infinity of *extension* and of *thought*. Fichte (1762–1814) said that the one existing reality is the “Absolute Ego,” or universal *I-ness*, which becomes aware of its dreams or thoughts or mental images (and these are our bodily world) and then realizes that, after all, these are not different or distinct from itself. Follow-

ing upon this vague (and pantheistic) doctrine, von Schelling (1775–1854) made the one actuality a *universal reason*, and Hegel (1770–1831) made it an indeterminate universal *idea*. Schopenhauer (1788–1860) explains the universe as “Will” unfolding and manifesting itself in individual things. Von Hartmann (1842–1906) says the one reality is “The Unconscious” which gradually comes to awareness by “will” and “idea,” and projects the image-individuals which we call the various world. Bergson (1859—) says the only reality is “becoming” or “duration” and this is brought into actuality by an inner “vital impulse” (*élan vital*). Spencer (1820–1903) holds that the one reality is “The Absolute” which is also “The Unknowable,” and reduces the fields of science and philosophy to apparent happenings (*phenomena*) which reveal themselves as subject to a universal law of evolution.

### c) ESTIMATE OF MONISM

It is manifest that the monistic theories mentioned above are, with the exception of crude materialism, theories of unreality. They explain the world by explaining it away. Only the materialists come to grips with a bodily world which is “on its own,” which is actually here in something of the manner in which normal consciousness apprehends it. Of course, materialism cannot stand, for, as we have seen, a bodily reality cannot be self-existing or necessary; it de-



mands its causes; it is *ens ab alio*, not *ens a se*. And the First Being is necessarily infinite, whereas matter is necessarily finite. For the rest, Spinoza makes matter infinite, and adds to this absurdity a second one, viz., the existence of *thought* in matter. Fichte, Schelling, Hegel, and the others, deny the actuality of the world they attempt to explain. They are like the man who should say, "What you see doesn't exist, but I'll tell you what it is."

Monism is an unjustified over-simplification of the problem of reality. It does not come to grips with the problem; it makes solution impossible by denying the terms of the problem. It does not explain; it explains away. Thus it is unreasonable, and therefore unacceptable to scientist or philosopher.

Monism is not only in conflict with reason, but with the data of direct experience which are the foundation of all our knowledge. Any theory that denies the trustworthiness of consciousness and sensation, in their direct and simple findings, cuts all basis from human certitude and leaves us to the insane silence of skepticism.

#### SUMMARY OF THE ARTICLE

In this brief Article we have defined the term *monism* and have learned what monists hold to be true about the bodily world which is the material object of cosmology, and the first field of all our knowl-

edge. We have found monism, whether *materialistic*, *idealistic* or *transcendental* (as the vague German theories may be called), unacceptable as in conflict with reason, with consciousness, and with direct human experience.

## ARTICLE 2. ATOMISM

- a) Meaning of Atomism
- b) Tenets of Atomism
- c) Estimate of Atomism

### a) MEANING OF ATOMISM

*Atomism* is a doctrine which proposes to explain the bodily universe by pointing out the fact that bodies are made of smaller bodies. And, while we acknowledge the manifest fact, we are not satisfied with the inadequate explanation.

It must be clearly understood that we are not now discussing *the atomic theory* which is the currently accepted *science* of matter. We are discussing the theory of *atomism* which is an exploded *philosophy* of matter. We recognize the value of the atomic theory. We are quite ready to acknowledge that chemically compounded substances are made up of minimum-particles called molecules, and that molecules are made up of chemically simple particles called atoms, and that atoms are made of protons and electrons and imponderable matter. This, after all, is plain science fresh from the laboratory, and has nothing directly to do with philosophy. But atom-

ism proposes itself as a philosophy, and with this philosophy we are immediately concerned.

The atomic theory may be illustrated as *the description* of a house by an enumeration of its parts, down to the smallest items used in the building. Atomism is illustrated in *the explanation* of the house in terms of its parts, without reference to architect or builder, and without reference to forest or lumberyard or quarry or brick-works. Very naturally, we may accept the description of the house as true and valuable, and at the same time we may reject the explanation of the house as silly and inadequate. In a word, we accept atoms (and the atomic theory); but we reject atomism.

*Atomism* and *atom* are words taken from the Greek *atomos* which means "uncut" and even "indivisible." The indivisibility here indicated is structural indivisibility or, in a very precise sense, physical indivisibility. For when one has divided and subdivided a bodily substance until available instruments can make no further partition, one has come to a minimum-particle of the substance. This minimum-particle is, as a quantity, still further divisible, and indefinitely so, for it has halves and quarters and hundredths and millionths, and so on endlessly. Hence, when we call a particle of bodily substance *indivisible* we mean one of two things: we mean either that we have no means of making a further actual division of the matter, or we mean that fur-

ther actual division would affect the very nature of the material handled and change it into another specific kind of bodily substance.

When the term *atom* was first applied to the minimum-particle of a chemically simple substance, it was thought that the word was just and properly descriptive; it was thought that the atom could not be divided; that it was really something uncut and uncuttable. But modern science has "cut the uncuttable," so to speak, and the atom now has its own "building stones," as we have noticed in another place. However, the term has been retained even if its original literal meaning is now no longer justified. This comment refers, of course, to the atom as handled in physical science. In the philosophy of matter here considered (that is, in atomism) the atom still means an uncut and uncuttable minimum of matter which is, in one way or another, the cause and the explanation of the bodily world.

#### b) TENETS OF ATOMISM

There are two types of philosophical atomism, *mechanistic* atomism and *dynamistic* atomism. Both hold that matter is to be explained ultimately in the fact that bodily substance is made up of minimum-bodies, called atoms, which coalesce to form the world and all the bodily things in the world, lifeless and living. Both hold that the atoms are all of the same specific *kind*; that is, both types of atomism

teach the *homogeneity of matter*, which means that there is no *essential* difference between clod and plant, between plant and animal, between brute and man; the world is "all of a piece." But after agreeing that matter is made of *atoms* which are of the *same specific kind*, the two schools of atomists part company. We shall speak of their tenets in separate paragraphs:

1. *Mechanistic Atomism* (also called *Pure Atomism*) holds that the atoms or minimum-amounts of bodily substance differ only in size and in motion; they have no indwelling power, force, or faculty, by which they act; they are guided by no tendency, purpose, or finality, in the unions which, as a fact, they effect; they do not lose their identity or undergo substantial change when they coalesce to form natural bodies, for in all their movements their own being is invariable and constant. The movement of the atoms is an external or extrinsic movement, a thing *undergone*, a thing *communicated* to the atoms from something outside themselves. Since the atoms have no force or power of their own, they cannot exercise any positive activity, and therefore all their movement is a matter of applied outside force. Hence pure atomism postulates *a mover* or *a motor-force* outside the atoms; and ultimately this must be the First Mover or God. Pure atomism is, therefore, necessarily *theistic*; it presupposes a God. Atheists, indeed,

like the Roman poet-philosopher Lucretius, have held by the theory of atomism, but they do so only by ignoring the *cause* of motion and focussing upon the *fact* of motion as an explanation of the universe. But, acting thus, they deify matter itself (at least equivalently), and become *pantheists*. Some Christians, like Descartes and Secchi, have professed pure atomism as the philosophy of the bodily world, but these do not attempt to explain man's spiritual activities (intellection and volition) in terms of atoms and local motion; indeed, Secchi limits his atomism to the inorganic or non-living world.

Notable names associated with the history of pure or mechanistic atomism are, among the ancients, Heraclitus and Anaxagoras of the 6 century B. C.; Democritus of the 5 century B. C.; Epicurus of the late 4 and early 3 century B. C.; Lucretius of the first century B. C. In Christian times, Gassendi (1592–1656) and Descartes (1597–1650) were proponents of atomism.

2. *Dynamistic Atomism* teaches that the atoms or minimum-particles of bodily substance are endowed with an indwelling force or power of motion. Some atomists of this type say that the motion of atoms is due to a twofold power of attraction and repulsion; others find a sufficient explanation of motion in the repulsive power alone. Some say that the atoms come into immediate contact to form bodies; others declare

that the atoms are always separated, even in the most solid of bodies, by vacuum-intervals or vacuoles,—and thus these latter atomists teach the actuality of *actio in distans* which we have already noticed as a physical, if not an absolute, impossibility. Dynamistic atomism, like pure atomism, holds that atoms are changeless and non-corruptible; they keep their being, constant and invariable, in all combinations.

Many atomists of the dynamistic school admit that force-endowed atoms will not explain the phenomena of life, at least of human life. These affirm the existence of an entelechy or soul which unites with certain atom-formed bodies to communicate activities of a superior nature. But, apart from a few Christians, these philosophers seem to make the life-principle an adjunct joined *accidentally* to the living body. We, on the contrary, hold that the life-principle, in every living body (plant, brute, man), is *a substantial form* which joins with matter to constitute the living body as a single if compound substance.

### c) ESTIMATE OF ATOMISM

To say that natural bodies are made up of smaller bodies may be perfectly true, and may have a scientific value. But such a statement does not even start the philosopher upon his quest. The philosopher wants to know what a body is, and the small body sets him the same problem as the larger body of which it is a part. Hence no theory of atoms can be

a philosophy. It still leaves unanswered the penetrating philosophical question, *What makes a body a body?* Thus, without going further, we may reject at once both types of atomism described above, and presented as an ultimate explanation of the universe.

In special, we may point out the following facts which render atomism inadmissible as a philosophy of the bodily world:

1. If all atoms are of the same nature (as atomists declare) it is impossible to explain a various universe. The world presents to our knowledge a great number of bodies that differ *essentially*, and these manifest properties and activities that are *different* and often *opposite*. Yet atoms which are all of one essential kind, and which retain their nature unimpaired in every collection, would constitute a world in which *essential difference* would be utterly impossible. Hence we say that atomism is to be rejected because it fails to account for the existence of essentially different bodies, and of bodies with essentially different properties.

2. Pure atomism holds that motion, externally applied, gathers atoms into collections that make up all the various bodies of the world. There is, however, much to contradict this simple statement. Take the one instance of *chemical affinity*, which every scientist, even the tyro, recognizes as a palpable fact.



By force of this affinity certain bodies are drawn into combination with certain other bodies; and this in a constant manner, and according to fixed and definite proportions of the bodies in question. But if pure atomism were true, any body would combine with any other, and we could not observe any special affinities or note their precise requirements. Further, pure atomism contradicts itself in saying that bodies have no forces or powers of their own, for it teaches that atoms cannot be divided, that they are indestructible. Now, this is only saying that atoms resist division, and such resistance is a force or power. It cannot be retorted that this is no special power, but only a phase of being, since being stands opposed to non-being by the fact of actuality or existence. No, for there is here no question of being, but only of the quantity of atoms. Quantity does not perish when it is divided; the total quantity is the same in the undivided body and in the sum of its divided parts. And to say that atoms resist division of their quantity is to say much more than that they hold on to their being. It is to assert a force or power in atoms, which, by the terms of pure atomism, can have no force or power. In a word, it is a neat self-contradiction. Now, a self-contradictory system cannot be accepted as a sound philosophy.

3. Dynamistic atomism, admitting some indwelling force or power in atoms, keeps this a definitely

mechanical power, that is, the power of local movement. But there are many things in the world (apart from the activities of living things) which mere local movement is powerless to explain. Light, electricity, radioactivity, affinities, are things which involve mechanical action or local movement, but which have, over and above, characteristics which are altogether unexplained when local motion has had its full hearing.

#### SUMMARY OF THE ARTICLE

In this Article we have defined *atomism*, and have made a clear distinction between the scientific theory of atoms, or *the atomic theory*, and atomism or *the atomistic philosophy*. We have distinguished two types of atomism, *pure* or *mechanistic* atomism and *dynamistic* atomism. We have found both types inadmissible because they leave the philosophical problem of the bodily world not only unsolved but unattacked. Moreover, we have found in both types of atomism inadequacies of explanation and self-contradiction of doctrine.

#### ARTICLE 3. DYNAMISM

- a) Meaning of Dynamism
- b) Tenets of Dynamism
- c) Estimate of Dynamism

##### a) MEANING OF DYNAMISM

The term *dynamism* is taken from the Greek word *dynamis* which means "force" or "power." We have

several words in English which derive from this source; for instance, dynamic, dynamo, dynasty. Thus *dynamism*, by reason of its etymology, suggests some theory of power or force as the explanation of the material world.

#### b) TENETS OF DYNAMISM

Dynamism is not a clear-cut system, but has various forms, and perhaps its most notable effects are found in the influence it brings to bear on scientific and philosophical systems which are not purely dynamistic. However, it is possible to select out a few points of doctrine which all dynamists (pure or mixed) defend. Thus dynamism holds: (*a*) that bodies are made up of non-extended, non-quantified elements; (*b*) that these elements are *points of force or power*; (*c*) that these points attract one another up to a certain stage or distance, and then hold one another off; thus they act upon one another across a vacuum or void (*actio in distans*); (*d*) that the points of power are changeless, undergoing no transformation of nature when they combine to form bodies.

Notable names associated with the history of dynamism are, among the ancients, the Pythagoreans of the 6 century B. C.; Zeno of Elea of the 5 century B. C.; and, in a very limited way, the great Plato of the 5 and 4 centuries B. C. In modern times, Giordano Bruno (1548–1600), Wilhelm Gottfried Leibnitz (1646–1716), Christian Wolff (1679–1754), Giu-

sepe Boscovich (1711–1787), Immanuel Kant (1724–1804), Eduard von Hartmann (1842–1906) are listed as dynamists in their interpretation of the nature of bodies.

### c) ESTIMATE OF DYNAMISM

Dynamism contradicts the definition of *substance* and turns the world into a non-substantial reality. For it defines bodies in terms of their *accidents*, and thus makes the universe a great mass of accidents without anything substantial in which to inhere. A power or force is in itself *a quality*, and leads on to function or *action*; and philosophy lists both *qualities* and *actions* as accidents, that is, as realities which are not regularly suited for existence *themselves* (that is, *alone*), but for existence as the marks, limitations, characterizations, or modifications of something else.

Again, dynamists either admit the real extension of the universe, and of bodies in the world, or they call the extension merely apparent. (a) If they admit real extension, they are wholly illogical, for extension cannot be the product of inextended elements: zero added to zero will still be zero. Nor can they affirm that the inextended points of power (which are the constituents of all bodies) are actually held at a distance from one another and thus effect a truly extended body; for inextended points *with nothing whatever between and among them* still results in an inextended totality. (b) If the dynamists call the

world a mere apparent world, they have still to explain the apparition, and this they cannot do in terms of their own philosophy. They say,—some of them,—that we get the impression of continuity in bodies from the fact that the point-forces are in perpetual motion, just as we get the impression of a continuous ring of fire from a torch that is whirled rapidly in a circle. The illustration is objectionable on two counts: First, the flame of the torch is actually extended; there is no illusion about that to start with; whereas, according to dynamism, the whirling point-forces are inextended and thus invisible in themselves, and they are certainly not rendered visible by being moved rapidly about. Secondly, an illusion is due to a misapplication of actual experience; before we can have an illusion of continuity or solidity, we must have had some experience of what actual continuity or solidity is; but dynamism renders this prerequisite experience impossible, and hence destroys the possibility of illusion.

Dynamism openly professes the activity of point-forces on one another *across a void*. This *actio in distans* means activity without a channel to convey the activity. We have already considered this action-theory, and have found it inadmissible.

Finally, dynamism cannot explain the unity of organic parts in a living body; it cannot explain the unity of constituting parts in molecule or atom in lifeless matter. It cannot explain unity at all. For

points of force, inextended and always invariable in nature, cannot really enter upon unity without compenetration. To avoid this, *actio in distans* has to be admitted, and *actio in distans* (could it exist) is certainly fatal to organic or inorganic unity.

The extreme type of the modern "electrical theory of matter" is neither more nor less than dynamism. Most modern physicists accept the theory of electrically-charged particles of matter, and this is quite intelligible and does not come into conflict with reason. But the extremists do not say that the particles of matter (protons and electrons) are electrically charged; they say that these particles are no true particles of matter at all but only points of electric power. This, as we have said, is dynamism pure and simple, and is to be rejected for the reasons alleged above.

#### SUMMARY OF THE ARTICLE

In this Article we have defined *dynamism* literally or *nominally*, and we have also given its *real* definition which presents it as a system or philosophy which attempts to explain the world of bodies in terms of non-extended, non-quantified, points of force or power acting and reacting among themselves across a void. We have found this philosophy deficient and unacceptable for many reasons: it conflicts with the findings of sense and of reason; it

denies, at least equivalently, the substantial character of bodies and of the world; it involves in itself the self-contradictions of "extension born of inextension" and of "phenomena without any stage on which to appear"; it teaches the impossible doctrine of *actio in distans*; it fails utterly to explain continuity or unity in bodily being and function. We have noticed that the extreme form of the modern "electrical theory of matter" is a dynamistic system, and is, for this reason, inadmissible.

#### ARTICLE 4. HYLOMORPHISM

- a) Meaning of Hylomorphism    b) Tenets of Hylomorphism  
   c) Estimate of Hylomorphism

##### a) MEANING OF HYLOMORPHISM

The term *hylomorphism* is a combination of two Greek nouns, *hyle* "matter," and *morphe* "form." It is, therefore, a "matter and form" theory. It is the philosophy which seeks to explain the essential constitution of a natural body in terms of a twofold principle, one material and indeterminate, the other formal and determining.

It is supremely important that we understand the name *hylomorphism*, and the doctrine which it indicates, with full thoroughness. We must carefully avoid taking the terms *matter* and *form* in a loose, casual, or colloquial sense. These terms are highly technical, and, in their present use, they must be un-

derstood in strictest philosophical meaning. For this reason, it may be allowed us to approach the study of hylomorphism by making a journey of investigation through the wide and intricate domains of those much used and much abused words, *matter* and *form*. Perhaps no other words in the English language are more commonly used, more various in meaning, more loosely understood.

1. *Matter* is a word capable of the widest variety of meanings. Let us look at just a few of these: (a) *Matter* is often used as a synonym for *body*; thus we speak of ponderable and imponderable matter, of solid and liquid matter. (b) The word *matter* sometimes means any object of thought, discussion, study, or experience. Thus a person says, "I have no opinion on the matter"; "We shall take up the matter with the authorities"; "This is a matter of importance"; "Spiritual experience is not a matter for laboratory experiment." (c) Sometimes *matter* indicates *importance*, as in the sentence, "It matters very greatly what a man believes"; "It is no matter whether you be rich or poor"; "The point you raise is not material to the discussion." (d) Often the term *matter* which is literally the opposite of things *spiritual*, and in contrast with *form*, is used in close combination with these terms, as in the expressions, "We are interested in spiritual matters"; "This is a matter of the spirit, not the body"; "This is a matter of form"; "These



formal matters do not concern me.” Of course, this employment of the term *matter* is only another instance of its use in the sense explained above under *b*, but the manner in which careless colloquial usage thus tangles and confuses the term with its opposites seems to call for special notice. (*e*) Often *matter* is used to indicate *meaning* or *information* or *data* as contrasted with the manner or style of expression. Thus one may say of a treatise, “Many fine words, but little matter”; “Your matter is satisfactory, but your style is very crude”; “The matter is all here, but where is the logic that should mark its presentation?”

Now, in our present study *matter* (and its adjective *material*) can have but one fundamental meaning, although that meaning has a *primary* and a *secondary* implication. Matter, in primary sense, is the basic stuff out of which a bodily being is made. Matter, in secondary sense, is an actual existing body. Thus we have *primary matter* and *secondary matter*, or, in the ancient Latin terminology, *materia prima* and *materia secunda*. *Materia prima* or *primary matter* is usually (and less elegantly) called *prime matter*. In the system of hylomorphism, the matter considered is *prime matter*.

*Prime matter* is the substrate common to all bodily being. A man, a dog, a tree, a molecule of coal, an atom of hydrogen, are all *bodily*. Each of these realities is *a* body. Each is an *actual existing* body. That is, each is *materia secunda* or secondary matter.

But all the bodies mentioned are *bodies*. They have something *in common*, although, as finished realities, they have essential differences. In other words, as *secondary* matter (that is, individual bodies) they are distinct and different; in point, however, of *prime* matter they are not distinct at all—one is *body* as truly and completely as any of the others or as all of the others together. It is only because some *determining* element (different in each case) *has combined with prime matter in a substantial way* that we have the different bodily substances, viz., the substances of man, of dog, of tree, of coal, of hydrogen. The *prime matter* which is the common substrate of all bodies, has in itself no determinateness, nothing to make it *actual*, nothing to make it this or that *kind of body*, but waits, so to speak, for the coming of the substantial determinant which will give it actuality as *materia secunda*, a finished body of definite type actually existing. Prime matter is thus *the subject* of the determining element which gives it existence as a substance. Thus we may define prime matter as follows: “A passive and indeterminate substantial principle which is the subject of all substantial determinations and substantial changes, and which remains changeless *in itself* under such changes.” The molecule of coal (a secondary substance, that is, an existing body) is made up of prime matter and the determining element or principle which makes it *coal* and no other substance. Now, burn up the coal, and

the secondary substance is changed; it is reduced to ash and smoke. But the prime matter *in itself* is not changed at all. It *supports* the change, so to speak; it is the same amount of prime matter which *was* determined or set in the substantial character of coal; and now it *is* set or determined as other substances; but *it is the same prime matter* throughout.

2. *Form* is a term which, like *matter*, has a great variety of meanings,—of meanings that are different and sometimes even opposite. Hence we must carefully determine the sense in which the word is to be used in our present study. To illustrate the various senses in which the term *form* may be employed, consider these few instances of its use: (a) *Form* is frequently used as a synonym for outline or shape, and we speak of the ovular form of a race-course, or of the symmetrical form of a drawing. (b) Sometimes *form* means a plan or program, a record, or a questionnaire. Thus, a performer is said to go according to form, a race-horse is judged by the form-sheet, an applicant for a position is requested to fill up a form. (c) The word *form* is often used for *good condition*, and a golfer is said to be “in form” or “at the top of his form.” (d) Frequently the term *form* suggests something unimportant, or something easily done, a requisite but facile unwinding of “red tape.” Thus, certain procedures are called “questions of form” or (confusion worse confounded) “mere matters of

form.” (*e*) The adjective of *form*,—that is, *formal*,—is often employed to indicate a certain dignity, or a certain decorum involving precise details of dress or conduct. Thus we speak of “formal dress,” of “a formal occasion,” of “a formal introduction.”

To philosophers, *form* is a word of tremendous meaning; far from meaning *unimportant* (as in the phrase, “a mere question of form”) it means the exact opposite. It means something thunderingly important. It means that which *determines* a thing, sets it in its being, in its essence, in its accidents, in its actuality. Any *determining* element in a reality is a *form*. And (as in the present study) when we speak of bodily substances, the term *form* means *substantial form*, that which makes a bodily substance an existing reality (that is, an *actuality*) of the precise essence and nature that we find it. A man, a dog, a tree, a molecule of coal, an atom of hydrogen are all *material*; they are all *bodily*, and this fact is due, fundamentally, to their common element or *prime matter*. But these bodily things *exist*, they are *actual*, they have each their own essential or specific *kind* of being; each is essentially and substantially distinct and different from all the others. Now, it is the *substantial form* of man which makes the one bodily being a human being; it is the substantial form of animal which makes this other body an animal; it is the substantial form of plant which makes the third body a plant; it is the substantial form of coal which makes

this molecule a molecule of coal and not of any other substance; it is the substantial form of hydrogen which makes this atom an atom of hydrogen and not, for instance, an atom of calcium. That which sets and determines a substance in its actual being, and makes it a substance of this precise kind or essential nature, is its *substantial form*.

Of course, man, dog, tree, coal, hydrogen, have *accidental* forms too. The human being will be of a certain age, sex, size, nationality, condition of health, temperature, location, and so on; at any given moment, he is marked and determined by many points of fact or actuality. But these many and variable forms do not constitute his substance as *this kind of actual body*. They are *accidental* forms, not *substantial* forms. Similarly, the tree will be of a certain size, age, botanical class, location; the molecule of coal will be in a certain place, at a certain time, it will have its certain temperature at any given moment; so too with the atom of hydrogen. But these determinants (that is, forms) do not make the tree, or the coal, or the hydrogen, the *substance* that each is; they are *accidental* forms, not *substantial* forms. It is the commoner doctrine of scholastic philosophers that each individual body has only one substantial form, and a plurality of accidental forms. We must be careful to understand the meaning of the phrase "each individual body." For what we mean by the phrase is *a continuous body*. Now, any living body is con-

tinuous throughout its living structure; and a lifeless body is strictly continuous at least in its minimum-particles.

We may define substantial form (with which alone we are concerned in our present study of forms) as "An active and determining substantial principle which is the term (that is the goal, the end, the completed being) of all substantial changes in bodies, and which constitutes each individual continuum in its essential actuality."

Hylomorphism is the doctrine of Aristotle (4 century B. C.), of St. Thomas Aquinas (1225-1274), and of Scholastic philosophers generally.

#### b) TENETS OF HYLOMORPHISM

*Hylomorphism* is the philosophical doctrine which explains the essential constitution of bodies in terms of a twofold substantial principle, the one principle passive and indeterminate (*prime matter*), and the other principle active and determining (*substantial form*).

Hylomorphism teaches that *prime matter* has, in itself, no determinateness of any kind. It cannot exist *alone*, for existence is a determinate state of being, and hence *a form*, whereas *prime matter* is, in itself, wholly without form, and is contrasted with form. *Prime matter* is, therefore, *pure potentiality*, that is, it is an unmixed readiness or capacity for being actualized by on-coming *form* which fuses with it to

bring to existence an actual body of a definite essential kind. But prime matter is not an abstraction of the mind; it belongs to the order of substances, granted it is a highly imperfect substance, indeed the most imperfect substance. For an imperfect substance is one that regularly requires substantial union with some other substance to give it existence in a specific kind of actuality. We may find a homely, and somewhat unworthy, illustration of prime matter in the picture of a citizen who, by reason of sickness or other cause, cannot stand upright; but when supported by a kindly companion, he is quite able to assume an erect posture. The illustration is indeed only a weak analogy drawn from accidentals, but it may be profitably suggestive; it may help in the understanding of the statement that prime matter is not mere nothingness, nor mere abstract possibility, but is a most imperfect substantial reality which requires form to bring it to actuality, that is, to existence in a definite kind of bodily being. Prime matter is, in bodies, the principle of their passivity (that is, their capacity for receiving accidental forms, and also for receiving new substantial form which drives out the old substantial form and induces substantial transformation, as illustrated, for instance, in the burning of coal). Prime matter is thus the principle of the inertness or inertia of bodies, and of what philosophers of an older day called their "indifference" to the forms that might possibly actuate bodies, chang-

ing them accidentally or transforming them substantially. Further, prime matter is the principle of the quantity or extension of bodies. For while every substantial form requires a definite minimum of matter for its subject (that is, for constituting a body), and while this minimum quantity of matter will be various for various kinds of bodies, it remains the fact that quantity *as such* affects the matter rather than the form; this may be illustrated in the fact that a small baby which presently becomes a large man or woman is not changed substantially by the change in quantity, but retains the identical substantial form throughout growth. Rightly, then, do we assert that the prime matter of a body is *the proper subject of quantity* in the body, and that quantity is the *proper accident* of the matter rather than an accident of the form. Of course, since prime matter cannot exist alone, but only in an *in-formed* condition, it is true that it has no quantity on its own account; but the point we make is that *in existing bodies* (or, if the phrase be preferred, in *in-formed matter*) quantity is attributable to the matter and not to the form as such, even though the form brings to the matter its *actual* capacity for quantification, and enables that capacity to be realized in fact.

Hylomorphism teaches that *the substantial form*, in each individual (that is, continuous) existing body gives to the body its *essential or specific kind*. It is the substantial form which makes this body a



human being; it is the substantial form which makes that body a plant; it is the substantial form which makes that other body a molecule of coal and not some other substance. Further, it is the substantial form of a body which determines its *nature* or its operating capacity and its active character. For, while it is the compound of matter and form,—the *substantial composite* which we call *a body* or *materia secunda*,—which exercises the operations or activities proper to such a being, it is the substantial form which is the root-principle of these activities. It is the whole man that walks and digests; it is the complete tree that grows. But the man does not walk and digest because he is material, but because he is *an actual bodily being of this essential kind*, and it is the substantial form of man which makes him so. The tree does not grow because it is material; indeed, many material things (that is, bodies) do not grow; the tree grows because it is constituted *as this kind of bodily substance*, and it is the substantial form of tree which makes it so. Again, it is the substantial form which gives direction, tendency, finality, to the activities of bodies. We have yet to speak of finality in bodily being and activity, but it is manifest here that,—granted such finality exists,—it is the form and not the matter of bodies which is its root-principle. For the form is the root-principle of the activities themselves, and, in consequence, it is the root-principle of all involved in the activities, such

as direction and tendency. Matter in itself is indeterminate and "indifferent," and hence has not, *of itself*, any direct influence upon activities or their drive or direction.

About prime matter and substantial form, the following points are to be carefully noted:

1. Prime matter has not in itself any determinateness, and therefore we cannot speak of it as of *kinds*, or even say, with precision, that it is *of one kind*. Still, the limitations of language impose upon us the necessity of saying that prime matter is *uniformly the same* in its nature throughout the various universe. In other words, prime matter, considered alone (although it must be remembered that it cannot *exist* alone) is a single sort of reality.

2. Prime matter is *dependent* on substantial form for existence and for specific determination. In other words, prime matter cannot exist unless substantial form combine substantially with it to give it actuality in this or that essential kind of reality in this or that definite individual. For this reason the substantial form is called *the principle of specification*. It is that which *specifies* a body; that is, it is the substantial reality which determines the *species* or *essential kind* of the body. Now, bodies cannot exist *in universal*; there is no such thing in nature as an existing *body-*

*in-general*; for bodies to have existence *individuality* is required; bodies can exist only as these and those concrete individual actualities. Of course, the mind understands what *body* means (*a* body, *any* body, *every* possible body) and can define *body* with a single definition which expresses the essence of all individual bodies, actual and possible. For the mind understands *in universal*. But, as we have said, concrete existence cannot be *in universal*, but must be *in individual*. Therefore, when we say that the substantial form constitutes a body in its specific or essential kind, we say at the same time that the substantial form constitutes the body of that kind *as an existing individual body*. Still, the fact that this individual body (say, this tree) is *this* body and not some other individual body *of this kind*, is due to the fact that the substantial form is united substantially *with precisely this matter* to which it gives *actual* quantity, and not with some other "portion" of matter to which it would give actual quantity. In other words, if the substantial form of this tree has actualized prime matter in joining substantially with it to constitute *this* tree, the same substantial form, in joining with some other "portion" of prime matter, would have constituted *another* individual tree of this kind, but not precisely *this* tree. Therefore, although all the actuality of the tree is referable to the substantial form, and even the actual individuality of the tree is so referable, the passive matter has played a part

inasmuch as it was precisely *this* matter which the form actualized. And, being actualized, the prime matter took on quantity, and exists as *this precise quantified matter* (not necessarily this precise quantity or amount of matter—for the tree grows and does not lose individuality by added size, quantity, or amount). Now, it is as *this precise quantified matter* that the tree is *this individual tree*. For this reason we say that *quantified matter* is *the principle of individuation*. The old Latin phrase is *materia signata quantitate* or simply *materia signata*; that is, “matter marked by quantity,” or “quantified matter,” is the principle of individuation in a body.

3. Substantial form depends, in its own way, upon prime matter. If the substantial form be incapable of existence *alone*, it requires union with matter to give it existence. Of course, what *exists* is then “in-formed matter,” that is, the composite called *a body*. But the matter exists in the body, and the form exists in the body, and neither exists (or, in the present case, neither *can* exist) alone. A substantial form which thus depends upon union with prime matter for its existence is called *a material form*, not because it has matter in its own make-up, for it has not, but because of its *dependence* upon matter for existence in an existing body. All substantial forms in the bodily world, with the single exception of the human substantial form, are *material* forms. For sake of il-

illustrating the interdependence of prime matter and material form, consider again the ignoble picture of the citizen mysteriously incapable of standing alone. Now, suppose that his charitable friend is in the same regrettable condition. Neither can stand alone. But, shoulder to shoulder, they *both* can manage it, and can make their way along the street. An interesting case of "united we stand," etc. Similarly, prime matter and material substantial form are each powerless to "stand alone"; neither is a complete substance; neither is capable of independent or individual existence. But "together they stand"; together they constitute an actual and complete substantial composite, that is, an actual body.—The human substantial form is, —as philosophical psychology proves,—the spiritual soul. As a substance it is *complete*; as a man it is *incomplete*, for the soul is not the whole human being, but only the most noble *part* of a human being. The soul is not *generated*, that is, substantially produced by a transformation of existing substances; it is, in each instance, directly created by God. This point is amply proved in psychology; here we cannot enter upon a proof. And the moment of the soul's creation is the identical moment of its substantial joining with the matter which it makes a human body; technically we say, "the moment of the soul's *creation* is the moment of its *infusion*." Therefore, the soul does not pre-exist to its body. But the soul endures after leaving its body. Since the soul is spiritual, it is naturally

deathless or immortal. It does not depend upon matter for existence since it is not a *material* form, but a *non-material* or *spiritual* form. Hence, the human soul (that is, the human substantial form) does not depend upon matter for its own existence as a soul or for its own proper spiritual operations, but only for existence and function as the actuating form of an existing human being; its dependence on matter is thus extrinsic, not intrinsic.—It is manifest from the foregoing considerations that, whereas prime matter is not diversified as of different kinds, substantial forms are diversified. There are material substantial forms and non-material substantial forms. In this world, the only non-material substantial forms are human souls. In the celestial world the angelic beings are *pure forms*; they are pure spirits, with nothing material about them in structure or dependency. And, since matter is the principle of individuation,—and angelic beings lack all matter,—the angels are not, strictly speaking, individuated; they are not *individuals*, but each angel is a *species*, that is, a distinct essential kind of spiritual substance. The angels are *complete* substances, both as forms and as essences. Human souls which have been severed by death from their respective bodies are individuated by the *real relation* which each bears to the quantified matter which it “in-formed” in earthly life.—Material forms are diversified as sentient forms, vegetal forms, and mineral forms. The term *mineral* is ap-

plied to the substantial form of any non-living bodily substance.

4. In any actual body, the substantial form is *one* in itself or actually. Some of the minor substantial forms (sentient, vegetal, mineral) are *potentially* multiple. That is, the individual body, which is a single continuous quantity, is actuated by only one substantial form, but *it may be divided* into a plurality of individual bodies of the same species, and each of the bodies so resulting has then its own substantial form. Thus a rose-bush may be cut and divided into several rose-bushes. The undivided bush has only one substantial form *actually*; but, in the plant in question, the bodily substance is capable of division in such wise that life may be preserved in each of the parts; therefore, the plant has a potentiality or capacity for such division, and its substantial form is said to have a parallel potentiality or capacity by reason of its dependence upon the matter of the plant. Thus we say that the rose-bush is actually one, potentially many; similarly we say that *the substantial form of the rose-bush* is actually one, potentially many. Substantial forms of the higher type (human souls, and the substantial forms of most animals) are never multiple, either actually or potentially; each of such forms is necessarily *one* substantial form, having no capacity for division according to division of the body-structure (or mat-

ter) on which it, intrinsically or extrinsically, depends.

5. In every living body, the life-principle (*soul, entelechy, bathmic force, plasmic energy*) is the substantial form. When this form is driven out by the death of the living body, the remaining structure is substantially different from the living body. The corpse of a man is not a man; it is a package of various inorganic (non-living) substances, and naturally tends to break up into these, and so the body decomposes. Hence, a corpse is not a single substance but a mixture of many substances, whereas the living man, actualized by the spiritual substantial form called the soul, is a single, if compound, human substance.

6. Substantial change involves the incoming of a new substantial form and the simultaneous outgoing of the old substantial form, the prime matter remaining. Substances manifest their character by their properties, and when these are wholly changed we know that the substance has changed. When, for example, a living body (whose properties are vital functions, heterogeneity of organically united and interdependent parts) is changed to a dead body (whose properties are non-vital activities, unrelated groupings of homogeneous parts, equilibrium and rest) we know that substantial change has occurred: the living body has been changed into a plurality of



lifeless bodies. Again, when hydrogen and oxygen are brought together in due proportions under a proper agency, the gases are changed into water. The properties of water are not the same as those of the gases, and therefore we know that the change is a change of substance; the two substances (hydrogen and oxygen) have become a single compound substance called water. Substantial change is *instantaneous*. Inasmuch as it is the production of a new substance (or substances) it is *generation*; the same change, inasmuch as it is the reduction or removal of the old substance (or substances) is *corruption*. The corruption of one substance is the generation of another, and vice versa.

7. When a compound substance (such as water) is generated by the fusion or substantial union of other substances, we have what is called a *compound*. A compound is to be carefully distinguished from an *accidental mixture*, which is the commingling of various substances, each of which retains its identity; such for instance is the mixture of sand and salt. A *compound* is a substantial unity. The substantial forms of the elements which are joined together in compound are said to endure in the compound *in a virtual manner*, but they do not endure there *actually*. The substantial form of water is a true substantial form, distinct and different from the form of hydrogen and the form of oxygen. But, since water really

owes its being and activities to the substantial union of these gases; and since their forms can be readily generated again from the water, it seems that their forces are somehow latently present (that is, *potentially* present) but not *actually* present in the water itself. And this potential presence is not a purely passive thing, for the water is capable of being reduced to the gases and, indeed, may be said to have a kind of tendency to such reduction; the potential presence of the elements is a kind of *active* potentiality. We call this sort of potentiality *virtual*. Thus we say that the elements in a compound are present in the compound, not *actually* (for actually the compound is a true substance distinct from the elements) but *virtually*. More precisely, we say that *the substantial forms* of the elements are virtually present in the substantial chemical compound.

8. When a new substance is *generated*, a new substantial form or forms *are educed from the potentiality of matter*, and simultaneously another form or other forms *are reduced to the potentiality of matter*. No question here of non-material forms, for such forms are never generated or corrupted. But what is meant by generation as an *educing* from, and by corruption as a *reducing* to, the potentiality of matter? This means that prime matter is an imperfectly substantial potentiality, a capacity for the receiving of substantial forms. Prime matter is altogether pas-

sive, wholly inert, entirely "indifferent," as to which form, in any instance, is to be joined with it to constitute a complete body. Yet, under certain conditions, wrought by existing substances (and fundamentally by existing substantial forms) prime matter is rendered *proximately apt* for the receiving of a certain form, and under the action of existing forms, it actually receives such form. Thus, the new substantial form is said to be *educed* from the potentiality of matter. The new substantial form is, so to speak, *drawn out* from prime matter by the activity of existing forms. Thus, under the activities (mechanical, physical, chemical) of hydrogen and oxygen, prime matter (which is actually in-formed by the substantial forms of these gases) is rendered ready for the receiving of the new form of water, and, under the same agencies, actually receives it. At the same instant, the forms of hydrogen and oxygen are *reduced* to the potentiality of matter, inasmuch as these forms are, so to speak, thrown back into the capacity of matter to have such forms. Yet, since our example concerns a compound which is resolvable again into its elements, the reduction of the forms of the gases to the potentiality of matter is not a complete reduction to pure passivity, but to a state of virtual potentiality. When an animal dies,—to take a further example,—the life-principle (which is the substantial form of the animal) is reduced to the potentiality of matter in the sense that matter which was once a

sentient organism, and now is so no longer, *can* have the substantial form of such a substance, as is proved by the fact that it *did* have such a form. But the life-principle does not endure virtually in the corpse of the animal nor in the various substances that are gathered together in the "package" we call the dead body; no, the educing of a sentient life-principle from matter will require the conjoining of new elements (male and female) in a vital process which has nothing to do with this dead body. The life-principle of the animal is wholly removed. Yet it is not accurate to say that it is annihilated, for it is not; the accurate phrase is "reduced to the potentiality of matter." In the potentiality of matter, of course, there is no *actuality* of the reduced form; potentiality and actuality stand opposed; therefore, the life-principle of an animal which is so reduced, does not *exist* (for existence is a synonym for actuality), but is purely *potential*.

9. Matter and form (that is, prime matter and substantial form) are to be conceived of as two co-principles, imperfectly substantial, which are naturally ordained for substantial union together to constitute a complete bodily substance. Matter and form are not to be thought of as two *existing* things, each ready for union (as, for instance, hydrogen and oxygen are) with the other. For forms do not pre-exist to the matter which they in-form, nor has prime matter

any existence of its own; existence comes with the actual union of the matter and form, and is actively referable to the form.

10. Since bodies come from other bodies by generation and corruption, it is manifest that to have new bodily substance, we must have old bodily substance; there must be a bodily source for bodily being. But it is equally manifest that the process of generation cannot proceed in an infinite series of bodies from other bodies, and these from other bodies, and these from still other bodies, and so on forever. For an actual infinity in anything limited (like a series or chain of creatures) is a contradiction in thought and in terms. *Processus in infinitum non datur*, says the philosopher; that is, "There cannot be a chain—of things or events—that is actually infinite." Hence, the *first* bodily beings cannot have come into existence by way of generation, that is to say, by way of substantial change. There is no conceivable way in which finite actuality can come into *first* existence except by an *absolute* production, under the action of Boundless Power, no materials or prerequisites or material sources being required. Such a production is called *creation*. Thus we see the inevitable truth of the terse statement of the Scholastic philosopher, "Bodily substance has its *first* origin in *creation*; thereafter, bodies come from bodies by way of substantial change."

## c) ESTIMATE OF HYLOMORPHISM

Hylomorphism appears to be the only philosophy of bodies that succeeds in presenting a satisfactory account of bodily substance *in all respects*. That there are points of obscurity in its application to certain phenomena, is readily admitted; but that there are points of contradiction in the system itself, or in its certain application to thoroughly known data, or in its tentative explanation of data which are still obscure, is flatly denied. For more than two thousand years, this system (acclaimed and despised by turns) has remained the only consistent system of all the theories that attempt to account fundamentally or philosophically for the bodily universe. On its record alone, its endurance, its consistency, it merits the deepest respect of scientific and philosophical minds. Indeed, it can lay claim to actual *proof*,—a negative proof, of course,—in the fact that it alone has maintained itself in integrity, while all other systems (atomism, dynamism, monism) have twisted and changed, and cast off elements and taken them on, and contracted here and expanded there to meet momentary difficulties, and have failed in the end. Argue the point very mildly thus: if all systems of the philosophy of bodies may be reduced to four,—monism, atomism, dynamism, hylomorphism,—and if the first three of these four are found to be patently inadequate and even self-contradictory, while the fourth appears to meet all requirements, and is not,

at any point, in conflict with itself or with the data it attempts to explain, then, manifestly, the fourth system is the true one. Thus negatively the position of hylomorphism is established. Of course, hylomorphism does not depend for our respect or acceptance upon this negative proof; it has positive proofs too, and these we shall presently consider. But *were the negative proof the only proof available*, it would be sufficient to win the assent and approval of clear minds. A man might say, "This system is not easy to understand. It is not without many difficulties. But, some philosophy of bodies there must be; the truth is somewhere. And if truth is not to be found in monism, atomism, or dynamism,—as it certainly is not,—then I must accept hylomorphism and give it my interest and effort, so that its obscurities may be cleared up."

It may be said, "Your old hylomorphists, Aristotle and even the medieval savants, were all wrong in their listing of material *elements*. They knew nothing of the ninety-four chemical elements we know today. They knew nothing of protons and electrons. They even accepted the transmutation of elements as a fact, and appealed to it to show the real distinction between matter and form. Is it not evident, then, that modern science has upset the hylomorphic theory?" We answer: Granted that the ancients were wrong in their decision about *just what substances are elemental*, they were profoundly right, and in agreement

with modern science, in acknowledging *the existence of certain true elements*. Indeed, we do not know to-day that ninety-four make up the complete list of existing elements; on the contrary, we are convinced that there are more which await discovery. But this is a matter of experiment and the disclosing of concrete data, not of fundamental doctrine or theory. Granted that the older hylomorphists knew nothing of protons and electrons (and we know precious little about these things today), and granted that they appealed to the transmutation of elements as an illustration in evidence of a doctrine, this only means that they had not penetrated into the ultimate *concrete structure* of bodies, and that they mistakenly chose an illustration which does not, in fact, illustrate. But if the proton or the electron be the basic bodily being, it is still a true body, as true a body as the round earth is a body (indeed, truer, in a substantial way, since it is the true fundamental continuum), and still has its matter and its form. And surely no one will claim logic for a denial of a doctrine on the grounds that its defenders have chosen an inept illustration to example its application. The upshot of the question is the constitution of the true continuum. But, whatever this may be, it is manifestly a bodily reality with a definite character and function; in other words it is a *material* reality with its substantial character or *form*. Hence the objection given above in quotation marks is no real objection; it is merely apparent in its



force; it is the utterance of one who has not thought out the full meaning and the implications of what he wanted to say; it is a statement of a person over-eager to object, who allows words to rush out before they are well weighed. In a word, it is an objection,—scientific and not scientific,—which aims a heavy blow and beats the air: “Mighty Casey has struck out!”

Many modern objections to the theory of hylomorphism,—and this we say in all charity and humility,—come from a depth of ignorance so profound as to be utterly amazing when one considers the places in which it appears. So eminent a philosopher,—to choose one notable example,—as Mr. C. E. M. Joad, can calmly write and publish to the world such drivel as the following, apparently in an honest conviction that he is presenting fairly the doctrine of hylomorphism (*Guide to Philosophy*, p. 308 f.): “Among the forms which a material object may exhibit, there is one that St. Thomas Aquinas called ‘the substantial form.’ The substantial form is that which makes the object what it is; in the case of a leaf it would be ‘leafiness,’ in the case of a jug ‘jug-giness’ and so forth. A thing’s substance is the union of its *materia prima* with its substantial form. Any other qualities which it may possess, those, for example, in virtue of which we call the jug white or black, tall or squat, are called accidents, since they are not essential to the jug’s being a jug, and are due

to the accidental union of the jug with the forms of whiteness or blackness, tallness or squatness.—The ability of matter to change, that is to say, to take on a new form, arises from what is called its ‘potentiality.’ This potentiality is latent until it is brought into play by an external act. Thus, if St. Thomas were asked to give an account of what happens when water is boiled and turns into steam, he would say that the potentiality of the matter of which water is composed to take on the substantial form of ‘steami-ness,’ has been transformed into actuality by the exposure of water to the heat of the fire.—As one reads St. Thomas’s views, one cannot help noticing how the full-blooded Forms of Plato, the inhabitants of a perfect and changeless world, which alone possess the full title to be called real, have been watered down until they have become nothing more than the shaping agencies of the *materia prima*. That they cannot exist without the matter to which they give shape is clear from St. Thomas’s doctrine of the soul. Man is a combination of soul and body, the body being the substance, which owes its qualities to the imposition of various forms upon the *materia prima*, and the soul being the substantial form. Conformably with his doctrine of matter and form, St. Thomas insists upon the necessity of the body to the soul, in order that there may be a soul at all. Hence the soul could not survive the death of the mortal body, unless it were provided with a new and glorified body. But it

is with precisely such a body that, he teaches, it is provided at death.”—Comment on this addle-pated hodge-podge of little fact and much fiction is hardly needed. The veriest tyro in Scholastic philosophy knows that ‘jugginess’ is not a substantial form,—as though a bit of clay or metal were substantially changed in being shaped into a jug, white, black, tall, or squat. The tyro also knows that when water has been changed into steam, no substantial change has taken place. The first-grade schoolboy will, if allowed, show Mr. Joad where he goes wrong in Thomistic theology, and will explain that the soul can and does exist without a body when a man dies, and that the resurrection of the body is not so prompt and pleasing a business as theologian Joad makes out; nor is the soul ever provided with a new body in the sense indicated in Mr. Joad’s confident explanation of things as they aren’t. Mr. Joad’s amazing ignorance (which may be called,—accidentally and not substantially,—the Joadiness of Joad) covers a good deal of ground in a short series of printed lines. He doesn’t know the distinction between substantial form and accidental form; he doesn’t know the distinction between material forms and non-material forms which are intrinsically independent of matter for existence and proper operation; he doesn’t know the distinction between complete substance and incomplete substance; he calls the human body the substance of a man and inconscionably drags in the soul

as a wholly unnecessary substantial form which acts like an accidental form; he fails to make clean distinction between the terms *actual* and *real*, and loosely describes the function of form as the bestowal of *shape* on matter. Now, a man who attempts to set forth the doctrine of hylomorphism must not be afflicted with these points of ignorance and these verbal and mental confusions; if he labor under these handicaps it cannot be expected that he should state the case fairly. Yet Mr. Joad is not to be excused for his ignorance of Scholastic doctrine, for he holds the impressive position of Head of the Department of Philosophy and Psychology, Birkbeck College, University of London.

Another typical example in illustration of the vague and misleading,—and often downright erroneous,—presentation of the theory of hylomorphism offered by moderns, is the following comment on the philosophy of Aristotle taken from the textbook called *First Adventures in Philosophy* by Mr. Virgilius Ferm, professor of philosophy in Wooster College, Ohio (p. 279): “Thus with matter and form united, we have the *hylomorphism* which characterizes this system of metaphysics. Thus Mr. X-the-man is the embodied form of which the Young X-the-youth was the matter; the Young X-the-youth is the embodied form of which X-the-baby-boy was the matter; the baby-boy the embodied form and the embryo the matter; and so on. Thus everything in

Nature reveals this process of realization of an immanent working principle, this process of embodying the pattern-possibilities." It will not take the student long to show the manifold misconceptions under which the worthy professor of Wooster is laboring.

Now, if hylomorphism cannot even be stated with approximate correctness by eminent professors of philosophy, it has little chance of appeal to the minds unfortunate enough to fall under their control. Students of Scholastic philosophy must dispel this lamentable ignorance about the only consistent philosophy of bodies that has survived the mounting centuries. They must, for their own sake and the sake of truth, appreciate their heritage, and guard against misprizing the doctrine of hylomorphism because eminent teachers,—or, more precisely, teachers in places of eminence,—hold it in facile contempt without knowing anything about it. Let the student carefully avoid the Joadness of all the Joads and the mindlessness of many modern minds.

Coming now to the positive evidence for hylomorphism as the true philosophy of bodies, we find at once two cogent proofs available. One of these proofs is based upon *substantial change* in bodies, and the other upon the *extension and activities* of bodies. But before taking up the first of these truly conclusive arguments, we must notice a fact. Certain Scholastic cosmologists refrain altogether from

appealing to the argument from substantial change (and, indeed, they need not appeal to it, unless they wish, for the argument from extension and activities is quite independent, complete, and sufficient) because they feel that, since it was originally framed, in ancient times, upon the assumption that *elements may be transmuted*,—a theory no longer acceptable to science,—it has no force of appeal to a modern mind. The ancients did not know of those microscopic and sub-microscopic elements of matter which we call protons and electrons; and their “elements” (air, earth, water, fire) have long been discredited. Even the theory of transmutation of the ancient elements would be now rejected as utterly fallacious by one who, accepting the ancient list, would subject them to experiment and test in a modernly equipped laboratory. Now, say the cosmologists here in question, only a true transmutation of elements (of a proton into an electron, or vice versa) would show with absolute certitude the existence of a real distinction between matter and form. Since such transmutation is not possible, substantial change (which is admittedly a fact) furnishes only an inconclusive argument for the real distinction between matter and form, and had, therefore, best not be used. While the position of these cosmologists can,—if limited strictly to inorganic matter,—be interpreted in such wise as to justify it, such interpretation is not imperative. We still find high value in the argument

based upon substantial change in bodies, and we shall not hesitate to use that argument.

*1. The Argument from Substantial Change in Bodies*—The fact that substantial change occurs in the bodily world is beyond dispute. Living bodies turn to lifeless bodies, inorganic matter undergoes transformations which are manifestly no mere accidental changes, but changes affecting the very nature of the substances concerned in them. We have already noticed that our knowledge of natures, that is, of the very *essences and activities* of things, is reached by justified inference from the characteristics of being and operation which we observe in the things; in a word, our knowledge of the natures of things is derived from our knowledge of the *properties or attributes* which the things manifest. As a thing *is*, so it *shows* itself, and so it *acts*. In so far as a reality manifests unvarying characteristics and operative tendencies, so far it manifests its own inmost character or *nature*. There is no conceivable way in which the mind can get at the inmost reality and being of things except by this method of reasoning to nature from manifest properties. For properties are so consistently, so invariably, so tenaciously connected with the substances to which they belong, that we say with justice that they *flow out* from the complete nature of the substances, and are our guides and indicators when we come to ask what the nature (or *working*

*essence*) of any substance may be. No one doubts that the activity colloquially known as *burning* belongs to the very nature of fire; and if one is asked what fire is, one tells something of its nature by saying that it is a thing which burns. No one doubts that the substance called a weed is *a thing which grows*; growth is such a manifest characteristic of the weed, so certainly associated with the substance called weed, that, unless blocked, the weed *will* grow; it is certain to the least observant that the growth of the weed is not some accidental or outer movement like the swaying of the weed in a wind; everybody says that the weed itself *grows*, it *does* the thing called growing; it does this in such fashion that one cannot help concluding that the outwardly manifested growth comes from an inner *natural* tendency as a *proper* operation. And thus we know something of the *nature* of the weed-substance inasmuch as we know that it is *a thing which grows* or *a thing which normally tends to grow*. Again, nobody doubts that the complex structure of the human eye, and its normal function as experienced by every person who is not blind, manifest something of the natural aptitude and tendency of the eye; that is to say, structure and function give us some clue to the *nature* of the eye. From *proper* characteristics and operative tendencies (that is, from *properties*) we learn to know what natures or working substantial essences are. Now, if we find that a certain substance manifests definite properties,



and presently we find that these properties have been changed into different, and even opposite, things, we know with certitude that the substance itself has been changed. We know that *substantial change* has occurred. When, for example, we see a substance like the weed, which manifests operative tendencies of a *vital* character (it grows; it takes nourishment; it builds and maintains a unified organism although its parts are many and heterogeneous; it tends towards operation and fruitfulness and never to mere equilibrium and rest), we know that the weed is *a living substance*. If, presently, the weed no longer manifests any of the vital tendencies mentioned; if it now no longer grows, or is nourished, or holds its parts in organic unity, or operates towards self-maintenance and fruitfulness; if it shows tendencies which are *opposite* to all these, and inclines to break up into disunited parts, to find equilibrium and rest; then we know that the substance is no longer a living substance but *a lifeless substance*. We may still call it a *weed* or a *dead weed*, but this is a mere imperfection of speech; we know better; we know that it *isn't* a weed at all, for a weed is a living thing and this is a lifeless thing. Just so, when a man dies, we speak of the corpse as though it were still a man; we say "He looks natural," or "He is very thin"; but we know perfectly well that all this is just a kindly, if mistaken, mode of expression; we know that the corpse is not a man at all, since a man is alive, and the corpse

has no life. We know in the case of the weed or the deceased man that *substantial change* has taken place. We know this because the *properties* which once manifested a living being are no longer in evidence, and the *properties* which manifest non-living being are now apparent. Summing the whole matter in a few words, we may say: substantial changes actually occur in the world, and they are inevitably recognized by normal minds in the fact that the properties of substances undergo essential changes.

Granted then that substantial changes actually occur, there are only two conceivable ways of explaining them. Either (*a*) the old substance is utterly annihilated, and the new substance created; or (*b*) there is some underlying support, some substantial *subject*, of the change (*matter*); and there is some substantial determination (*form*) whose acquisition or loss causes the subject to undergo the change.

The first alternative is inadmissible for many reasons, any one of which would be sufficient grounds for rejecting the theory of continuous creations and annihilations. We need not explain these reasons in any detail, but it may be well to mention a few of them. First, then, annihilation is within the absolute power of God alone; so also is creation; this power cannot be communicated to creatures, for they lack the capacity to receive it. Hence, on the annihilation-creation theory of change, no finite substance could induce substantial change in another finite substance;

all substantial change would be due to the direct intervention of Almighty God. Thus the world would be illusory; for the substantial changes found in digesting food, in burning wood, in the combining of hydrogen and oxygen to generate water, and all other substantial changes which we observe as due to the action of creature-agencies, would be due to God's direct and immediate action, and not to the stomach of a living being, or to the fireman and the flames, or to the chemist and the combined gases, or to any creature-causes. And, if this be so, all our knowledge must be scrapped as worthless, and we must lapse into the self-contradiction of the skeptic. For the existence and effectiveness of creature-causes is as manifest a reality as our own existence or the existence of the world around us; if this be doubted, nothing is certain, and science and philosophy perish together. We cannot admit a theory which involves such consequences. Again, it is the doctrine of philosophers that God, who *can* annihilate, *does not*, in fact, annihilate. Further, if all substantial change in the world were due to the direct action of God alone, the equipment of creature-causes for inducing substantial change (such, for example, as the digestive system which substantially changes foodstuffs taken into the stomach) would be meaningless. Yet it is the doctrine of both science and philosophy that Nature does nothing in vain; and our reason assures us that the Infinite Creator (All-Wise as well as All-Powerful)

would not,—and in His wisdom *could* not,—furnish a creature with elaborate and intricate equipment unless that equipment had a meaning. We therefore find entirely unacceptable an explanation of substantial change as the utter annihilation of one substance and the total new creation of another. We are driven, then, to accept the alternative explanation of substantial change, that is, the explanation found in the theory of *matter* and *form*, the theory called *hylomorphism*.

We say that substantial change involves two things, viz., a support or subject of the change, and the acquisition-and-loss which the subject underlies and undergoes. In other words, substantial change involves *matter* and *form*. When a continuum of coal (lump or molecule) is burned up, the material substance called coal is changed into other substances called, collectively, ashes and smoke. The coal is not, as we have seen, *annihilated* and the new substances *created*; no, there is a bridge to support the change of the bodily being as it passes from one substantial state to another. This bridge is *prime matter*, the common substrate of all bodies. And, when coal and fire are brought together, the action and reaction which takes place between these two substances, causes the determinate being (or *substantial form*) of coal to be lost, and,—in the same identical instant,—the new determinations (or *substantial forms*) of ashes and smoke to be acquired. It is the subject, the

prime matter, which undergoes and underlies this substantial loss-and-acquisition. The prime matter which was substantially in-formed as coal, is now the prime matter that is substantially in-formed by the substantial determinants (that is, the *substantial forms*) of ashes and smoke. Thus we conclude that the bodily substance called coal, as well as the bodily substances called ashes and smoke, are each composed of prime matter and substantial form. These two substantial realities are the root-constituents of bodies; the ultimate physical and substantial co-principles which make *a body a body*, and *the actual body* which it is.

Take a further illustration. When a living body becomes a dead body, a substantial change has occurred. The living body is a true continuum, while the dead body is not, but is a "package" (which retains for a time the outer "shape" of the living body) that may be called a mixture of mineral substances. Now, the instant of death is the instant of the substantial change here indicated. And this instant is indivisible and immeasurable. For death, like every substantial change, is *instantaneous*. We sometimes say that a man is *dying*, and King Charles II is said to have remarked that the process of dying is inconscionably slow; but this is a matter of words. Up to a certain instant the person doomed to death is alive, is a living substance; at that instant he ceases to be a living substance; and the instant is not mensurable

or divisible. Death, like every substantial change, is an *absolute* thing, not subject to degrees; one cannot say, with literal truth, that a person is somewhat alive or rather dead. He is alive or he is dead; there is no "no man's land" between the two states of being. Yet, though the change be instantaneous, it is a "going over" from one state of being to another, and since the "going over" is no merely accidental thing but a substantial change, it requires a substantial "bridge" for its passing. Now, the term *bridge* is not to be understood as something which spans a gap (for there is no gap, the change being instantaneous) but something which affords a support for a substantial process. The living body, substantially changed into a non-living mixture of mineral substances, is an object *substantial and material* throughout the process; at no instant is it pure or denuded matter without any substantial form or forms. Take an illustration in analogy (remembering that it is analogy and not literal exemplification) : a ball of wax is perfectly spherical in shape; now it is flattened into the shape of a pancake. But it is wax throughout; and at no instant is it without shape. Of course, shape is an accident, and change of shape is an accidental change. And the accidental change is successive, not instantaneous; for no matter how quickly force is applied to make the sphere of wax as flat as a pancake, it remains true that the wax goes rapidly through a whole series of shapes intermediate between the

spherical and the flat forms. But, these points aside, the illustration really illustrates, because it shows that in change (substantial or accidental) there must be something which underlies the change, which is the subject of the change, which is that in which the change occurs. In substantial change, this underlying subject and support, *exists right along*, first in virtue of the one substantial form, and then in virtue of the new substantial form (or forms, if the substance is changed into a plurality of new substances). If we weigh the words carefully and are diligent to understand accurately, we may say that every substantial change requires a thing that *is changed* in the sense that it loses one substantial character and acquires another; and this thing is *not* changed in the sense that it does not cease to exist. Now, this underlying reality we call *prime matter*. And the substantial determinant which, at any moment, makes it an existing body of a certain kind, is *substantial form*. Prime matter is the substrate which is in-formed, and is the subject of substantial changes which occur in bodily being; substantial form is the determinant of prime matter as an actual body of definite specific kind. Prime matter can lose its substantial form, but not otherwise than by the incoming of a displacing substantial form. Substantial change is not intelligible unless we accept the basic constitution of bodies as prime matter and substantial form. Substantial change is a fact. Therefore this fact compels us to

recognize the value and truth of the hylomorphic theory of bodies.

2. *The Argument from the Extension and Activities of Bodies*—That natural bodies are *extended* or *have quantity* is a manifest fact to all who accept the universe as actual and substantial, and not as an illusion. And that bodies have activities which flow from their very nature is no less obvious. Now, the mere fact of *extended matter* cannot even begin to account for proper activities. For matter is in itself inert, indifferent, and consequently the flat opposite of an active principle or source of activities. Bodies have matter, and this alone does not explain their activities; hence bodies must have something determinate and active and substantial (since the activities here considered are no mere receptive states; they are active or reactive forces and functions) in their essential make-up. In a word, bodies as active agents are inexplicable except upon the recognition of active *substantial form* affecting and determining passive *prime matter*.

Take for example the natural activity of burning which we find in the bodily reality called fire. It is an activity, unquestionably, and as such cannot be attributed to the substance of the flames or ignited gases inasmuch as these are *material* (for matter is the principle of passivity not of activity); but this constant, uniform activity is no mere accident of the



fire; it inevitably follows upon and comes from the very nature of fire; it proceeds from the very essence of the substantial reality in which it occurs. It has, therefore, a substantial source, an active source which is not matter; and we call this substantial source by the very suitable name of substantial form. Take a further illustration: laboratory science informs us that bodies of certain chemical nature are inclined to combination with certain other bodies according to strictly determined proportions and under definite conditions, and that this inclination is always carried out when opportunity offers. Now, this determinateness of activity in a body cannot have its substantial source in what is itself indeterminate and passive, viz., matter. It must have its source in the determinate character of actual bodily substance; in other words, it must have its source in the substantial form of the active body.

3. *A Supplementary Consideration*—A living body is generally understood to be more than a collection or composite of parts acting and reacting mechanically, physically, and chemically upon one another. For a living body is something more than the sum of its parts. There is “something over,” something substantial, something other than the body-mass and the body-structure, something which makes the body *alive*. A scientist will name for you the chemical elements found in a living body,—say one of the

simpler plants,—and will determine the exact proportions in which the various elements are here compounded. Yet no scientist, by bringing together the several lifeless elements, can produce a living substance. There is a substantial ingredient of the living plant which the scientist cannot lay hold of and control. Now, the doctrine of hylomorphism holds that the *life-principle* (that substantial “something over”) in a living body is *the substantial form* of the living body. It is an active and determining substantial principle which somehow unifies in structure and function a welter of various heterogeneous parts and makes one organic substance of the whole. There is no denying the substantial actuality of this principle, for we see what occurs to the once organic substance when that principle is removed by the death of the living body. Hence, in addition to the *matter* which is unquestionably present in a living body, there is present also *a substantial form* which makes the body an actual living substance.

There are some philosophers (even among the ranks of the less wholehearted Scholastics) who say, “Hylomorphism cannot be questioned in the realm of living bodies. But might we not be going too far to say that it is the inevitable truth about the basic physical constitution of lifeless bodies?” To these we may reply that the arguments considered above,—those based on substantial change and on the quantity and activity of bodies,—justify us thoroughly in re-

garding hylomorphism as the true philosophy of all bodies, lifeless as well as living. For, view the point from any angle, the last analysis shows us, in every bodily substance, a *material* reality actualized as a definite *substantial type*; there are *two* substantial aspects of a body that call for explanation; and the philosophy of a twofold bodily principle (viz., *matter* and *form*) is the only philosophy which affords the requisite explanation.

SUMMARY OF THE ARTICLE

In this Article we have defined *hylomorphism* as the *matter-and-form* philosophy of bodies. We have indicated the precise meaning of the terms *prime matter* and *substantial form*. We have set forth the tenets of hylomorphism, incidentally defining important related matters such as the *principle of individuation*, the *principle of specification*, the meaning of *complete* and *incomplete* substances, the distinction between *material* and *non-material* substantial forms, the *unity* of substantial forms and the *potential multiplicity* of inferior substantial forms, the nature of *substantial change*, the distinction between a *compound* and a *mixture*, the manner in which the *forms of elements* endure in a compound, the mode of *the uniting* of matter and form, and the *production of bodily substance*. We have set forth the case for hylomorphism as the one true philosophy of bodies,

offering first a *negative* proof, and then a twofold *positive* proof, the latter drawn from the respective facts of *substantial change* and the *extension and activity* of bodies. Incidentally, we have indicated the startling misstatements about *hylomorphism* made by eminent modern philosophers, and we have taken warning, lest prevalent ignorance about this most valuable system, and falsifications of its doctrines which are currently broadcast, should cause us to underestimate its value or importance.

## **BOOK SECOND**

### **THE ORIGIN OF BODIES**

**This Book studies the first origin of bodies, that is, of the material universe, and then takes up the question of the continued emergence of bodies which marks the progress of the world. In a word, the Book discusses the first beginning and the development of the bodily world. There are two Chapters:**

**Chapter I. The Creation of the World**

**Chapter II. The Development of the World**



## CHAPTER I

# THE CREATION OF THE WORLD

This Chapter studies the first origin of the world, and proves that bodies must, in fact, have a producer and a production, even in the face of the metaphysical possibility (if it is a possibility) of *eternal matter*. Further, the Chapter shows that the first beginning of bodies must have been an act of *creation*, and indicates the inept and impossible character of the non-creationist theories, whether these be bluntly materialistic or pantheistic. The Chapter then discusses the possibility of eternal matter, and the probable age of the world. There are two Articles:

Article 1. Creation

Article 2. The Age of the World

### ARTICLE I. CREATION

- a) Meaning of Creation
- b) The Possibility of Creation
- c) The Fact of Creation

#### a) MEANING OF CREATION

*Creation* is the entire production of a thing without the use of any materials. It is defined technically as *the production of a being in its entirety out of nothing*. And *nothing* means just what it says. It means the *complete* absence of any seedlings that might grow into the thing produced; the *complete*

absence of materials out of which the thing produced might be built up.

There is an ancient Latin definition of creation which the student should know: *productio totius rei ex nihilo sui et subjecti*, that is, "the production of a thing in entirety out of nothingness either of self or of subject." In other words, the production, to be called creation, presupposes nothingness to start with; and the nothingness is the absence of all of the "self" of the thing produced, and of all "subject" or materials out of which a thing could be produced or made up. It is the absence of all "self"; thus the production, by what are called natural causes, of a great tree from a tiny seed is not creation; the production started with something of the tree, something of itself, to begin with, namely, the seed, the germ of life which is now in the tree. Further, the nothingness which is, so to speak, the stage for the act of creation, is the absence of all materials; thus the production of house or of automobile, of watch or of chemical compound, is not creation; existing things had to be used and treated and shaped to make such things; that is, some *subject-matter* had first to exist. But creation starts with nothingness "of self or subject," and hence it is a complete, an entire production; it is truly "the production of a thing *in entirety*."

Sometimes the definition of creation contains this phrase, "by the causality of God." For God alone can create. The calling of being out of nothingness is the



exercise of *absolute or unconditioned and unlimited* power. For, by the very concept of creatural production, we find the limited agent (that is, the doer, the cause, the producer) coming up to the materials with which it is to work, using what is already there, meeting limit in the object with limit in the agent-power. Thus the very thought of *creation* is the thought of the exercise of absolutely limitless power, effortless power, perfect power. And such power is exercised only by the Infinite Being, "with Whom to will is to accomplish."

So strictly and inevitably *infinite* is the creative power that it cannot be communicated to any limited being. Thus God cannot give the creating power to any creature. It means no limitation in God, that He cannot bestow such power; it means only that a creature, as a limited being, has not the capacity to receive it. Of course, God confers wondrous powers upon some of His creatures. He has empowered men to forgive sins; He has empowered men to change bread and wine into the Body and Blood of Christ. But these powers, however wondrous, are not the power of creating. They are conferred by divine delegation of authority and God works in and through His human instrument in their exercise. But to confer outright upon a creature the power of producing reality from nothingness is unthinkable. A limited being could not even serve as an instrumental cause, properly so called, for the creative action. For here

is no question of authority, as in the cases mentioned above; here is a case of producing what is in no manner there. In the forgiving of sins, divine authority is conferred and divine power, upon a being capable naturally of exercising *some* authority; authority is not alien to the very nature of the instrument that God chooses to exercise infinite authority. In the changing of bread and wine into the actual Jesus Christ, authority and power is conferred upon a being capable naturally of dealing with realities, treating them, changing them. However far beyond all creatural power is the power of consecration in the Mass, its very concept is not in conflict with the idea of a creature or the service of a creature as the divinely chosen instrumental cause. But when it comes to *creation*, no creature can even *begin* to come into contact with nothingness and to do anything with it at all. There is, in a word, no connatural aptitude on the part of any creature to serve as an instrument for the creative activity. Hence, the act of creation is *entirely and solely proper to Almighty God*.

Take the matter in another light. Creation is not *a change*. It is not the change of one thing into another thing. It is the production of a thing out of *nothing*. When sins are forgiven, one (negative) quality of soul is changed to another (positive) quality; sinfulness is changed to grace. When bread and wine are changed into Our Lord Himself, one sub-

stance is changed into another. But creation lacks the starting point of change; it lacks what philosophers call the *terminus a quo* (or, "point from which") a change must start. Hence, although change is within the connatural aptitude of creatures, and although divinely conferred powers may marvellously enlarge this aptitude (and hence creatures may serve as instrumental causes of the most wondrous, even of infinite, change), creation, which is *not* change, lies entirely outside all creatural aptitudes; it is alien to them; it is in conflict with them. And therefore, no creature can be so much as the *instrument* divinely employed in the creative action.

For this reason, it is just and proper to call every limited being by the name of *creature*, that is, *a thing created*. For, ultimately, all reality harks back to its First Producing Cause (or its First *Efficient* Cause), and,—as we have noticed before and are now about to show in some detail,—the *first* producing cause must inevitably be a *creating* cause. Rightly, then, do we sum up all actual and possible reality under two heads, viz., *Creator* and *creature*.

Another point about creation is this: it must be *instantaneous*. This means, of course, that the creative act, whenever God exercises it, produces what He wills to produce *on the instant*. It does not mean that God cannot produce a reality and endow it with power to grow or develop gradually or *successively*, passing through many stages of a progress towards

final perfection or roundedness of being. No, what is meant is that the reality produced by the creative act, whether it be produced in fulness of rounded perfection, or produced in a kind of germ or embryo, is produced *instantaneously* when the creative act is divinely exercised. For it is manifest that *successive* emergence of being is *change*; it is movement from stage to succeeding stage. But we have seen that creation is not change at all.

In passing, we should notice that *annihilation* (which is the flat opposite of creation) is also to be conceived as (*a*) within the sole power of God; (*b*) an action in which creatures cannot serve even as instrumental causes; (*c*) an instantaneous action; (*d*) an action which is not a change. For annihilation is the reduction to complete nothingness of an existing reality. Manifestly, as no creature can produce reality out of nothingness, nor even serve as the divinely appointed instrument of such production, so no creature can sustain reality in being, holding it out of nothingness, or reduce it to nothingness entirely, or serve instrumentally for such reduction. Since God alone can exercise the action of creating, —in producing and maintaining a substantial effect, —so God alone can withdraw the power so exercised; only He who has the power to exercise can cease its exercise; only He who has the power to sustain reality above the abyss of nothingness can withdraw that

power and permit reality to fall again into the abyss. Again, it is clear that *annihilation* is no change. For a change always involves three things in itself: a real starting point, a real movement, a real finishing point. The finishing point, the goal, the term of the change, is called by philosophers the *terminus ad quem* (or "point to which" the change tends). Now, annihilation lacks this goal or *terminus ad quem*. For annihilation is not the transforming of a reality into something else and something equally real; it is the removal of reality altogether, the reduction of a thing to a no-thing, to nothingness.

Annihilation, however, is not requisite for our understanding of existing reality, as creation is. Things could not be here (as we shall see) unless they were *first* created. But, once reality is produced, there is no requirement of mind or matter which indicates that it shall altogether cease to be. Certainly, the infinite God who produced it and who supports it in being, can maintain it endlessly in being. Even if the law of *entropy* be true (and this law holds that all the energy which is ceaselessly exercised in the bodily world is gradually turning to heat-energy and is being dissipated throughout space and thus made unavailable for further employment; and that, in consequence, the world will eventually reach a state of equilibrium and of even temperature or coolness and become a spent force, a mechanism silent, cold, and moveless)

this is no indication that the world will be annihilated. A cold and motionless universe would still be an existing reality, just as truly and completely as the present universe is an existing reality.

Not only is annihilation not requisite for an understanding of the world, it is usually regarded by philosophers as an impossibility, not in the sense that God could not, absolutely speaking, withdraw the creative and sustaining power by virtue of which creatural reality exists, but in the sense that it would conflict with God's wisdom to do so. And what is in conflict with God's perfections is in conflict with God Himself (since God is essentially non-composed, and all that He *has* He *is*) and therefore cannot occur. When we consider God's power alone (although we know that His power is *not* alone, but is infinitely identified with His other perfections and His undivided Essence) we say that annihilation is within its scope; when we consider God's power as aligned with His wisdom, His goodness, and so on (and really His power is identified with these perfections and with His Essence) we say that annihilation is not possible. The technical way of putting all this is to say that annihilation is possible to God's *absolute* power, but impossible to His *ordinated* power.

But there have been philosophers who taught that creation itself is an impossibility. We shall study the question of the possibility of creation in the next paragraph.

b) POSSIBILITY OF CREATION

A thing is said to be *possible* inasmuch as it is *existible*, inasmuch as it *can be*. A thing is possible *in itself* (or *intrinsically*) when the concept or thought of it involves no contradiction. For that which involves contradiction in its very concept is not a thing, but the absence of being; it is "self-cancelling" and amounts to zero. Thus, "a square circle" is a contradiction in itself; it means a circle that is *not* a circle. Hence "a square circle" is simply *nothing*. We say that such a thing (and it is called *a thing* merely by figure, analogy, and by reason of the want of words for the expression of sheer negation) lacks intrinsic possibility. We say that it is *intrinsically* (or *absolutely*, or *metaphysically*) impossible. What is intrinsically impossible simply cannot be, even by a miracle, that is, by an extraordinary act of God. This does not mean that God's power is limited. God cannot produce what is intrinsically impossible, because this is not a thing at all; it is *no-thing* or *nothing*, and what is producible is always *something*.

The first point to establish, therefore, when there is question of the possibility of anything, is the fact of its intrinsic possibility. Does the thing involve a contradiction in its very concept? If so, it is impossible, and there is an end of the matter. But if not, we have usually a further point to consider.

When a thing is intrinsically possible it is existible by the power of God. It is *absolutely* possible. But,

while possible in itself, and hence possible to the absolute (or unlimited and unconditioned) power of God, it may not be possible when viewed *in relation to* the power of men or of other creatures. It may be intrinsically possible, and yet lack the *extrinsic* and *relative* possibility which consists in the ability of creature-causes to produce it. Thus a mountain of gold is intrinsically possible; it involves no contradiction in itself. A mountain of gold is also extrinsically possible in an absolute sense, since outside itself (that is, extrinsically) there exists the absolute power of God which can produce it. But a mountain of gold is extrinsically impossible in the relative sense which refers it to creature-causes (at least, to human creature-causes), since these are not capable of producing it.

To sum up: a thing is intrinsically possible when it *is* a thing and not a self-contradiction. A thing is extrinsically possible when there exists a cause which can produce it. Since there always exists a cause that can produce an intrinsically possible thing, all intrinsic possibilities are also extrinsic possibilities with reference to this Cause (that is, to God). But, since creature-causes are limited in being and in power, many things that are intrinsically possible are extrinsically impossible with reference to creature-causes.

In our present study, we need have no concern about the extrinsic possibility of *creation* in so far as this possibility has reference to creature-causes. For



we have seen that no creature can be a creating cause, not even in an instrumental way. The act of creating is proper to God alone. Hence, we ask now whether the idea, concept, or thought of *creation* (that is, of the act of producing a thing out of nothing) is free from conflict and self-contradiction. If it is, then *creation* is possible; it is an action that can occur. If not, then it has not occurred and cannot occur.

If there be a conflict or contradiction in the very thought of the production of something out of nothing, then this conflict must be localized, so to speak, in one or more of the *elements* of that thought. Now, the thought or concept of creation involves three such elements: a producer, a product, and a mode of producing. We assert that there is no conflict or self-contradiction in the thought of creation, no matter how we view it; each angle afforded us for consideration by the "elements" of the thought, gives us a clear view with no involvement or contradiction. For: (a) There is no contradiction in the thought of creation viewed from the standpoint of the divine producer, Almighty God. Our very concept of God is a concept of an *infinite* Being, all-perfect, and hence all-powerful. God can do all things; hence God can create. Nor do we find any obstacle to this truth in the statement *ex nihilo nihil fit*, "nothing comes from nothing," since this is an axiom which expresses the limitations of creature-causes, but is wholly inapplicable to the Creator-cause. The axiom can mean

only that nothingness cannot generate reality out of itself, for the reason that it is nothingness; and, further, the axiom can mean only that no finite being can summon reality out of nothingness. But the thought of *creation*, from the standpoint of God the producer, is precisely the thought of an *infinite* Being summoning reality out of nothingness. And, indeed, if such a Being could not create, It would not be infinite, but limited. Far, therefore, from finding in the concept of God an obstacle to the possibility of creation, we find in this concept a requirement for the power to create and hence a necessity for creation as a possibility. (*b*) There is no contradiction in the thought of creation viewed from the standpoint of the thing produced, the thing created. For finite things can exist; the proof is that such things *do* exist. And they have existence by reason of their producing causes. But if these causes are also finite, then they too have existence by reason of their own producing causes. And so we go on, but we cannot proceed so endlessly. *Processus in infinitum non datur*, "There is no logical appeal to an infinite or endless series of causes." Ultimately, we come to a producing Cause which has no cause of its own. We come to a *first* Cause. And there is no conceivable way in which the *first* Cause should produce a first finite effect except by summoning it into being absolutely, that is, by *creating* it. Far, therefore, from finding in the concept of a finite product (a creature) an

obstacle to the possibility of creation, we find in this concept a requirement for creation as the first beginning of finite products. Now, what is thus required to account for reality around us, is certainly possible. (c) There is no contradiction in the thought of the mode of creation, that is, an absolute, effortless, instantaneous producing of finite reality by the infinite Creator. Indeed, our mind is inevitably led back, through the study of creatures, to just such a production effected in just such a manner or mode. A *first* production necessarily means a production from nothing; no materials are present to work upon (else they would be *first* instead of the product made of them). And where there are no materials to work with, there can be no effort expended, no successive stages of production as the materials are put in use and the effect built up. Further, the infinite Being cannot be limited to labor and effort; these are imperfections and points of finiteness. Hence no mode of *first* production is conceivable except the effortless, instantaneous, absolute mode of creation. Far, therefore, from finding in the mode of creation an obstacle to the possibility of the act of creating, we find a requirement for this mode of first production. And the sane mind cannot view as requisite and consistent what involves contradiction and impossibility.

The conclusion is inescapable. Creation, viewed from any angle, is necessarily *a possibility* to the infinite First Cause. Nay, for *creatures* it is *a necessity*;

for without first creation, creatures could not exist. Yet creation is not a necessity for God. God needs no creature. God takes on no added perfection from the existence of creatures. God is all-perfect in Himself, and infinitely self-sufficing. Hence, God has no *need* to create. That He has, in fact, created, is owing entirely to His perfectly free and uninfluenced *choice* to create.

### c) THE FACT OF CREATION

The world of bodies is here about us, and we ourselves are part of that world. And, as we have repeatedly observed, the existence of the world, and of ourselves in it, is proof positive and compelling that there has been a first production which is *a creation*. No other explanation can account for the world; no twisting of argument can escape creation and find another accounting for the world. The *fact* of creation is indisputable. Why, then, need we make a special study of this fact?

We study the fact of creation because there have been, and are, minds misled by faulty notions of *first production* (that is, of creation), and these have reached the conclusion that either (*a*) no such production is necessary at all, since matter is eternal and uncaused, or (*b*) such production is the projection of God Himself, or of His ideas, into the universe to constitute what we call creatures. So once more we take up (now on the score of *first production*) the

bizarre and degrading doctrines of *materialism* and *pantheism*.

1. *Materialism* finds in matter itself (either with or without the adjustments and management of God) a sufficient explanation of the world. *Atheistic materialism* denies the existence of God, and makes matter self-existing; thus matter is deified, made the self-subsistent First Being or God. Atheistic materialism is, to all intents and purposes, only a phase of crude pantheism. *Theistic materialism* admits the existence of God, but not of God the Creator; it considers matter as an eternal substance, uncaused or unproduced, which God arranges and manages. Thus, God has set up the world and arranged it, using materials for the purpose, as a builder might set up a house, using wood and stones and mortar and nails. *Agnostic materialism* dodges the issue of God's existence, and is content to treat of matter as an eternally existing substance which had rounded into plan and shape (as the world we know) either by chance or under the drive and direction of some inner law of its being, or, more precisely, under the influence of *an infinite series* of causal forces which come from matter itself and make it *evolve* in a certain way. Agnostic materialism is only a step removed from atheistic materialism and pantheism.

All types of materialism insist upon one thing, to wit, that matter is *eternal and unproduced*. Keep

those two words "eternal" and "unproduced" together. It is an altogether different question which asks whether matter could possibly be eternal *and created*, that is eternal and *produced*, and we shall consider that question later. But, we repeat, materialism has, as its cardinal tenet, the doctrine of matter as *eternal and unproduced*.

Now, we assert that *unproduced matter* is a contradiction in thought and in terms. Matter is by definition and concept a thing with limits; it is marked by the inevitable characteristics of finiteness, mutability, contingency, composition. And only *production* can impose such limits. An unproduced being is a being wholly self-accounting; it is a being infinite, uncomposed, necessary, changeless. Thus to say *unproduced matter* is to say "a being that is infinite and finite; changeless and changeable; composed and uncomposed; contingent and necessary." In a word, the term *unproduced matter* is a silly self-contradiction.

Again, matter is, by very concept, a thing indifferent to rest or movement, it is *inert*. Yet matter cannot actually *exist* unless it be either in movement or at rest. Existence *means* that so far as matter is concerned. Still matter itself cannot explain the actual state in which it is found. Therefore *something other than matter* must have given it existence. But if matter has been *given* existence, it has been produced. Matter is, therefore, not an unproduced actuality.

We conclude, perforce, that matter is not *ens a se* but *ens ab alio*, that is, matter is not self-subsistent being, but being which has existence from something other than itself. We have already seen, and we shall notice again presently, that *ultimately* matter has existence from the First Being by way of *creative production* or simply by way of *creation*.

From the foregoing it is manifest that *materialism* is false doctrine, and is to be rejected.

2. *Pantheism* identifies, in one way or another, *the world* and *God*. We have already proved in the First Book of this manual (*Chap. I, Art., I, c*) that this sort of identification is a thing untrue and impossible. Here, then, it will suffice to set out the briefest sort of argument to recall pointedly to mind the nature of that impossibility.

The First Being (that is, God) is necessarily conceived as uncomposed, infinite, necessary, immutable. But the world, as we have seen, is marked by proper characteristics which are the flat opposite of the divine perfections. The world is composed, finite, contingent, mutable. Hence to identify God and the world is as impossible and as meaningless as to identify circle and square. Such identification is a self-contradiction, and therefore it indicates an *intrinsic* (or *absolute*, or *metaphysical*) impossibility.

Again, to say that the world is an outpouring of God (as an inlet is an outpouring of the sea, or as

flying sparks are "outpourings" of the fire) is to say that there is a kind of development, or successive process of being, in God. So also it is an assertion of growth or development in God to say that the world is a projection of divine ideas or dream-images. Now, as we have repeatedly noticed, God is Pure Actuality; He is eternally perfect in an infinite way; hence there can be no possible improvement, development, or perfecting of God. Pantheism, therefore, whether it be of the materialistic type or of the idealistic type, is a theory which involves contradiction, and is therefore metaphysically impossible.

Therefore, we reject *pantheism* as inept, false, and inadmissible.

3. *Creationism* is the doctrine that the world owes its first origin to an act of true creation exercised by Almighty God. We assert that creationism is the true philosophy of world-origin. We prove the assertion in two ways, *negatively*, and *positively*.

(a) A *negative* proof of creationism (or perhaps it would be more accurate to call it a proof *by exclusion*) is thus formulated: The doctrines of world-origin are three and only three. All conceivable theories on this point are necessarily reducible to one of these three: materialism, pantheism, creationism. But we have already shown that the first two are false, self-contradictory, and therefore impossible.



It is consequently manifest that the third, and only remaining, theory is the true one.

(*b*) Things which exist have their existence either *necessarily* or *by the gift of that which has existence necessarily*. In other words, things which exist have existence either by their own essence (so that their essence *is* to exist, and they are therefore self-subsistent and *entia a se*) or existence has, so to speak, been imparted or shared to them by that being which has existence by its own essence. An analogy may clear up the point. A thing which is *hot*, for example, either has heat by its own essence (as fire has) or heat has been shared to it, directly or indirectly, by that which has heat of its essence. Hence if a bar of iron is hot, we know that (since iron is not hot by its essence) heat has been imparted or shared to the iron; and, ultimately, the heat has come from that which is hot by its own nature or essence. Thus if the iron bar be part of a radiator, and is made hot by steam, we find that the hot steam has come into existence by the action of heat on water, and the heat has come to the water (immediately or indirectly) from the application of that which has heat of its own essence. So, in the order of being or existence, a contingent existence points back necessarily to a necessary existence; an *ens ab alio* points inexorably back to *ens a se*. Now, there is no conceivable way in which the necessary being (that is,

the being which has existence of its essence) can share or impart existence to other things except by way of *a first creation*. Once created and preserved in being, a thing may exercise its causal activity and produce further effects (as heat, once imparted by the fire, may make water hot, and water may make iron hot, and iron may make one's hands hot). But the *first* origin must necessarily be a creation. For, as we have seen, the necessary being cannot be identified with the non-necessary world of existing things, nor can the necessary being be the mere source (material or idealistic) from which things come, as water comes from a spring or as pictures come from a light thrown on a film. The first gift of existence to contingent realities must be an *absolute* gift, an immediate, complete, instantaneous production of realities. And such a production is neither more nor less than *creation*. The existence, therefore, of contingent realities in the world is proof positive and inescapable of *a first creation* as the true origin of the world.

#### SUMMARY OF THE ARTICLE

In this Article we have defined *creation* as the absolute production of a thing in its entirety out of nothing. We have explained the terms of the definition, and have seen that creation is an action proper to God alone, an instantaneous action, an action in

which creatures cannot participate even as instrumental causes, and an action which is, properly speaking, not *a change*. We have considered *annihilation*, which is the complete reduction to nothingness of existing reality. We have found that annihilation has characteristics like creation (proper to God; instantaneous; incommunicable to the power of creatures even instrumentally; not a change). We have noticed that annihilation is within the *absolute* power of God, but not in His *ordinated* power (as conflicting with divine perfections) and that it does not occur. We have shown that creation is *possible* inasmuch as it involves no conflict or self-contradiction in itself, whether viewed from the standpoint of God the Creator, of the creature produced, or of the mode of production. We have established the fact of creation, proving the doctrine of *creationism* true, and showing that *materialism* and *pantheism* are false.

## ARTICLE 2. THE AGE OF THE WORLD

- a) Possibility of Creation from Eternity      b) Creation of  
the World in Time

### a) POSSIBILITY OF CREATION FROM ETERNITY

We have seen that *creation* is inevitably the explanation of the first origin of the world. Now it may be asked whether creation is necessarily a temporal thing, whether in fact it might not be *ab*

*aeterno*, that is, whether God might not have created, not *in time*, as we say, but *from eternity*. In other words, we ask whether matter (the bodily world) might not be eternal. Of course, we know, and have proved, that matter cannot be *unproduced*. But, granted its production, its first creation, we ask whether it might not be eternal.

The *eternity of matter*, discussed here as to possibility, does not mean a perfect eternity. A perfect eternity is predicable of God alone. For a perfect eternity admits no successive stages or moments of duration; it is "all there at once." Thus, it can belong only to an infinite being which knows no limitations of past and future, but which subsists in a changeless all-embracing *now*. The concept of "eternity of matter" is the concept of a *relative* or *limited* eternity, an eternity which merely excludes *beginning*, but admits successive duration and change.

Can matter have been created from eternity? Is it possible that matter has had a creation, but no beginning? The question is moot among Scholastic philosophers, but most of them incline to the opinion that eternal matter is not possible. Let us consider some pros and cons.

Since God is eternal, it is manifest that He can create from eternity. There is no change or development in God; to say that there is, or can be, such change or development, is to fall into the fundamental error of the pantheists. Certainly, there was

no *moment* at which God became able to create, for God is eternally able to create. Thus it seems that eternal creation is possible.

There is an answer to this argument. No one denies the infinite perfection of God. There is not a doubt in the world that God can exercise from eternity all possible activities and powers. Indeed, He *does* so, when we understand the divine operations strictly and are not confused by the limitations of human speech and human thought. But granted that God *can* create *ab aeterno* when the point is considered absolutely, is there not some involvement of difficulties on the part of creatures, and of their requisite mode of being, that makes creation from eternity a self-contradictory thing? There are indeed great difficulties, but it is not certain that these constitute an absolute self-contradiction in the concept of creation from eternity. Such difficulties are, for example, the following two:

(a) Creatures, and particularly *matter* or *bodily being* which is the focal point of our discussion throughout cosmology, are limited things, and, in themselves substantially or at least in accidentals, they undergo a continuous succession of states and conditions. We may say, to put the matter shortly, that creatures experience a continuous series of *events*. Now, if creatures have existed from eternity this series of events must be an actual *infinity*. For the series has been running on forever *without any start*.

Yet we have already learned that an infinite series of numbers (or simply *a number actually infinite*) is not possible, and events are numerable things; an infinite series of events can be, and indeed must be, expressible in terms of an infinite number. Therefore, it appears that the concept of creation from eternity involves a difficulty that amounts to self-contradiction and consequent impossibility.

(*b*) The same difficulty, seen from a new angle, is discerned in the contrast of *time* and *eternity* in bodily being. If matter has existed from eternity, it appears that this existence is measurable in moments. For limited existence, and notably material existence, is admittedly a *successive* thing, a thing which involves *movement*, and reference to *before and after*, to *now and then*. But such an existence is precisely what we describe as an existence *in time*. It has *moments*, succession, measurability in terms of what has gone, what is, and what is to come. In a word, creatureal existence appears to be time-bound existence. But to call a time-bound existence a time-free existence is to be guilty of contradiction. And it appears that the concept of creation from eternity involves just such a contradiction.—It is to be noticed that this argument has no force when applied to *an eternity to come*. For there is manifestly no contradiction in the concept of creatures being continually maintained in existence. The point is that their continued existence will never be rounded out into a *completed* eternity.

But the concept of creation from eternity is the concept of *an eternity that has gone*; it suggests an eternity already completed and rounded out. Indeed, at any moment in the past history of creatural existence, an eternity has been completed, in the sense that *an infinity of moments* has already been traversed. Here, then, there seems to be a difficulty in the concept of creation from eternity, and a difficulty so great as to amount to self-contradiction and consequent impossibility in the concept and reality of such a creation.

Recall the fact that when we say God *cannot* do a thing, this is never a limitation in God. It merely indicates a self-cancelling conflict in the "thing" which we say God cannot do. God cannot make a square circle, because a square circle is simply nothing; it is not a thing, but two things that cancel each other out and leave nothing. Just so, if it be true (and it surely looks true) that the concept of creation from eternity is the concept of a self-contradictory thing, then we say that God cannot create from eternity. Not that we assert any limitation in God, but that we recognize limitation in creatures, and in their requisite mode of being. It is not that God cannot *give* existence from eternity; it is rather that creatures lack capacity to *receive* such existence.

It is probable therefore, to put the point mildly, that creation from eternity is an impossibility, and indeed an absolute impossibility.

## b) CREATION OF THE WORLD IN TIME

Whether or no creation from eternity be *possible*, human reason recognizes as acceptable *the fact* of creation in time. There is, indeed, no compelling proof, direct and inescapable as a mathematical demonstration, to show that creation in time *is* a fact. But there are many persuasive arguments which strongly recommend the acceptance of such creation as a fact. For example, the mind finds no *requirement* for creation from eternity (that is, for *eternal matter*) in its deepest explanation of the world of bodies; there are tremendous difficulties in the way of a clear concept of eternal matter, and these even seem to indicate the absolute impossibility of such matter; the creation of matter in time appears to be more in line with the divine perfections; the unvarying tradition of all peoples expresses a constant human conviction that the world had a beginning. We must look more closely into one or two of these arguments.

(a) There is no *need* of creation from eternity to explain the world to the deepest investigations of the human mind. It is normal and natural for man to find in a world marked by change and limitation, a clear indication of *a beginning* rather than an eternal origin. Further, the mind looks in vain for any requirement of eternal creation in the two realities involved in the concept of creating, namely, *God* the Creator and *the world* of creatures. Certainly God, who is subject to no stresses or compul-



sions (since He is infinite in all perfections, and therefore infinitely free), is not required to create at all; therefore, He is not required to create from eternity. As we have seen, God takes nothing *real* to His own nature and essence by the production of creatures out of nothing. Hence we find that the thought or concept of God involves no requirement of creation *ab aeterno*. And as for creatures, for the world itself, it is manifestly a contingent reality, that is, a thing which *might not* have been made at all. It has in itself no *requirement* for existence. Manifestly, then, it suggests no requirement for *eternal* existence. What, then, could lead the reasonable mind to declare that the world has been created *ab aeterno*? Surely, nothing. It would be unreasonable, therefore, to assert that the world has been created from eternity; it would be a baseless assertion. On the other hand, it is reasonable to assert the creation of the world *in time*,—since there is much to suggest this conclusion,—and to accept it as a fact. For there are but two possibilities about the fact of the world's origin; either it was created in time or it is created from eternity. If the latter is the remote possibility (and most remote it surely is) the former is the proximate and acceptable probability.

(*b*) It seems to be more in accord with God's perfections that He should have created the world in time. For, as St. Thomas points out, "That which did not always exist, manifestly has a cause; but the

existence of a producing cause is not so evident in the case of what has always existed." Hence the *causality* of God is more evident in a world that has had a beginning than in a world that has existed from eternity. By the same token, the *existence* of God is more immediately apparent as First Cause of a world created in time than as First Cause of a world existing eternally. But that which makes God's existence and causality more directly apparent is more closely in accord with the divine perfections (which, as St. Paul tells us are manifested in the creature world) than that which leaves these paramount realities in a state of obscurity. In other words, the world, which manifests God's existence and perfections, is a clearer, more suitable, more apt manifestation as a thing with a beginning, than as a thing without beginning. And it is surely right and reasonable to conclude that God has chosen the clear, apt, and suitable service of the world for the instruction of the intelligent creatures for whom He made the world. Reason, therefore, recognizes a strongly persuasive argument in all this for the fact of creation *in time*, and, at the same time, an equally strong dissuasion from accepting as fact the creation of the world *ab aeterno*.

We may add here, for the information of Catholic students (or rather, for the purpose of recalling to the mind of Catholic students a fact which they know), that Divine Revelation as well as the infal-

lible declaration of Christ's Church leaves us in no doubt about the actual creation of the world *in time*. Holy Scripture, in the first words of Genesis, tells us that "*In the beginning*, God created heaven and earth." And the Fourth Council of the Lateran declared that God "from the beginning of *time*, made out of nothing the creature, both bodily and spiritual." This, of course, is not an argument for the philosopher, except in so far as it evidences the absence of all clash or disagreement between Revelation and reason.

As to the actual age of the world (created in time) we have no certain sources of information. Modern science, generally speaking, likes to express the age of the world in terms of millions and even billions of years. Still, very learned scientists have asserted that there is no *compelling* reason to believe that the world, or at least our earth, is more than fifteen or twenty thousand years old. Thus there is a tremendous field for speculation on the question. Faith has nothing to say on the point, for the *hexahaemeron* or "six days of creation" are only "days" in modern speech, that is, in translations of the Scripture. The scriptural word *yom* (which is translated or mistranslated as "day") indicates an indefinite period of time; perhaps the word has even a philological connection with our word *eon*. The "days" of creation may have been stretches of millions or billions of years; we have no means of knowing even their ap-

proximate duration. Hence there is nothing in Faith or in philosophy to give us a clue to the actual age of the world in terms of years. The matter must be left to the scientists, and it seems rather unlikely that these will be able to reach a reasonable agreement on the point, at least until the world is a lot older than it is now. However, the actual age of the world is an item of very small importance; in fact, it is negligible for the philosopher. The point is that whenever it began, it had a beginning; whenever it was created, it had a Creator; and, since God is absolutely *outside time* the length or brevity of the world's term of existence is without meaning in reference to His eternity.

#### SUMMARY OF THE ARTICLE

In this brief Article we have considered the *possibility* of creation from eternity, that is, the possibility of *eternal* (but *produced*) matter. We have seen that the difficulties involved in the concept of *eternal matter* or *creation ab aeterno* are such as to make this creation appear impossible. On the other hand, we have noticed that strongly suggestive reasons invite the mind to the conviction that the world was actually created *in time*. We have noticed, in passing, that Catholics hold by Faith (in perfect agreement with sound philosophy) that the world

was, in fact, created in time. We have seen that there is no means of expressing the actual age of the world, or of our earth, in terms of a definite number of years.

## CHAPTER II

### THE DEVELOPMENT OF THE WORLD

This Chapter discusses the question of how the world, once originated by creation, was built up, set in order, developed to its present form. First, the Chapter studies the movement observable in the world and the emergence of bodily reality from bodily reality. Secondly, the Chapter considers the possibility of an evolutionary progress in the series of bodily emergences. There are two Articles:

Article 1. Movement in the World

Article 2. The Formation of the World

#### ARTICLE I. MOVEMENT IN THE WORLD

- a) Meaning of Movement    b) Classification of Movement
- c) Substantial Change

##### a) MEANING OF MOVEMENT

*Movement or motion*, in a very wide sense, means any operation whatever, whether of body or spirit, of finite being or of infinite being. In a stricter sense, movement or motion means a going over from one state or condition to another. In a word, it means *change*.

Change (or motion in a strict sense) is, as we have seen, a characteristic of bodily being. It involves a

transit,—a going over,—from one state or condition (substantial or accidental) to another. In this full sense, change is *proper* to bodily being, for spirits cannot change substantially, and the infinite God is not subject to any change, substantial or accidental; He is the Being “with whom there is no change nor shadow of alteration.”

Change consists essentially in the *transit*, the *going over*. But it involves two other things, viz., a starting-point and a term or goal. The starting-point is called the *terminus a quo* (or “term from which”); the goal is called the *terminus ad quem* (or “term to which”) and the going over from starting-point to goal (that is, motion or change proper) is called the *transitus* or “transit.” In addition to the three requisites of motion or change considered *in itself*, there are two other requirements, viz., a *mover* or *motor-force*, and a *support*. Nothing moves itself, absolutely speaking; whatever moves is moved, and is moved by something other than itself. Further, movement does not occur in the void, it is a going over and requires “a bridge,” even when it is instantaneous; it requires a *support*. To illustrate: in the accidental change which occurs when cold water is made hot, we find the elemental requirements of change: the *terminus a quo* is the cold water, or, more exactly, the coldness of the water; the *terminus ad quem* is the heated water, or the heat of the water; the *transitus* is the progress from cold to hot which

the water undergoes. In addition to these three elements of change in itself, we find the other two requirements, to wit, the *mover* or *motor-force* is discerned in the fire and its action upon the water; the *support of the change* is the bodily being of the water which supported, so to speak, the coldness and now supports the heat, and was the supporting reality which received the first touch of heat and held steady while this was increased in succeeding degrees.

That motion exists in the universe is a manifest fact. We have already considered this point in our studies about the *characteristics* of the bodily world and in our classification of *bodily activity* as mechanical, physical, and chemical.

#### b) CLASSIFICATION OF MOVEMENT

Movement, motion, or change is *extrinsic* if it exists in name only, and not as actual fact. Thus the pillars that are on our right as we go into church, are on our left as we come out. To say that they have *changed* or *moved* is not true in actual fact, but they do stand *in a changed relation* to ourselves because of *our* movement, and we call this an *extrinsic* change in the pillars. *Intrinsic* change is change in actual fact, not merely in name. Intrinsic change is *metaphysical* if it is beyond the nature or *physis* of finite things and of creatural powers to produce. We have three examples of metaphysical change, viz., creation, annihilation, transubstantiation. Metaphysical change



is not change properly speaking, for it lacks one or other of the internal or external requisites for change properly so called. Creation lacks the *terminus a quo*, for it has nothing as a starting-point. Annihilation lacks the *terminus ad quem*, for its formal term or final goal is nothingness. Transubstantiation lacks the *support* which endures under change, for it is the *complete* change of one substance into another, nothing of the former substance remaining. Cosmology has no concern with metaphysical change, but considers *physical change* or change properly speaking. Physical change is that which has a definite *form*,—substantial or accidental,—as its term or goal. Hence, physical change involves something enduring, something permanent, something that supports the change and does not itself change as the new form is acquired and the old form lost. In a word, physical change is a change of *form* in enduring *matter*.

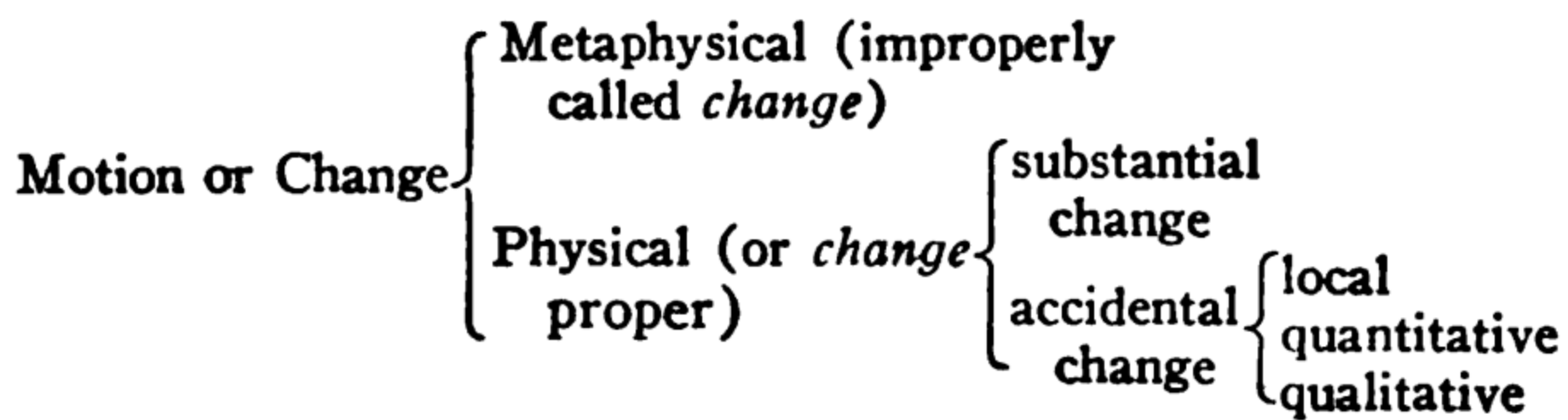
Physical change is *substantial* or *accidental*. Substantial change is the transit which occurs in prime matter as one substantial form is lost (*corruption*) and a new substantial form is acquired (*generation*). Since the loss and gain is simultaneous, we say that the corruption of one substance (that is, the loss of substantial form) is the generation of another substance (that is, the acquiring of new substantial form), and vice versa. The Latin phrase is, *Corruptio unius est generatio alterius; generatio unius est corruptio alterius*. Corruption and generation are in-

*stantaneous* changes, not *successive* or gradual.—Accidental change is the transit which occurs in the gaining or the loss of accidental form. Remember that a *form* is any determinant or determinateness of being. Heat or whiteness or sweetness are accidental *forms*; location, local movement, rest, are accidental *forms*; increase and diminishment in quantity are accidental *forms*. Since some accidental forms can be acquired without concomitant loss of other accidental forms (for example, light or illumination which displaces the non-being called darkness) there can be accidental generation without accidental corruption; but usually these occur simultaneously, and together they are called *conversion*. Accidental change is, in itself, *successive* or gradual (as, for example, the change which occurs *by degrees* as water changes from cold to warm and from warm to hot). But at the instant when accidental change begins to affect a substance we find an instantaneous accidental *generation* or *corruption*. Thus, when cold water receives the very first beginning of change to a higher temperature, this change is instantaneous, although the water thereafter goes on becoming hotter by successive degrees. Accidental change is a change in place, in quantity, or in quality (*local change, quantitative change, qualitative change*). The accidental change which takes place in a body by reason of its exercise of connatural activities is *local*, and sometimes *quantitative*, in mechanical ac-

tivity; it is *qualitative* in physical and chemical activity.

To illustrate the types of physical change. Wood that is burned up, food that is turned into the flesh and blood of the eater, the living body turned to a lifeless corpse, all these illustrate *substantial change*. We shall speak in detail of the character and actuality of this type of change in the next section of the present Article.—Accidental change may be noticed in the examples just cited: in the heating of the wood which precedes its burning, in the churning of food in the stomach and its qualitative change, in the physical and chemical changes that occur in the corpse as its components are sifted out and each drawn by proper affinities to its kind.

The following schema will help the student to fix in memory the classification of the important types of motion or change:



### c) SUBSTANTIAL CHANGE

The first actuality conferred upon the world was that which drew bodily being out of nothingness into existence; it was, as we have seen, an actuality conferred by the divine act of *creation*. Now, the state

of the world as we find it, and the history of the earth as written in its geological strata, as well as our daily experience with the character and activities of bodily beings, living and lifeless, all inform us of the fact that the world has undergone and is undergoing a process, a progress, a development. While it is manifest that accidental changes are occurring all the time, it is no less evident that new substantial being is continually emerging and old substantial being is continually disappearing. Among bodies, we find no evidence,—at least no compelling or even highly persuasive evidence,—of new *creations*; on the other hand, it is the contention of philosophers and scientists alike that we have no *annihilation*. The emergence and the disappearance of bodily substances is owing, therefore,—after a *first* creation,—to substantial generation and corruption. In a word, the world carries on by the actuality and exercise of *substantial change*.

Monists and philosophical atomists, and other theorists of materialistic bent, deny the existence of substantial change. Necessarily, then, they deny the actuality of substantial differences among natural bodies. Yet, as we have seen, substantial change is a fact to be acknowledged if there is any value in human science at all. We cannot come at the nature of substance by scales and test-tubes and retorts; we cannot find out what substance is by the diligence of our hands or the sharpness of our eyes. We can only

know substance by our mind,—our intellect or reason,—which recognizes its existence as the absolutely necessary explanation of accidental being, and recognizes something of its nature in the activities and properties of natural bodies. All science, as well as all philosophy, recognizes differences in bodily substance as indicated by differences in the properties (static and operative) of bodies. Yet if there be but one kind of bodily substance, and no substantial change, then all physical and chemical formulas are futile things; all laboratory science is ado about nothing. We are not prepared to accept a doctrine which would plunge us into the contradictions and inanities of skepticism. Therefore, we accept as reasonable, right, and inevitable, the doctrine which maintains that there are essential differences in bodily substances, and that bodies can lose substantial form and acquire substantial form. We accept the actuality of *substantial change* in the world. Nor do we accept this as a doctrine of scientific or philosophical *faith*; we accept it as the conclusion of sound reason dealing with facts; our certitude on the point is *scientific certitude*, not the certitude of sound *belief*.

Nearly all scientists and philosophers of consequence are quite willing to acknowledge the difference that exists between living and lifeless reality as an *essential* and *substantial* difference. Not all, however, are so willing to acknowledge substantial difference between any two lifeless bodies. However,

the evidence is all against any theory of qualified monism (*inorganic monism*). It is still a soundly scientific principle that when two inorganic (or lifeless) bodies manifest essentially different properties, there is a substantial difference between the bodies themselves. And when a body is changed into other bodies (as water into hydrogen and oxygen, as wood or coal into ashes and smoke) there is a substantial change if the newly emerged bodies manifest properties essentially different from the properties of the original body. Nor does this scientific principle lose force by the most recent discoveries and experiments in the world of the atom and its structural parts. If, by knocking out an electron from an atom of one substance, we have at once an atom of an essentially different substance, we cannot conclude that all inorganic substances are merely a matter of arrangement of electrons about a nucleus. True, the removal of an electron in the fashion described would be a mechanical process, but it is not unusual to find physical and chemical capacities altered by a change in mechanical movement. That such change is merely local change or mechanical movement does not tell the whole story. Physical and chemical *consequences* can follow from purely mechanical activity. A certain quantity of matter is required for the bare existence of any substance; and a certain structure (atomic and sub-atomic) of the matter is required for the existence of a definite *kind* of substance. Reduction of

quantity or change of structure might be accomplished by merely mechanical means, yet the result would not be merely mechanical or a matter of local movement; it would be a result rightly called an essential and substantial change. To say that because a certain arrangement of nucleus and electrons defines the actual structure of a body, and to conclude from this fact that all inorganic bodies are "of a piece" and that no substantial differences exist among them, is surely illogical. One might as well say that, because a definite structure and arrangement of parts define a man, the removal of any one of these parts (say, head or heart) would not induce a truly substantial change in the human being. Of course, we here invade the field of organic bodies, but only for the purpose of noticing a striking analogy. The point we make is this: there often is a dependence of substantial character upon the merely mechanical arrangement or structure of a body, but this is not saying that the substance *consists* in the arrangement; the substantial character of the body here in question may be said to *follow upon* or to *depend upon* the structural arrangement, but not to *consist in* the arrangement. Similarly,—to borrow an illustration from the accidental order,—the quality of heat or heatedness follows upon and depends upon the friction which accompanies mechanical motion, but, as we have seen, it would be jumping a gap to assert that therefore heat *consists* in motion.

After a first creation, the world is furnished with its continuous procession of natural bodies by means of substantial change. This is true of all emerging bodies, living and lifeless. And, as we have repeatedly observed, substantial change comes about by the fact that new substantial forms (with the exception of the spiritual substantial form of man, which is not here within our purview) are continually educed from matter, and old substantial forms are continually reduced to matter. The quantity of matter (that is, of prime matter) is constant; it is the sum of the quantity of all existing bodies. Prime matter is not quantified in itself, but only in its existence as informed matter (that is, as *materia secunda*) in actual bodies. When new bodies emerge upon the scene, there has been no increase in prime matter; existing matter has been newly in-formed, old forms being displaced, as the new substantial actualities come into existence.

That prime matter is all "of a piece" so to speak, we freely concede; indeed, we assert it, for prime matter is not *a kind* of matter in itself, and hence has no substantial or essential differentiations in itself; it is the common substrate of all actual bodies. But that there are no differences,—and essential differences,—among substantial forms, we stoutly deny. We appeal to human experience, to reason, to the conclusions of physical science, as evidence for our denial.



## SUMMARY OF THE ARTICLE

This brief Article has recalled for our ready understanding and application much that has been touched upon in discussing the nature of bodies and their connatural characteristics and activities. We have defined *motion* and *change*, and have offered a summary classification of important varieties of change. We have discussed the existence of *substantial change* in the world, and have insisted upon the substantial differences that exist among inorganic bodies of essentially different properties.

## ARTICLE 2. THE FORMATION OF THE WORLD

- a) Cosmogony
- b) Cosmogonic Hypotheses
- c) Inorganic Evolution

## a) COSMOGONY

*Cosmogony* is the part of cosmology which deals with the development of the world that follows upon its creation. Cosmogony seeks to trace to first material origins the world of natural bodies which we observe around us. It does not seek to account for the *first origin of matter*; it seeks to discover how matter has been shaped and formed into the marvellously arranged universe which we now behold.

It is manifest from the findings of physical science (notably, astronomy and geology) that the heavenly bodies and systems, and the earth itself as a tiny part

of one such system, have been developed out of more unified material masses. Evidence of successive changes or stages of development in the earth is found in the rocky strata of its crust. There was certainly a time when no living thing (plant or animal) could exist on the earth. There was a later time when plant life appeared, and a still later time when animal life came into being. Cosmogony, however, leaves to the special scientists,—the geologist, the seismologist and the biologist,—the detailed study of the development of *this earth*; it is concerned rather with the development of *the universe*.

#### b) COSMOGONIC HYPOTHESES

When a scientist takes up a problem he has usually no means at his disposal for its solution except the method of trial and error. He makes, at the outset, a *supposition*, a scientific *guess*, at the answer, and then sees whether this answer will meet all the facts. The scientist says, "Let us suppose that the thing under investigation is of such and such character,—as its appearance and activity seem to suggest; or let us suppose that the process in question has proceeded in such and such manner,—as really seems likely." Then the scientist checks and tests his supposition to find out whether it will explain the facts, and all the facts, and only the facts; and whether it is the one explanation which can account for the facts.

The *likely looking supposition* which a scientist

adopts in endeavoring to account for a reality or a process is called *a hypothesis*.

The true scientist does not attempt to defend his hypothesis. He tries earnestly to break it down. For he is after *truth*, and is in no wise concerned with the mere defence of a cleverly imagined scheme. And he knows that truth will stand up, and falsity will fail, if sufficient tests are available. Often the obscurity of the question investigated, or the lack of means for discovering evidence and for testing conclusions, prevents the scientist from advancing his opinion beyond the realm of *possibility* or at most of *probability*. In such a case, the hypothesis remains a hypothesis,—a more or less likely supposition, but a supposition after all. Such, for example, is the hypothesis that there is an upward evolutionary trend among the species of living things, and that a superior species is a development of an inferior species. And we speak of this doctrine as the evolutionary hypothesis. True scientists, even those who sincerely believe it to be the actual explanation of specific differentiations in organic bodies, are frank to admit that it is a hypothesis. Only the scientific (and *not* scientific) writers and teachers assert evolutionism as a fact.

When a hypothesis stands up to every test, and looks more and more probable, it is advanced to the rank of *a scientific theory*. And when the theory is established by indubitable and compelling evidence, it

becomes *a scientific fact*, and its bearing upon further scientific study is expressed in *a scientific law* or *a law of science*.

Coming now to the inquiry into world-development following world-creation, we find many hypotheses offered for our consideration. Perhaps one of these hypotheses (an emended form of that offered by Laplace) deserves to be called a theory. But we shall probably never attain to the unquestionable scientific *facts* in the case, since means of investigation are distinctly limited and no final check-up is available.

We shall here give a brief outline of two typical hypotheses of world-development. The first is that of the French astronomer, Pierre Simon, Marquis de Laplace (1749–1827). The second is that of a number of scientists among whom the German biologist Ernest Heinrich Haeckel (1834–1919) holds a position of prominence.

1. Laplace taught that the primordial state of the world was that of a great aeriform sphere revolving rapidly on an axis. The centrifugal force exercised by this mass in its violent whirling motion caused rings of its substance to be cast off into space. Yet the force of attraction, exercised by every bodily mass on every other, held the rings about the primal sphere, and in time (since the rings were drawn to one another as well as to the central sphere) pulled them apart, and their fragments went on whirling

about the central sphere. These fragments took on spherical form themselves, and then they cast off rings of their substance, and the whole process which began with the original sphere of matter was repeated on a smaller scale with each of these fragmentary spheres. And thus came into being the universe of "solar systems," that is, of central stars or suns with planets whirling about them. Our own solar system, as astronomers well know, is but one of a myriad of such systems, and a minor one in point of size; our own earth is but a planet, and, as regards size, but a minor planet in a minor system.

2. Haeckel, and others who, like himself, were wedded to the hypothesis of *natural selection*,—and who, incidentally, proved themselves unworthy scientists by their blind defence of a supposition as an established fact,—held that the original mass of matter had certain points and parts of durability, suitability, or *fitness* which caused them to endure when the moving mass ground and crushed its parts together. Thus, by chance motion and friction, the enduring parts or elements of the primordial mass were separated out. And since such separating was consequent upon the nature of the chance-moved matter, it may be rightly called the product of *natural selection*. By such chance selection the universe took form. By a further exercise of such selection, the universe took on its beautiful arrangement. Thus

natural selection is invoked to explain the existence of the world (stars, planets, nebular masses) and also the harmony and beauty of its order and movement.

### c) INORGANIC EVOLUTION

The term *evolution* usually suggests the biological hypothesis of the development of superior species of living things out of inferior species. But the term itself has no such implication. The term *evolution* means neither more nor less than *development* or *growth*. In our present use of it, the word excludes the whole order of living things, and is used to signify the development of the lifeless world,—the universe of “heavenly bodies” of which our earth is one.

Now, is it likely that this world has evolved out of some primordial mass of matter, created by God, and endowed by its Creator with the capacity and the equipment for developing into the world we now know? Is it likely that God, in the beginning, created the world as it now is, or that He placed it in embryo, so to speak, and gave it the powers and the movements needed to bring it to full form, harmony, beauty?

Certainly, on the face of it, the question of world-development involves no conflict with Revelation, no matter which of the two suggested views is adopted. For God, the Creator, is wholly outside time, and outside temporal processes, and whether the world

was set in form instantly by divine decree, or came into form after the long lapse of ages and the functioning of complex processes, it remains a fact that the world was created by God, and that the full form and development of the world is the work of God. We wholly exclude, as unscientific and irrational, the view of Haeckel that mere *chance* stirred the primal (created) matter and caused it to develop into an ordered universe. Chance is never an explanation; it is never a reason or a cause. Chance merely means something unforeseen or something unintended (or even something unimportant) *in an effect* which has its proportionate producing and sustaining cause. Chance marks (to our imperfect and partial view) some detail *of an effect*; it never is an accounting *cause*. It is only a badly muddled mind that can speak of anything as "the effect of chance." For chance has no effects; chance *is* an effect, or the mark of an effect. The world, then, had its first cause, and in that cause must be radically discerned all that we find in the finished effect, whether this effect was produced immediately or through a long series of developmental stages for which the Creator equipped the primordial matter.

To say that the world was slowly developed out of a great nebular mass of primordial matter is to say what looks likely enough. To say that the world was set in order, much like the present order, at the beginning, looks less likely, but cannot be flatly dis-

proved. But it seems more in harmony with the discoveries of philosophers and scientists, and also more in agreement with the infinite perfections of the Creator, that some process of development,—some *inorganic evolution*,—has brought the world out of a primal state into its present form. Some process resembling the hypothesis of Laplace seems the most reasonable explanation of the forming of the universe.

That a system of development seems more in accord with the divine perfections is manifest from these facts: (*a*) The tremendously great and, at the same time, the minutely complex development of the universe is a striking evidence to man of God's power and wisdom. The world is meant, as Christians hold, to speak to man of God and of His Providence and Love, and therefore man is to find admirable and impressive proofs of the divine perfections in the world. Now, as a work of art or of fine mechanical arrangement impresses the beholder with the skill and ability of the artist who made it, so the world impresses every observant beholder with the power and wisdom of its Creator. And as the admiration for a builder increases as the complexities of his work are unfolded, and the stages of its skillful construction are indicated, so with the world. We are all the more impressed by the limitless power and knowledge of the Creator when we consider His bodily universe as a development,—under the agency of material



forces with which He endowed it,—from some nebulous primordial matter. We are indeed so impressed by the world as it stands; we are much more impressed by contemplating the world in a process of development. Just so, we are impressed by the skill of an artist in metals when we see the finished product of his work; we are a thousand times more impressed when we see him take a mass of gold and, with sure hand and eye, bring it to finished form and beauty. (b) The development of the world from some primordial material substance which was created and dowered with forces for its further formation, causes us to envision portions of the substance moving off to make vast nebular, solar, and planetary systems, and impresses us with the vastness of space in which these developments occur. And the vastness of space, thus strikingly envisioned, is naturally suggestive of the *immensity of God's power and presence* which control the activities of so measureless a field. (c) The long reaches of years, running into staggering millions and even billions, which scientists assign as necessary for each stage of world-development, indicate in a most telling manner God's absolute independence from time, and impress us with an overpowering conviction of the divine *eternity*.

A doctrine of world-development by a process of inorganic evolution does not come into conflict with philosophy. Unlike the hypothesis of organic evolution, the hypothesis of inorganic evolution involves

no difficulty (real or apparent) on the score of an effect superior to its total cause. For inorganic evolution (that is, the gradual formation of the non-living universe under the action of material forces) does not suggest the emerging of new and superior *species* from lower species. The *species* here in question (and these are the real stumbling block in the way of the organic evolutionist) are classes of essentially different *living* bodies, and hence do not concern the cosmogonist at all.

A doctrine of world-development by a process of inorganic evolution is consonant with the findings of physical science. The existence of nebulas, of "hot" and "cold" stars, of star-groupings that look like emerging systems, all suggest stages and states of a process of development. And the whirling movement of the heavenly bodies seems, in its direction, to suggest that these have broken away from one central whirling mass. Yet here there is a puzzling exception or so; for instance, the moons of Uranus are revolving in what may be called the wrong direction.

Summing up the whole question, we may say that the hypothesis of a gradual world-formation, by some evolutionary process affecting an originally created nebulous mass of matter, is not in conflict with philosophy, with science, or with the attributes of the infinite Creator; indeed, the hypothesis appears to be the most likely of the explanations suggested to

account for the present form and harmony of the bodily universe.

#### SUMMARY OF THE ARTICLE

In this Article we have defined *cosmogony* as the science of world-development after the creation of an original mass of primordial matter. We have seen the meaning and value of *a scientific hypothesis*, and have noted its limitations. We have considered, in general outline, two typical hypotheses of cosmogonists, that of Laplace, and that of Haeckel. We have explained the sense of the term *inorganic evolution*, and, after contrasting it with *organic evolution*, we have found that some gradual development of world-form from primordial matter, by a process of natural development under the agency of material forces, appears to be the best available explanation of the physical universe. We have noticed that this hypothesis has reasons to support its probability, and that it is in no wise in conflict with philosophy, science, or Revelation.



## **BOOK THIRD**

# **THE TENDENCY OF BODIES**

This Book discusses the “purposive finality” or the “teleological tendency” manifested by bodies, and by the world itself. Further, the Book studies the plan, or set of laws, according to which bodies exercise their final tendency, and investigates the possibility of exceptions to natural laws. The Book has two Chapters:

Chapter I. Finality in the World

Chapter II. Nature and Her Laws



## CHAPTER I

### FINALITY IN THE WORLD

This Chapter studies the purposive or teleological tendency of bodily reality. After discussing the meaning and the existence of purpose in things, the Chapter establishes the fact that *the ultimate end* of natural bodies is God, the Infinite Good. The Chapter is divided into two Articles:

Article 1. Final Causality

Article 2. The Ultimate End of Creation

#### ARTICLE I. FINAL CAUSALITY

- a) Meaning and Kinds of Causes    b) The Function of the Final Cause    c) Existence of Finality in the World

##### a) MEANING AND KINDS OF CAUSES

A *cause* is anything that contributes, in any manner whatever, to the producing of a reality. Now, the producing of a reality is either a *total* production (no elements, seedlings, or materials being presupposed or required) and then the act of producing is called *creation*; or the producing is the employment of existing things in such way that a new reality (substantial or accidental) comes into being. Only God, the Infinite Being, can create; and God is the First Creating Cause of all reality. God is the first or

*primary* cause; creatures, inasmuch as they are active, and hence *effective*, produce substantial or accidental effects and are *secondary* causes.

Many elements enter into the complete concept of causality. For a cause is anything whatever that has an influence or bearing on the thing produced, that is, on *the effect*. A boy whittling a piece of pine into the shape of a boat illustrates for us many types of cause and causality. The boy, by his own activity, produces the result (that is, the boat), and is therefore *a cause* of the result or effect. But he requires some material to work with; this material makes its contribution to the finished effect, and is therefore a true *cause*. The boy has some notion (clearly envisioned or vaguely sensed) of what the finished product will be, and this serves him as a direction or pattern in his work; hence this too is a *cause*, for it has a bearing upon the effect. The boy requires some suitable tool with which to shape the material, and this, in its own way, contributes to the producing of the effect, and is therefore a *cause*. The finished effect is of a definite substantial kind, and of definite accidental determinateness (such size, such weight, such precise shape extending to the least line or scratch); in other words, the effect is definitely *formed*, as to substance and accident, and here again we discern a contribution to the product and therefore true causality: the "form" (substantial and accidental) is a *cause* of the effect which it constitutes or qualifies. Then the whole work depends upon



some end, motive, purpose. The boy had some end-in-view in starting his work and in carrying it on. This end may have been vaguely sensed or conceived; the boy may have begun whittling without any notion of turning out a boat, and only later (led perhaps by the shape that the wood was assuming under careless strokes of the knife) set deliberately to work to fashion the boat. But there was some purpose in the whittling to start with. And there was some purpose *maintained* or *changed* as the work went on. It may have been mere "idle" activity at first, the purpose being to pass the time, or to experience the simple pleasure of drawing a sharp knife through soft wood. Then the purpose may have been a newly formed intention of making a boat. At any rate, some *purpose* or *motive* entered into the activity, and this purpose or motive makes its contribution to the finished product, and is therefore a true *cause*.

The boy is the active producer of the boat; he is the effecting cause, the making cause, the actively producing cause of the boat; technically he is called *the efficient cause* of the boat. The tools he uses are *instrumental causes* of the boat. His preconceived notion of what he is making or to make; or the picture or image or actual vessel which he uses as a pattern or model, is the *exemplar cause* of the boat. The wood used,—not merely considered as "stuff," but as this precise kind of substance,—is *the substantial formal cause* of the boat: it "forms" the boat substantially as

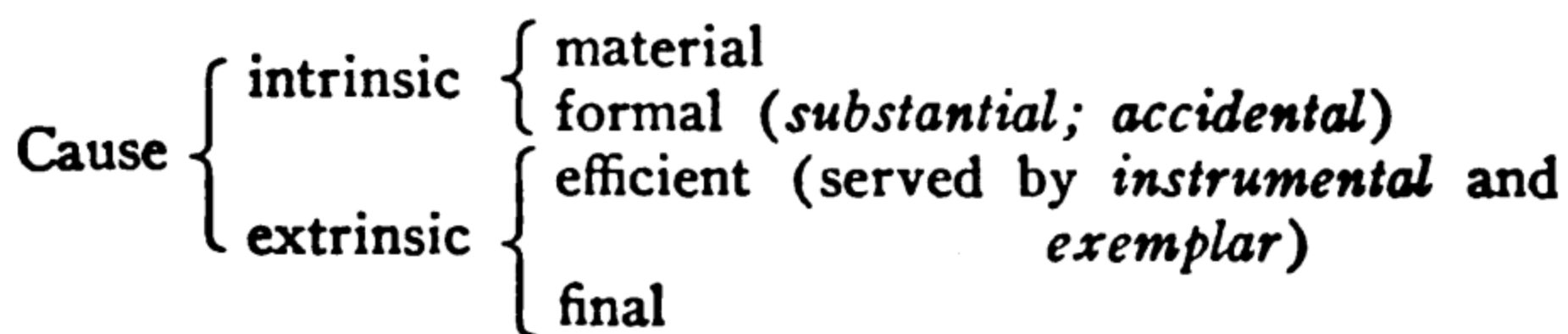
a *wooden* thing, not a thing of metal or of other substance. The accidents of the boat,—such as size, shape, weight, coloring, and all other accidental determinants actually present in the boat, down to the last and least line and scratch,—determine or “form” the boat in its non-substantial character, and these are called *the accidental formal causes* of the boat. The wood used by the boy,—considered merely as “stuff” out of which the boat is made,—is *the material cause* of the boat. The motive or purpose which stirs the boy to the work of making the boat, and keeps him at it, is *the final cause* of the boat.

Notice how every one of the causes mentioned justifies in itself the definition of *cause*. For a cause is that which contributes *in any manner* to the producing of a thing. And a little attention and reflection will make clear the fact that each of the causes named and described above is a true contributing factor to the complete finished product or effect. Without any one of the causes mentioned, the boat would not be precisely and in all respects the actual thing it is; hence each of the causes has made a contribution, and is rightly called *a cause*.

Notice that some of the causes are *right in* the effect. The material cause (the stuff out of which the boat is made) and the substantial formal cause (that which makes wood wood, and makes the wooden boat a wooden boat) are *right in* the finished boat. They are therefore called *intrinsic causes*. Every material

or bodily effect has, of necessity and intrinsically, a material cause and a substantial formal cause. Notice, too, that the accidental formal causes are right *in* the effect; they are determinants that are there. But the efficient cause and the final cause are not right in the effect. The boy who made the boat does not enter in any way into its being or construction; nor is the purpose which led to its making an element resident in the effect. For this reason we call the efficient cause and the final cause extrinsic causes. Notice that the exemplar cause and the instrumental cause are also extrinsic to the effect, even though the effect is *like* its exemplar or model, and a careful examination might disclose what instruments were used in making the effect.

We may sum up the causes we have here been considering in the following schema



#### b) THE FUNCTION OF THE FINAL CAUSE

The final cause has been described as the purpose or end-in-view which leads the efficient cause to action and sustains it in action. It is that "on account of which" or "because of which" the efficient action is undertaken and carried through. Now, the efficient

cause may be a cause equipped with knowing-power, or it may be a non-knowing cause. In the former case, the efficient cause, when led by knowledge of an effect as "good" or desirable, goes after it as *an end* (Latin *finis*) to be achieved; the efficient cause acts with *finality*, or in virtue of a *final cause*, known and desired. If the knowledge which leads on to the efficient action be of the senses only (as, for example, the smell or sight of food), we say that the efficient cause is led by *sentient appetency* to the achievement of its end. If the knowledge be that of the mind or intellect, the efficient cause which acts in the light of such knowledge is led by *intellectual appetency* to the achievement of an end. Another name for intellectual appetency is *will*. If the efficient cause is not equipped for knowing, or if its action is in no way influenced by its knowledge, it is led by *natural appetency* to attain its end; and for such an end the efficient creature will have a certain need, fitness, capacity, or aptitude. A dog seeking its food illustrates sentient appetency or sentient tendency to an end. A man choosing freely to eat or to fast illustrates intellectual appetency; and, inasmuch as the man may choose to fast despite hunger, we see that an end may be envisioned intellectually and freely chosen, even when an opposite end makes its appeal to the senses. A tree in its tendency to grow to maturity and fruitfulness and to maintain itself in that state illustrates natural appetency or natural tendency to an end; so does a stone in its tendency to

follow the laws of cohesion, gravitation, inertia; so also does man and animal in their purely material or bodily tendencies and in the tendencies of their vegetal life. In every case, an efficient cause tends to produce its effect under the appeal, or in the direction, of *an end* or *a final cause*. An efficient cause exhibits in its action a true *final tendency*.

Final tendency, which takes its name from the Latin *finis* "end" (and the Latin adjective *finalis* "related to an end; final") is sometimes called *teleological tendency*, a term which derives from the Greek *telos* which is the same as the Latin *finis*. The scientific discussion of ends is often called *teleology*.

It is the function of the final cause *to invite* the activity of the efficient cause, or, at least, *to serve as a goal* towards which such activity is directed. In the case of creatures (that is, limited causes, or *secondary causes*) the final cause is often *the motive* (more or less accurately so called) of their efficient causal action. In the case of God, however, the sole *primary cause*, there can be no question of a literal *motive*. For a *motive*, taken literally, is a moving power or force which affects the efficient cause "from the outside" so to speak, and *moves* it to its action. Now, God is not moved. He is the Infinite Being. No external cause can affect Him. Indeed, there exists no positive reality which has not come from God, and it would be absurd to think of God as *moved* by that which has its whole power and all its influence from Himself. It would

come, in last analysis, to the thought of God moving Himself through the medium of a creature. Therefore, since God is not moved by external force or power, He is not, in the literal sense, *motivated*. He acts efficiently for the most perfect *reason*; He acts with the most sublime *purpose*; He acts to a perfect *end* or final cause; but He does not act under *motive*. The science of theodicy demonstrates the truth that God, the First Efficient Cause of all things, is also the Ultimate Final Cause of all. God's efficient causality in the creating, conserving, and governing of creatures is, first and foremost, to the end that His glory be manifested externally, formally, objectively; in other words, God Himself is the *end* of the divine casual efficiency. Cosmology, however, cannot undertake this question in detail, although we shall deal with it summarily in the next Article. Here we stress the point that the efficient action of secondary causes is often exercised (and, in one sense, always exercised) under the appeal, the motive force, of a final cause; whereas the efficient action of God, the primary cause, is directed to a purpose or end freely set to be achieved. Of both creatural and divine efficient action we accurately say that it tends to an end, a purpose, a final cause, a goal; but of creatural action alone may we say that it has a *motive*.

To sum up: the function of the final cause is to serve as the reason, the justification, the explanation of efficient causal action. The final cause is "that *on*

*account of which* the efficient cause acts." It is the goal freely set to be attained, or the goal already set and determined towards which appetency (natural, sentient, intellectual) inclines the efficient cause in action. The final cause can always be called the end-in-view, the reason, the objective, the goal, the purpose of efficient action; for creatures, it can also be called the motive of efficient action.

For creatures, final causes may be many and various, even in the one act of efficient causality. Final causes may be linked up like the sections of a chain or the steps of a stairway. Some are *proximate*, ready to hand; others are farther off or *remote*, and, in any series, one will be the most remote of all, it will be the *ultimate* end, and it will give reason and existence to the whole series which is directed towards it. In a similar way, the steps of a stairway confronting a man who wishes to get to the next floor, are proximate, remote (intermediate), and ultimate (or most remote). The first step is proximate; it is to be taken first of all; the others are remote. When the first step is taken, then the second is proximate, the others remote. The last step of all gets the man to his desired destination, and it was for the sake of getting there that each and all of the other steps were taken. Thus the ultimate end is one that gives meaning and force to all the other ends in its series. The ultimate end, in the old saying, is "first in intention, last in execution," that is, it is first in the intention or the

drive of the efficient cause; it is the thing really set as a goal; but it is the last to be obtained, for the ends which lead to it must first be gone through and achieved. The proximate and intermediate ends (that is, the proximate end, and the remote ends that lie between the proximate and the ultimate end of a series) are thus seen to be no *ends in themselves*, but rather *means* to the ultimate end.

To illustrate all this. A young man wishes to become a lawyer. He enters the law school, a callow freshman, with this *ultimate* end in view. Without the ultimate end he would not undertake the achieving of any of the ends (which serve as *means* to the ultimate end) in this special series; just so, without the will to get to the next floor, the climber would not take *any* of the steps of the stairway. The young man has, in his freshman year, the proximate end of passing his examinations and being promoted to the next class. Once there, he fixes on the further promotion as the next end or objective. And so on through his course. He has, as ultimate end of this series, the attaining of his degree and the status of a recognized man of the law. That is the *ultimate end* of this particular series. Yet that ultimate end is not *absolutely* ultimate. No, in its turn, it is subordinated to other ends, to wit, the holding of a certain social station, the possessing of the means of gaining an honorable livelihood, and so on.

It is the task of ethics and of rational psychology



to prove that man, in his human actions ( that is, in his deliberate and responsible efficient causal activity) tends towards one absolutely ultimate end, one infinite master end, which is *boundless good* and *happiness* in the possession of that good. Presently, we shall undertake a task proper to cosmology, and show that the whole bodily universe exhibits a tendency to the one absolutely ultimate end, the *summum bonum*, the boundless good, which is God Himself. (Cf. *Article 2 of this Chapter*)

c) THE EXISTENCE OF FINALITY IN THE WORLD

No one in his senses can deny the wondrous order and action observable in the bodily world. We cannot deny that bodies hold their being, and that they *do things*, and by doing achieve what they set out (consciously or unconsciously) to do. And where we note failure in achievement, we are still forced to acknowledge the drive, the *effort*, so to speak, in the direction of an end

Nobody, in fact, denies that ends are achieved in this bodily world; nobody denies that things tend towards their proper and proportionate ends. What many do deny is that this tendency to ends is *intended* by any power or person, worldly or other-worldly. These objectors to the doctrine of finality regard the world as a universe that has somehow been shaken out of a chaotic state into an ordered one, but they deny true *design*, and they deny true *finality*, which

is always, in the last analysis, something which comes from *an intelligent and purposive power*.

When we assert the existence of finality in the world, we assert that the order, design, and action observable in the bodily universe is the product of an Ultimate Intelligence which *meant* and *intended* things to function so. We not only assert that ends are *worked for* and *obtained*; everybody must admit so much. We assert that these ends are also *intended*.

Those who deny true finality are, among others, pantheists, Kantians, atheists, materialists, philosophical naturalists. The pantheists make the world itself divine, in one way or another, and thus render all bodily activity meaningless, for it is but a function (real or apparent) in the infinite Being and an end unto itself. The followers of Kant deny all objective (or trans-subjective) reality to the world, and therefore render futile all attempts to know whether there is any true causal activity in things. The atheists (misnamed, for the human mind cannot formulate sheer negation, and atheism is never a simple denial of God but always a replacement; it is a substitution of some false God,—nature, force, energy, etc.,—for the true God) deny true final causality because their ugly and untenable theory of “no God” will not allow them to acknowledge a First Cause which has set the world in being and applied it to its ends. The naturalistic philosophers will not look beyond the functioning of “nature” for the ultimate explanation which

reason insists upon pointing out, and hence they do not concern themselves with the roots of finality and purposiveness observable in the bodily world.

Against the mistaken and shortsighted theories here mentioned, we take our stand, aligning ourselves upon the side of reason. We assert that natural bodies,—and the bodily world, in consequence,—exhibit a true finality. Further, we declare that this finality is not merely *extrinsic* to bodies (that is, it is not a matter of external moving or “shoving” of bodies towards their ends, as billiard balls are driven by the impact of the cue), but is a true *intrinsic* finality whereby bodies are, in their very nature, formed and inclined to the active attainment of due and proportionate ends. Now, a “due and proportionate end” of any bodily reality is one that is fitted to round out the perfection of such reality or to hold it in its perfected state; in a word it is something *good* for the reality itself (that is, it is *bonum sibi*), and, secondarily, such a “due and proportionate end” may be a service which the perfected reality may render to other things (that is, it is *bonum aliis*).

We may sum up our doctrine on this point in the following statements: There is in natural bodies a true intrinsic finality by which they tend towards what is good for themselves (*bonum sibi*). Secondarily, this tendency may result in what is good for things other than themselves (*bonum aliis*). In this final tendency of bodies, we discern the plan or design of an intel-

ligence, and, in last analysis, of the supreme and infinite Intelligence.

To prove these several points :

1. *Natural bodies have a true intrinsic finality*—We notice that bodies act in a manner that is consistent, constant, uniform, each in its kind. Now, what is consistent, constant, and uniform, can in no wise be considered as something that merely *happens* or *chances* to occur. For *chance* is defined as “something that happens without being intended”; it is never a *cause*, but an *effect* which is unforeseen or unintended. And such an effect is, by its very nature, an exceptional and unpredictable thing. But what occurs consistently, uniformly, and constantly, is neither exceptional nor unpredictable. What occurs consistently, uniformly, and constantly, is an effect intended and *directed to an end*. Further, what is intended and directed to an end has true *finality*. Therefore, we may, and indeed must, conclude that natural bodies, by reason of their constant and uniform activity, have true finality. But is this finality intrinsic? We answer that it is, and for this reason: consistency and uniformity, especially as manifested under various extrinsic conditions, indicate an intrinsic source or principle. Natural bodies tend always to produce the same effects; a plant tends to grow, to achieve and maintain maturity and fruitfulness; fire tends to burn combustible matter; chemical substances tend by their affinities to combine in

certain invariable proportions, and so on. It is manifest that this tendency in bodies is an *inner* tendency, a tendency that comes from the very nature of bodies, and not from some set of external circumstances, even though certain circumstances may be required as *conditions* for the tendency to have its full effect. For the tendency or drive will be manifest, even when the conditions are not right for its full exercise. A tree planted in suitable soil will grow; in unsuitable soil, it will die or will fail to develop properly; but even in the unsuitable soil, it will give evidence of its tendency; it will, as we may say, "try" to grow. So with non-living bodies. A piece of coal will hold to its nature, and will lose it only under the action of a strong external force; intrinsically it "hangs on" to its being. We are fully justified, then, in our assertion that natural bodies exhibit a true intrinsic finality or tendency to an end.

2. *The intrinsic finality of bodies is towards what is good for them*—By the "good" of a thing, or "what is good for it," we mean, first of all, what holds it in being, develops it fully, maintains it in the complete possession and play of its powers or activities. Now, the world manifests the fact that bodies tend to conserve themselves ("self-preservation is the first law of nature"), and they give up their being only under the force of external agencies. The stone wears away only under the action of wind and water or under the

blows of other bodies; the plant sends out root and radicle to hold its place firmly and to take in food; plant and animal tend to repair all reparable wounds or injuries and to carry on, even if in a hampered way; the spider spins its web, the bird builds its nest. In all this we see the tendency of bodies to keep themselves in being and to achieve what is useful or necessary for their permanence and effectiveness. Living things tend not only to hold the *individual* plant or animal in existence and to bring it to maturity and perfected activity, but they tend also to propagate and make permanent *their kind* or *species*. Thus there is manifest in the world of bodies an indubitable tendency towards an end that signifies *the good* of the bodies themselves and of *their kind*.

3. *The intrinsic finality of bodies is sometimes, secondarily, for the good of other things*—Thus the prodigality of nature in the matter of seeds. The oak may seem to waste uncounted acorns, most of which will never survive to develop into trees; but there is no true waste. The acorns serve as food for animals, as fertilizer for the earth. And even though the inner drive of the seed towards its own development and fruitfulness is never to come to realization, the secondary tendency is carried out in the benefit bestowed on other bodies. Scientists tell us that flies, fishes, frogs, and indeed all animals, give off millions of germinal cells or “seeds” which are never brought

to development; here again, the prodigality of nature manifests, on the one hand the *determination* of nature (the intrinsic finality) to get *some* seeds into circumstances and conditions favorable to growth and development, and, on the other hand, it manifests a bounty of goodness to the other things which benefit by the undeveloped seeds. There is yet a third good for others (*bonum aliis*) which nature shows in her unstinted gifts; intelligent creatures (that is, men) must be impressed by her bounty with the utter goodness, the limitless generosity, of the Giver of all good gifts.

4. *The intrinsic finality of bodies indicates the plan or design of an intelligence and, in last analysis, of the supreme Intelligence*—That bodies tend to due and proportionate ends which are good for themselves, and often for other things, is, as we have seen, a manifest fact. But there are some stubborn minds which will not admit that this tendency is the product of any intelligence; that it is not something foreseen and *intended*. This theory of denial boils down to the theory that the order and harmony of bodily activity, as well as the arrangement and plan of the bodily universe and all individual bodies in it, are products of sheer chance. Surely, only stubborn minds that will not even look at the evidence furnish the sole explanation of this absurd opinion. For consider the complexity of a single body, nay, of a single atom.

Consider the wild variety of bodily beings, and of parts and elements in the same body. Yet with this complexity and variety there is beautiful balance, harmony, interrelation of part with part, of function with function. And this not *once* or in *a single item* of the world's array of bodies, but *everywhere*, in *everything*, and (most amazing of all!) *all the time*. If a wondrously complex, yet balanced and harmonious, bodily substance were found *once*, one might be tempted to say that it *could* have happened without intention; yet, even then, the temptation would be brushed aside as nonsensical. Design and balance amid complexity is always recognized, by the very skeptics and agnostics, as clear evidence of mind and intention. The crudest tool fashioned by our remote ancestors is recognized as a thing made with purpose and with some understanding of use; in a word, it is recognized as *intended* by an intelligent artificer. And no one would think of saying that the more complicated examples of man's skill and ingenuity (say a watch, a radio, an automobile, a telescope) merely happened to fall into ordered arrangement by unintentional chance. Yet the finest of man's works of art or skill are as nothing compared to the meanest natural body. And when we remember that the bodily world is undergoing constant change, that atoms and atomic parts are in a whirl of motion, that accidental and substantial change are the continuous "order of the day," and that, notwithstanding, the harmony



and balance of bodies are faultlessly preserved throughout the process of change, we are speechless with amazement, we are powerless to conceive or to express appreciation, and we are overwhelmed with the crass stupidity of the silly theory of mere chance. Such things as these,—these natural bodies of marvelously exact and balanced construction, of plain and resistless tendencies to their good,—are certainly things planned and intended by a wondrous intelligence; they are things known and intelligently directed to the attainment of their ends. More: since every positive reality must be ultimately traced to a First Reality, supreme and infinite; since every perfection must be ultimately founded in the First and Infinite Perfection, it is manifest that the perfection called intelligence must come to creatures, and affect finite things, as the manifestation of the ultimate and supreme Intelligence.

Sometimes we hear objections to our doctrine from those who are puzzled by what they call the imperfections of the world and of the bodies. At the outset, it must be clearly noticed that anyone who talks of imperfections acknowledges the existence of perfection; for imperfections are only deficiencies noticed in a plan or product that offers knowledge of a standard, that is, of perfection. Hence the objectors who point out this or that fact as an imperfection in the world of bodies acknowledge, by that very action, their own recognition of the order, plan, and balance

of intelligently planned and directed existences. They find fault with the intelligence which has arranged things so; but to find fault with an intelligence is to admit that the intelligence exists. To lay blame upon a being, is to acknowledge that the being is an existing and responsible actuality, an intelligent author of its acts and operations.

The so-called imperfections in the world, or *physical evils* as they are called, cannot long engage the attention of the student of cosmology; the science of theodicy deals with these things in detail, and proves conclusively that physical evils are in no wise inconsistent with the divine wisdom or with the decrees of providence. All the cosmologist has to do is to show that the world in general, and some individual worldly bodies in special, are manifestly directed to an end by an intelligent power, which ultimately is the divine power. That here and there we find bodies *whose purpose we do not understand* is nothing; we cannot expect to understand every detail of the vast universe with our strictly limited minds. And we have had telling lessons in the unwisdom of concluding that anything lacks purpose because we do not understand that purpose. A few years since, men of science were of the opinion that the pituitary gland was a "vestigial organ," a thing now meaningless in the human structure; we know better today; we know that this gland has a tremendously important purpose, a purpose bound up with the functions of growth and bodily development,

and fraught with issues of life and death. It was recently thought that the vermiform appendix was a thing useless and purposeless; it is now known that it has a definite function in the economy of the human body, although we have no perfect agreement among medical men on the exact nature of that function. Even if there were bodies which we could justly call purposeless (ignoring the tendency of every bodily being towards its own conserving and maintenance as a *bonum sibi*), we should find in these no obstacle to our doctrine on finality. Even if nine-tenths of the bodies in the universe could be called purposeless, we should still find, in the remaining tenth, proof positive of our position: that an intelligent power (and ultimately the infinite power) has set these in their place and directed them, intrinsically, to their ends. Just so, even a disorderly and cluttered house, filled with meaningless bric-a-brac, presents clear evidence of purpose, for it is manifestly meant for a refuge, a shelter, a human habitation, a home.

#### SUMMARY OF THE ARTICLE

In this Article we have set forth the definition of *cause*, and have listed and explained the more important types of causes. We have dwelt in detail upon the meaning and the function of *the final cause*. We have noticed the inescapable fact of *a final tendency* or *a teleological tendency* in natural bodies. We have seen

that bodies not only tend to *obtain* an end, but that it is an end *intended*, and ultimately intended by the Supreme Intelligence. We have proved, in detail, that natural bodies have *a true intrinsic finality* towards that which is *good for them*, and often towards that which is *good for other things*, and that this finality is evidence of the plan or *design of an intelligence* and ultimately *of God*.

## ARTICLE 2. THE ULTIMATE END OF CREATION

a) Types of Ends

b) The Ultimate End

a) TYPES OF ENDS

We have already noticed that there are final ends or causes which lead on to further final ends or causes. There is, in creatural activity, a scale or hierarchy of purposes, some at hand or *proximate*, others *remote*, and, in each series of related actions, one is *ultimate*. Again, ends, considered in themselves, are seen to be desirable on their own account, or only desirable in view of that towards which they may be employed as *means*. Still again, ends, considered in reference to the appetency or drive of creatures, are simply *natural* ends, or they are ends *known* and *intended*. We shall discuss these types of ends in a series of short paragraphs:

1. An end or final cause is always *a good*. For a good is defined as anything that can be appetized, gone

after, tended towards, sought, desired; in a word, it is *an end*. Now, a good may lie close to hand; it may be achieved, so to speak, by simply taking it up without ado. Or it may lie further off, and certain measures must be undertaken to lay hold of it. In such case, the measures themselves become desirable, become *ends*; they are ends which are also *means*. And in any series of measures to an end, the first to be undertaken is a *proximate end* or an *immediate end*. The others (*means* and *final end*) are *remote ends*. The most remote end is *the ultimate end* of the series in question. Between the proximate end and the ultimate end lie one or more remote ends, and these are called *intermediate ends*. To sum up: Ends are *proximate* or *remote*. Remote ends are *intermediate* or *ultimate*. The ultimate end in any series is the end which gives meaning to the whole series. Similarly, the floor to which a flight of steps leads, and which is to be attained only by climbing the steps, one after another, is the thing which gives meaning to the whole flight; unless one wishes to reach that floor, one takes *none* of the steps at all. Now, there is an ancient Latin saying which is almost self-evident, at least to one who has grasped the meaning of ends as here outlined; it is this: *Omne agens agit propter finem*; that is, "Every agent (doer, performer, acting thing) acts to an end or for a purpose." And the saying is rounded out by the phrase: *et quidem propter finem ultimum*, "and indeed to an ultimate end, or for a final purpose." But

what of ultimate ends themselves? Are they, in each case, unrelated to anything other and further? No, the ultimate end of *a series of ends* is ultimate only *in relation to* or *relatively to* that series. It is an end only *relatively* ultimate. Now, all series of ends, together with their respective ultimate ends, must somehow take being and meaning from a universal tendency towards an end which is ultimate in every conceivable way, that is, towards an end which is *absolutely ultimate*. It is of this absolutely ultimate end that we shall speak in the next section of the present Article.

2. An end or a good towards which an agent tends as towards its ultimate end (at least relatively) is something actually or apparently good *in itself*; it is something aimed at as a desirable object, a thing good to have. Such an end is called, in the old philosophical terminology, a *bonum honestum*, that is, a thing objectively good in itself and desirable for itself. What serves as a means towards the acquiring of such an end or good, is itself desirable (and hence an end) because it can be *used* to attain the *bonum honestum*; such an end is called a *bonum utile*, that is, a useful good, a useful end; it is a *means* to the ultimate end. Again, the enjoyment of possessing the ultimate end stirs the agent to achieve that end; hence this enjoyment is itself something sought; it is a good or an end. It is called a *bonum delectabile*, that is, an enjoyable good or end. Thus when a man enters a hospital to

undergo a painful, dangerous, and expensive operation, he chooses the operation, the suffering, and the expense; these things are chosen as desirable or good; they are an end. But these troublesome things are not chosen for themselves, or as a *bonum honestum*. No, they are chosen as *useful* to attain the *bonum honestum*, which is health and soundness of body, at least in such measure as health and soundness are recoverable in the special case considered. Health and soundness are the relatively ultimate end; pain, inconvenience, expense, etc., are ends (proximate and remote) which constitute the *means*, and the circumstantial accompaniment of the means, which lead towards the attainment of the ultimate end; they are a *bonum utile*, or useful good or end. And the *enjoyment* of health and soundness, once possessed, is an end sought and intended by the patient; it is a *bonum delectabile*, a pleasing or enjoyable good or end.

3. A good or an end may be good and desirable because it squares with right reason, with conscience. Such an end or good is a *moral* good. An end considered without reference to conscience, without reference to right and wrong, is called a *physical* good or a physical end. A man who labors to make truth prevail seeks a moral end. A man who strives for health, wealth, or position (regardless of the morality of means employed, whether these be right or whether they be wrong) seeks a physical end, a physical good.

4. A good or an end is either *natural* or *known*. Creatures that lack knowledge (lifeless things and plants) tend by natural appetency towards what is good for them; this is tendency towards a *natural* end. Creatures endowed with knowledge are led by sentient appetency or by intellectual appetency towards certain ends, and these seek an end *known*, and, in the case of man acting rationally, an end *intended*.

#### b) THE ULTIMATE END

It is evident that an agent acts towards a last end in each series of connected actions. And to one who thoughtfully considers the matter, reviewing his own experience by way of illustration and proof, it is equally manifest that ends *relatively ultimate* are always directed to some further end,—the absolutely ultimate end, the end of all ends. This absolutely ultimate end must be, in its own objective character, a single end, not a collection or group; further, it must be the infinite First Being, that is, the First Efficient Cause of all or God. Thus God is rightly called the First Efficient Cause and the Ultimate Cause of all.

Why must the absolutely ultimate end be only one? And why must this one end be the infinite God? Consider that the direction of finite beings to their ultimate end, absolutely speaking, must be the work of an intelligence; we have already proved as much. And we have shown that this intelligence must, in



last analysis be the First Intelligence, which is both *One* and *Divine*. Therefore, it is the one God who directs creatures to their last end; and He Himself must be the end to which they are directed, since He alone is the eternal and self-subsistent *Good*. Let us consider some evidence for these facts in greater detail:

1. The ultimate end of all creation, that is, the absolutely ultimate end, must be the end set by the Creator. So much is manifest; for all that a creature has, in being and in activity, is from the Creator. Now, the Creator could not have set for His creatures any absolutely ultimate end except Himself. For, had the Creator intended any other end or *good* than Himself (which, indeed, could not have even existed before creation), He would have been *moved to create* by the attraction of this end, this good to be achieved. But here we face a double absurdity. First, the infinite Being would have been affected by a cause distinct from Himself, whereas, as a fact, God is in no wise affected by any cause, nor can any cause exist or have effectiveness except from God; and to say God is self-caused, in being or activity, is a contradiction in thought and in terms. Secondly, if God were moved to create for the achievement of some good, we should be forced to conceive of God as *lacking* this good and *acquiring* it by creating; but God is infinite and lacks nothing, nor can He acquire

anything, since He is absolutely and eternally all-perfect. Hence it is strictly inconceivable that any ultimate end or good other than God Himself could have been set for creatures.

2. There is no tendency towards an end except as *towards a good*. Even free creatures, who have *the choice of means* (which we call "freedom of choice") are not free to set for themselves an absolutely ultimate end of their being or activity. Man, in every free-act, seeks what is *good*, that is, what promises satisfaction, what is discerned as desirable or *good to have*. Even when he sins, and sins knowingly and perversely, he clothes the object of his choice with the mask of goodness or desirability; it is quite impossible to choose evil for its own sake and *as such*, since evil is, by very definition, the absence of good, the absence of desirability. Of course, the choice of evil under the mask of good (*apparent* good; something *sub specie bonitatis*) is an abuse of the choosing power, for it is a choice which *conflicts with reason* whereby a normal man knows that his whole life should be directed. The true use of free-choice, like the inevitable drive of non-free tendencies in irrational creatures, is ever towards the true and real good. Hence it is clear that the ultimate end must be the Ultimate Good, the Supreme Good, the *Summum Bonum* which leaves nothing beyond that could possibly be appetized or desired. But this Supreme Good can be no other than

the Supreme Being, the Infinite Good, which is God Himself.

St. Thomas Aquinas has an interesting word to say on this subject in his book *Contra Gentiles* (Bk. III, Ch. 17): "The *end* holds a place of primacy among causes, and upon it all other causes depend for their actuality as causes. For no agent acts except to an *end*. Now, a *further* end is the cause for intending an *earlier* end that leads to it; an agent is not moved to achieve a proximate end except in view of one farther on. And so the ultimate end is the first cause of all. Now, to be the first cause of all is something that belongs to the First Being. God, therefore, is the ultimate end of all things. Hence we read in *Proverbs, xvi, 4*, 'The Lord hath made all things for himself,' and in *Apocalypse, xxii, 13*, 'I am Alpha and Omega, the first and the last.' "

It is easy to see that, in any series of *final* causes, the ultimate cause or ultimate end holds the place of primacy, and that upon it depends the activity of the *efficient* cause. We must notice further that, without the activity of the efficient cause, the *material* cause would not be employed, nor the effect given *formal* actuality. Thus, upon the ultimate final cause the actuality of all other causes *as causes* depends. For this reason the ultimate end or ultimate final cause is rightly called "the first cause of all"; and it is easy to see that, in its absolute sense, the phrase "the first cause of all" must necessarily describe the First Being or

First Efficient Cause. Hence the First Efficient Cause is also the Ultimate Final Cause.

Now, it may be asked *how* or *in what manner* is God the Ultimate End of All Things. There must, indeed, be some marked difference between the way in which God acts towards Himself as last end, and the way in which creatures (that is, secondary and limited causes) act to the last end. For creatures invariably seek to attain something which, at the moment, they do not possess; the end invites them; it offers promise; it motivates their activity. But God is infinite; He lacks nothing; He seeks to attain nothing for Himself in His own most complete and perfect Being. How, then, can He act to an end?

The simple answer to the seeming difficulty is this: God acts, in His causal operations, to *manifest His goodness*, and by this manifestation to *procure His external formal and objective glory*. Notice that the thing which God seeks, so to speak, to "procure" is nothing that belongs to His Being, or is to be taken into His infinite Being; it is something *external*, and without which God would be God, completely perfect, completely self-sufficing, completely infinite. There is not, as with creatures, a tendency in God to procure something lacking to Himself. No, it is the free choice of God to manifest His goodness *outwardly*, and, by that manifestation, to have an *outward* formal recognition of that goodness. Not as a man seeks praise

or fame does God act towards Himself as *to be glorified*. Rather, as Infinite Goodness freely pouring out its immense benefit to creatures; as Infinite Truth shining out to be known (and hence *appreciated*) does God act; and this activity is to the end that creatures share His goodness; that creatures capable of formally recognizing and knowing Him may be drawn to Him in loving service and, at the last, in endless happiness. Thus "to draw all things to Himself" does God act towards Himself in creating, conserving, and governing creatures; in other words, God, in His causal efficiency, acts towards Himself as towards the Last End, the Ultimate Final Cause.

Let us utterly avoid the stupid blasphemy of identifying God's direction of all things to Himself as to their last end with the thing which we condemn in creatures (notably in our fellow men) as selfishness, self-seeking, or "looking out for number one." A man is condemned of selfishness and self-seeking only when he *misdirects* his rational activity and seeks *false* ends. The man who places his whole heaven in repose, wealth, power, influence, pleasure, is called (by a strange twist of language) a self-seeker. But there is more truth in the old saying that such a man is "his own worst enemy" than in the saying that "he loves himself." A man that seeks to save his soul is not selfish, but is merely doing the thing he is made for, and tending directly and rightly towards the last end for which he was created. Nor will normal minds re-

gard such a man as selfish in the evil sense; for he will be a man of goodness, he will manifest his love for his fellows, he will be eager and constant in practising the social virtues; in a word, he will be most *unselfish* in all his relations with others. Yet he will be, at the same time, tirelessly engaged in the quest of that last end which means the complete success of his life and the complete happiness *of himself*. In a silly cinema, a few years back, one of the actors was made to say with scorn that he could tolerate no "salvation seekers" because they were "selfish." But what was this intolerant person seeking? Was he not posing his own ideals (whatever they were) as the "salvation" of reasonable men? Yes, he was caught in the inevitable dilemma of every stupid radical who wishes to play God and upset the universe that he may rebuild it on his own plans. One cannot escape the necessity of a goal for any action; every agent acts to an end, and ultimately towards a last end. And well for the agent (if free to choose) that he chooses those means (that is, ends, proximate, remote, and relatively ultimate) which will carry him towards his true last end, and not away from it. But, in any case, it will be the true last end which he will seek, whether he reasonably seeks it by means which really lead to it, or perversely seeks it where reason assures him it cannot be found. The point here to remember is this: it is not selfishness and self-seeking (in the evil sense) that marks the activity of things and of men in their

strivings towards their true last end; no, selfishness comes in when the self is deified, and false means are employed which bear one away from the true last end.

Now, when we speak of God, we speak of the Infinite and All Perfect. There can be no conceivable *perversion* of God's activity, no seeking of the last end by false means. Hence there can be none of that creatural evil called "self-seeking" and "selfishness" in God. On the contrary, God's tendency towards Himself in His causal action, is, first and foremost, the wondrous diffusion of goodness and love to His creatures. No "selfishness" there. And by recognizing and proclaiming that divinely manifested goodness, creatures come to their own greatest treasure, their own last end. And so, each in its own way, creatures return to God; thus is He their Final Goal. And thus is God Himself both the Efficient Cause of creatures and their Final Cause; His creative, conserving, governing activity goes out from Himself to return to Himself. He acts towards Himself as towards the Last End.

Another point to remember in passing. All the bodily creatures of God, save man alone, are directed *of necessity* towards their last end. They achieve it by existing, by their connatural functioning. Man, however, has freedom of choice; that is, he is free to choose *the means* by which he will seek that Last End which he is *not* free to alter or transfer. If he perversely abuses his freedom of choice; if he comes to

endless woe instead of endless happiness, the changeless Final Purpose of God is in no wise affected or defeated. Man may defeat the plans of God in so far as these affect *himself*; he cannot defeat them in so far as these are God's irrefragable designs. In heaven or in hell, the human creature will still manifest the divine goodness, justice, mercy. And if it be in hell that a man must show forth the eternal justice, it is himself that has so determined. It is not God that has destined him to hell or has sent him thither; it is his own perverse choice, his own free will, foully abused, that has sent him there and keeps him there.

We say, then, that God, in creating the world, intends to manifest His goodness and to procure, by that manifestation, His own extrinsic formal and objective glory. Let us look at the meanings of terms and phrases in this statement:

1. *Glory* is defined by St. Thomas as *clara notitia cum laude*; we may translate this as "adequate recognition and appreciation." It means that when a thing of excellence is clearly known, and its excellence appreciated with due praise, that thing is *glorified* or has glory. Now, there is a twofold sense in which the term *glory* can be understood. First, it may mean *the excellence* of the thing which deserves praise, whether, as a fact, praise is given or not. A man who has painted a masterly canvas has produced a thing of excellence and has manifested the excellence of his own powers.



This is quite true, whether the canvas is viewed by others or is kept in hiding from all eyes save the painter's own. The thing *objectively* or *in itself* has excellence; so have the powers which executed it. We may say of the painting that it is an excellent (or glorious) piece of work; more justly, we may say of the painter that he has gloriously manifested his own excellence of skill and conception in making the painting. We say of the work that it is (as Father Rickaby puts it) "*a credit to the artist.*" Being a credit to him, it embodies or manifests his *glory*. This type of glory is *objective glory*; it is the glory which accrues to the agent (here, the artist) by reason of the fact that this *object* (here, this painting) exists as a work which stands *to his credit*. Hence, the excellence of a work of art or nature is itself *the objective glory* of the author of that work. But it is not yet glory in full character, full-fledged, rounded out, complete; in other words, it is not yet *formal* glory, or *glory as such*. To be *formal*, glory requires recognition and some measure of praiseful appreciation of that excellence which is its objective basis. The painter has not *formal glory* until the painting is seen, is known, and given at least a measure of deserved praise.

2. Taking glory from another angle, we distinguish it as *intrinsic* or internal and *extrinsic* or external. Intrinsic glory is, first of all, the objective excellence which is *in* a work of art or nature, or indeed in any

actuality (and here it is objective but not formal); it is also the due recognition and appreciation which a person has of his own excellence (and here it is both objective and formal). The artist produces a work which in itself has excellence; further, the artist knows his powers and appreciates them; thus in the work and in the artist we find *intrinsic* glory. In the work, this intrinsic glory is wholly objective; in the artist, the intrinsic glory is objective and formal. External or extrinsic glory is an outer manifestation of excellence (and then it is objective and not formal); it is also the admiration and praise given by those who know and appreciate the manifested excellence (and then it is both objective and formal). The glory of a work as an excellent object is intrinsic and objective. The glory of the worker, self-recognized, is intrinsic, objective, formal. The glory of a work as an expression or manifestation of the *worker's* excellence is extrinsic (that is, it is *outside* the worker) and objective. The glory of the worker, recognized and appreciated in the work, *by others* than himself, is extrinsic, objective, and formal.

3. God's intrinsic glory consists in His own supreme and infinite excellence and in the loving knowledge which God necessarily has of Himself. God's extrinsic glory consists *objectively* in His admirably fashioned creatures. It is of this objective glory that the Psalmist speaks when he declares that "The heav-

ens show forth the glory of God, and the firmament declareth the works of his hands." God's extrinsic glory consists *formally* in the knowledge, love, and praise which His rational creatures give Him on account of His manifested excellence. This is the glory given to God by free-will rightly used; it is given by dutiful men and angels. This is the glory we give to God when we seek to achieve the purpose of our being and "know, love, and serve God." It is of this formal and objective glory that we speak when we cry, "All for the glory of God!"

4. All the creatures of God are, so to speak, works of the Perfect Artist. They are *a credit* to Him. In themselves, objectively, they are excellent things. And why? Because, like all works of art, they are outer expressions of the artist's own ideas. The human painter puts on canvas what his own mind and fancy have first inwardly depicted, and this is true even when the painter employs an outer pattern or model. The Divine Artist finds *in Himself* the patterns and models. He knows all things perfectly from eternity *before they are made*. They are made, and indeed they are makable, solely in so far as they are first *known* eternally in the Divine Mind. Hence, each creature is not only a manifestation of God's power and knowledge; each creature is also a kind of *imitation*, and, in its own way, *a reproduction* of the Divine Mind, of the "archetypal ideas" of God. And, since God is

wholly uncomposed, each creature is, in its own limited way, a manifestation of God Himself. Hence creatures have in themselves, objectively, a manifest and marvellous excellence.

5. Creatures less than man, in this world of bodies, have, as their proximate end, *their own good*; as an ulterior (or remote) and intermediate end they have *the good of man*; as their absolutely ultimate end they have *God Himself*. Things less than man tend, by their very nature, to maintain themselves in being and to exercise their connatural functions, to achieve their connatural perfections in a rounded and complete way; this is their *bonum sibi conveniens*, their own connatural good. But these creatures serve *man*. They furnish him with food, with clothing, with suitable instrumental power in his toil on earth. And, by his study of these creatures, man comes to recognize his own dignity and destiny, and the goodness and perfection of the all-provident God. Thus creatures point out to man the existence of the Creator, the Designer, the Governor of the universe; they lead man to know, love, and praise God. In a word, creatures less than man serve to manifest God's glory extrinsically and to lead man to recognize God's excellence and to give Him formal glory. Thus all things in the bodily world, things lifeless and things living, things sentient and things rational (that is, man himself), exhibit a manifest order which shows

forth the power and goodness of God and awakes in man the saving appreciation of His excellence. Thus do all creatures conspire to one great and Ultimate End, which is *God Himself to be glorified*.

#### SUMMARY OF THE ARTICLE

In this Article we have set forth a classification of *ends* as *proximate* and *remote*, and we have distinguished remote ends as *intermediate* and *ultimate*; ultimate ends we have classified as *relatively ultimate* and *absolutely ultimate*. We have seen that an end is always a *good*, and that the absolutely ultimate end must be the supreme or absolute good, the *Summum Bonum*, or God Himself. After offering argument for this truth, we have considered *the manner* in which God is sought by all natural bodily beings as their absolutely ultimate End. We have seen that creatures tend to God to *glorify* Him, and that the Last End of creation, the reason and purpose of the efficient action of the First Cause, is the extrinsic, objective, and formal glory of God.

## CHAPTER II

### NATURE AND HER LAWS

This Chapter discusses the meaning of *nature*, in both particular and general implication. It studies the determinate activities of bodies under the *laws* to which such activity is manifestly subjected. It investigates the question of the occurrences which lie outside the field of natural operations and laws, and to which we give the name of *miracles*. The Chapter has three Articles:

Article 1. Nature

Article 2. The Laws of Nature

Article 3. Miracles

#### ARTICLE I. NATURE

- a) Meaning of *Nature*
- b) Definition of *Nature*
- c) Beings Natural and Non-natural

##### a) MEANING OF NATURE

The term *nature* is used in a great variety of meanings. Sometimes it is used to designate the material universe; thus, when we speak of a thing "existing in nature," we mean that it is to be found in the bodily world around us. Again, *nature* is often used to designate all bodily beings except man, and in contrast with man; and here, in special, it means living creatures, although it does not exclude things lifeless.

Thus, when we hear of the "beauties of nature," we think, first of all, of living things, such as blossoming flowers, singing birds, frost-touched forests; afterwards we think of the floating cloud, the purling stream, the sparkling snow; but we do *not* think of human beings. Again, *nature* is used to designate man as contrasted with other bodily things; it is used in the sense of *human nature*; thus, for example, we say, "'Tis not in nature to command success." Still again, *nature* may merely suggest one or more of the tendencies, appetites, or passions of man; the term is used so in the famous line of Horace, *Naturam expellas furca, tamen usque redibit*, "You may drive out nature with a pitchfork, but she will always come back."

Our use of the term *nature* (as we shall see when we come to define it accurately) is not altogether alien to all these loose interpretations or applications of the word, but we hold it more strictly in line with the literal and etymological meaning which examination of the term will reveal. For *nature* is derived from the Latin participle *natus* "born," a form of the verb *nasci* "to be born." And the *nature* of a thing suggests what the thing is born *for*; what it is originated *to do*; what it exists *to accomplish*. The nature of a thing is its reality or being *considered as equipment for action or operation*.

The *essence* of a thing makes the thing *what it is* in its inmost self or constitution. The *nature* of a

thing is this same essence considered as the principle or source of its due and proportionate operations and functions. Nature may be called *essence viewed dynamically*. When we ask what a thing *is*, we ask for its essence; when we ask what a thing *does* or *is to do*, we ask about its nature. To say that man is a creature composed of body and soul, is to express man's essence; to say that man is a being that can think and will, see and feel, take nourishment and grow, is to say something of the nature of man.

There is a point to remember when we contrast the terms *essence* and *nature*. An essence is an absolute thing; it either exists or does not exist, and there an end. But a nature can exist in full and rounded perfection, or in partial perfection only. Thus, a man who is lame and blind has a full and complete human essence, for essence is always full and complete when it exists at all. But the afflicted man has a hampered or defective nature. That is to say, some of his connatural functions cannot be exercised. Still, the nature of a thing is always present (even though hampered in what philosophers call the *actus exercitus* or "functioning actuality") as long as its essence is present. In other words, the essence *is* the fundamental nature, the root-nature, and it is thus the actual source or principle of operations proper to that essence, even when something prevents the actual exercise of such operations. It is a liberty of language which permits us to speak of a hampered or defective



nature; but no such liberty will permit us to speak of a hampered or defective essence.

Things in the material world exist as *individuals*. Each individual thing has its *essence* (which makes it *what it is*) and this essence is the root-principle or basic source of its normal activities (of *what it can do*) and is, under this aspect, called its *nature*. Hence, the world is made up of *individual natures*. But we may speak of bodily individuals (individual essences; individual natures) in the group, or collectively, and we are justified in this view since there is a great cosmic tendency in which all bodily things harmonize. So viewed, *nature* takes in the whole material universe, and here nature is not individual but *general* or *universal*. Thus we shall have to define nature as *individual nature* and as *general nature*.

#### b) DEFINITION OF NATURE

1. The nature of an individual thing is *the first or basic intrinsic principle of its rest and movement*. The definition calls for study of each term and phrase.

a) The nature of an individual thing (we may as well say at once, of an individual *body*) is the *first* principle of its rest and movement. That is, it is the basic, the radical, the fundamental principle of rest and movement in the body. A body is normally equipped with *powers* or *faculties* by means of which it operates or acts and is acted upon. These powers or

faculties are the *proximate* principles of the operations. We call *nature* the *first* principle, the *remote and radical* principle of operation, to distinguish it from these *proximate* principles. To illustrate: a man walks and sees, fundamentally or in the *first* place, because he *is an essence equipped for such function*, that is, because he *is a nature that can exercise these operations*. Proximately, however, the act of walking and the act of seeing are exercised *by means of the powers* with which man's essence or nature is furnished. Radically, it is *the man* who walks and sees; proximately, the walking *power* and the seeing *faculty* are exercised. A man's activity comes *from the man* remotely and fundamentally; it comes *from the man's powers* proximately. Thus, *nature* has powers and operates by means of powers; it is the *first principle* of the activity which proceeds from the powers as from *proximate principles*.

b) The nature of an individual body is the fundamental intrinsic principle of its *rest and movement*. Its "rest and movement" are its *acting* and *being acted upon*. Thus, the nature of a body is the radical principle or source of its operations, of its continuance in a state or condition, of its change to new state or condition. In a word, nature is the root-source of the *activity* of a body, and of its *operative passivity* (that is, its *reactive* capacity) as well.

c) The nature of an individual body is the funda-

mental *intrinsic* principle of its rest and movement. The external impulse or impact which sends a stone flying through the air is an *extrinsic* principle of this movement in space. Yet the stone has a *nature* which can receive and react to such an impulse, and this capacity for receiving and reacting is indwelling in the body in question; it is *intrinsic* to the body. That a man can walk is owing to a *nature* equipped with power for this operation; the movement proceeds from a power or faculty indwelling in the man, or *intrinsic* to the man. A man bound and dragged along undergoes the action of a principle extrinsic to himself. Yet here, as in the case of the stone, it is intrinsic to the man that he has the capacity to *undergo* such action, though the action as such proceeds from a principle extrinsic to him. The nature of a body is thus bound up with the very being of the body. It is intrinsic to the body. This is clear from the description of nature already given; for we have seen that the nature of a body is the very essence of the body considered as a source of activity, that is, of "rest and movement."

2. *General or universal nature* is the whole collection of individual natures. It may be defined as *the entire complex group of bodily substances inasmuch as these have powers or capacities to produce or undergo determinate effects.*

## c) BEINGS NATURAL AND NON-NATURAL

I. We contrast things as *natural*, *preternatural*, and *supernatural*. A thing is called *natural* in so far as it is something normally constituted and equipped in a world of bodily creatures. Thus the term *natural* applies to the bodily creature itself, to its normal constitution, to its normal powers, and their exercise. We say that water, for example, is a natural bodily substance, that it is formed naturally by the union of its component gases, that it naturally tends to extinguish fire, that it is natural for water to run down hill.—A body or bodily activity is called *preternatural* (from the Latin *praeter* “beyond,” and *naturalis* “natural”) if the *mode or manner* of its existence is not normal, and not to be accounted for by its own nature or connatural capacity. Thus, it is *natural* for a wound to heal gradually; it is *preternatural* for the wound to heal instantaneously. Nature does act to produce healing, but nature is not equipped to act in this abrupt *way*.—A thing is *supernatural* (from the Latin *super* “above,” and *naturalis*) when it exceeds, in its being, production, or operation, the entire capacity of creatural things. Thus, the coming to life of a dead man is *supernatural*. Nature does not only not act to produce such a resurrection *suddenly*; nature does not act to produce such a resurrection *at all*. The raising of the dead is wholly outside the powers of nature, and indeed goes contrary to these powers. *The super-*

*natural* is always attributable to Almighty God, directly acting or acting through the instrumentality of creatures. Extraordinary and non-natural events and activities may be attributable to spiritual creatures, God so permitting, but these phenomena are never *supernatural*; they are *preternatural*. The *preternatural* may also be due to direct intervention of God.

2. We contrast *the natural* and *the artificial*. A *natural* object or activity has its being by reason of the constitution and powers of creatures, apart from the play or influence of human free-choice. In a limited sense, such object or activity is *necessitated*. Thus, it is natural for a tree to grow, for water to quench fire, for fire to consume dry wood, for the blood to circulate, for eyes open in daylight to see. An *artificial* object or activity is one produced by human art or skill, and it involves in its making at least a measure of human free-choice. Thus, a baseball or an automobile is an artificial object; thus, the action of a locomotive is artificial. Thus, a bit of flint is a natural object; the same flint shaped into an arrow-head is, in so far, artificial.

3. We contrast *the natural* with *the compulsory*. Here our classification refers to activities considered in their principles or sources. Walking is a natural activity; being dragged along is a forced or compulsory activity. Natural activity proceeds from an

intrinsic principle; forced activity, from an extrinsic principle.

#### SUMMARY OF THE ARTICLE

In this brief Article we have defined *nature*, after a long approach to the definition through the study of various related uses of the term. We have explained the definition of nature in its *individual* or particular sense, as well as in its *general* or universal sense. We have seen that *the natural* is distinguished from, and contrasted with, *the preternatural*, *the supernatural*, *the artificial*, and *the compulsory*.

#### ARTICLE 2. THE LAWS OF NATURE

- a) Meaning of *Law*    b) Classification and Forces of Laws  
 c) The Order of Nature    d) The Course of Nature

##### a) MEANING OF *LAW*

In its fundamental meaning, *a law* is a norm or directive instrument to guide the free actions of man.

In this sense it is defined as *an ordinance of reason promulgated for the common good by those in charge of a society*. It is manifest that, in our treatise on cosmology, we do not speak of law in this original sense; we do not envision, when we talk here of law, the enactment of statutes by kings, parliaments, or councils; we do not treat of directive norms

for the guidance of men gathered into societies, in Church, in State, or in other social group. For law, as a directive norm for responsible man, is a *moral* instrument. We speak of law, in the present study, as a *physical* instrument, that is, as something recognized in the necessitated physical activities and operations of bodily creatures. In the last Article we made a distinction between *the natural* and *the artificial*; the law we speak of now belongs to the domain of *the natural* as explained in that distinction.

It is easy to understand how the term *law* was transferred from the *moral* order (that is, the order of free and responsible human activity) to the *physical* order. For we apprehend law as a directive force or instrument; and when we observe the regularity and order with which bodily things maintain their being and exercise their natural operations, we recognize the fact that their essential constitution determines and *directs* (so to speak) this constancy and harmony. So we say that bodies are under the control of "a law" by which their connatural activity is required of them. Further, we are aware, by plain reason, that the Creator of natural bodies has made them for a purpose and has equipped them to achieve it; thus He has "set the law" for their being and operations.

#### b) CLASSIFICATION AND FORCE OF LAWS

I. In so far as the law which governs creatures is

understood as the decree of the Creator, it may be defined as *the ordinance of Divine Wisdom which directs all activities and movements*. This is *the Eternal Law*. It governs *all* creatures, bodily and spiritual. It governs man in his free activities (thoughts, words, deeds, desires, omissions) as well as bodies in their necessitated activities. But it governs man through his reason; it governs *by suasion*. The same law governs natural bodies *by necessitation*. In so far as the Eternal Law is applied in the world to the shaping of activities, free and necessitated, for the welfare of man, it is called *Divine Providence*.—The Eternal Law is of absolute force; it is never set aside; it knows no exceptions. In its ultimate aim, it is never futile, never defeated. It directs (as we have seen) all creatures, free and without freedom, to their *absolutely ultimate end*, nor can it be in any wise thwarted in its resistless force, its complete success. Man alone, of bodily creatures, is capable of using and abusing freedom; man alone can refuse to obey the Eternal Law as it applies to his *moral activities* (that is, his free and responsible conduct); but man's sin does not thwart the Eternal Law in its essential objective; man's sin merely ruins man's own endless happiness, the *secondary* end of creation; the primary end of creation is absolutely achieved.

2. In so far as the Eternal Law is recognized by sound human reason in the domain of man's free



conduct, it is called *the natural law*. This is an electroplate phrase; it is unchanging and unchangeable, even to the definite article: it is *the* natural law. It is manifest that the natural law is a *moral* law; indeed, it is *the* moral law, in so far as this law is discoverable by human reason unaided by divine revelation. When the moral law is emphasized or clarified by divine revelation, it is, in so far, the *supernatural* moral law. In so far as the natural law is applied by sound reason for the temporal welfare of men, it takes the form of just and reasonable statutes in Church and State, and thus we have *the ecclesiastical law* and *the civil law*.—The natural law is a moral law, and hence it indicates the domain of good conduct as marked off from evil conduct. Man recognizes the moral law by reason, and applies it in each instance by the judgment of reason which we call *conscience*. Now, the rule of good conduct can know no exception; evil conduct is never permitted; hence the force of the natural law, and of certain and unwavering conscience, is an absolute force from which there is no appeal for exception or dispensation. In its positive prescriptions, the natural law binds, as the saying is, *semper sed non pro semper*, “always but not at every moment.” That is, a positive prescription of the natural law, such as the requirement that children honor and obey their parents, binds *always*; but it does not exact some special positive activity at every moment; children may be engaged in many lawful

pursuits for hours on end without actively thinking of obedience and without performing positive activities expressive of obedience. In its negative prescriptions (that is, in its prohibitions) the natural law binds *semper et pro semper*, "always and at every moment." That is, there is no moment at which what is forbidden becomes permissible. Thus, the prescription, "Do not disobey" binds the child at every moment, no matter what its occupation or preoccupation.

3. In so far as the Eternal Law stands manifested in the regular and harmonious activities of bodies, it is called *the law of nature*. Notice once more the need of careful use of like-sounding terms: *the law of nature* is discerned in the regularity and manifest purpose of bodily activity; *the natural law* is the moral law which regulates rational human conduct, inasmuch as this may be known by man's unaided powers of mind. Since the law of nature applies to many various bodies, each with its special mode of functioning, we usually make the term plural and speak of *the laws* of nature. These laws, in so far as they are manifested in individual bodies, and in special classes and groups of bodies, are called *physical laws*. In so far as these laws touch the whole universe in its unified harmonies and tendencies, they are called *cosmic laws*. The laws of nature (physical and cosmic) may be defined as *the rule of operation or*

*function set by the Creator for bodily things, to govern their activity and their undergoing of action in such wise that they tend, in a constant, consistent, and uniform manner, to their respective proper ends, and that all tend to their one absolutely ultimate end.*

—The laws of nature are said to *necessitate* bodily activity. Does this mean that the laws themselves are so *necessary* in being and in application that they cannot, even conceivably, fail, in any case, to have their full and complete effect, even as regards external things which feel their influence? Certain philosophers have answered this question with an uncompromising “Yes!” The pantheists, the materialists, the atheists, the naturalists, and the so called (and miscalled) rationalists, have all answered it so. But these persons are demonstrably wrong. There is need, in answering this question, to make a clean distinction: we must distinguish the laws as they stand revealed and active in the creatures which they regulate, and the same laws as they stand with reference to the Creator. We assert,—and shall pause upon the point presently to offer proof,—that the laws of nature are not necessary (that is, inevitably and normally efficacious) with reference to God; in relation to God these laws are *contingent* things, dependent things. We assert further that the laws of nature are not subject to the control of the creatures which operate under their sway or guidance, and hence these laws may rightly be called *necessary* or *non-*

*contingent* with reference to these creature causes. The philosopher puts the matter thus, in technical language: "The laws of nature are contingent with reference to God, the First Cause; they may be called necessary with reference to proximate causes." We must look into this truth in a manner slightly more detailed:

a) Physical and cosmic laws (that is, the laws of nature) are creatural things. And, like all creatures, they depend absolutely upon their Creator. No creature is, or becomes, independent of God. It is therefore inconceivable that bodily creatures, which owe their being and their powers and capacities to God, should set up a kind of independence on their own account and constitute an obstacle to the free activity, and free intervention, of the Almighty. Creatures have nothing *of their very own*, nothing unreceived; they are essentially and entirely *entia ab alio*, that is, contingent beings. Hence, if creatures could exercise a compelling or restraining force upon God, it would come, in last analysis, to a force exerted by God upon Himself,—a silly and self-contradictory notion. It is manifest, then, that the requirements imposed upon bodies by their being and constitution are *necessitating* with reference to the bodies, but not necessitating to the Creator. God did not *have* to make the bodies so; He does not *have* to keep them so; He is not constrained so that He may not interpose an influence to prevent the effect of their connatural functions,

even while their being and tendencies remain unchanged. The rationalists and those others who oppose this truth are compelled to their unwarranted and false conclusion by the ugly rigidity of their own false philosophies. They are like the old man of the hills who looked upon the works and pomps of "industrial civilization" for the first time. He studied, with manifest awe, a mighty monster called a locomotive. When told what this great machine could do, he shook his head and said, "It will never, never start." Presently his wide eyes beheld the locomotive moving smoothly off, drawing a lengthy train of cars along the track. Wider and wider grew the eyes as the train gained speed. Then, as the wonder disappeared around a distant curve, the old man shook his head a second time, and said, "It will never, never stop." Certainly the rationalists, and the rest of the materialistic philosophers we have listed, could never have envisioned the existence and play of the laws of nature. They are the type of persons who, if given advance information of a world of active bodies, would indubitably have declared that such a thing could not be, that it could never start. Faced now with the actual marvel of nature and her laws, they insist that these could not have been, and cannot now be, otherwise than we find them; they declare that natural processes cannot be in any wise interfered with or stopped.

*b)* But, though the laws of nature are contingent

before God and under His all-accounting power, these same laws are not dependent upon, or subject to what might be called the caprice of, the bodies which they normally regulate. In relation to bodies themselves, the laws of nature observed to be at work in them may be called *necessary* and *necessitating*. For the laws of any particular nature are an expression and a kind of *outpouring in activity* of the very essence of the body in question. A body is constituted in such and such a way and, in strict consequence, it is normally fitted and inclined for such and such activity. Its activity is directly consequent upon its essential being, and,—unless prevented by a power other and higher than that of the being itself,—this activity will infallibly follow. What a thing *is* is the determining factor in what it *can do*, in what it is normally *inclined to do*, and in what it normally *succeeds in doing*. *Agere sequitur esse* is an old maxim of philosophers, and it is almost self-evidently true: "Function follows essence." Hence it is abundantly clear that so long as an essence endures the activities which follow from that essence will (so far as the influence of the essence itself is concerned) preserve their character unchanged. The essence which manifests the play of natural laws may be called *the proximate cause* of the exercise of these laws. Thus we say that, *with reference to proximate causes*, the laws of nature may be called necessary

and necessitating.—As we have seen, God could transform the essence of a body into another essence. So much is surely within the power of the Almighty. And God could leave the essence of a body unchanged, with its enduring inclinations or tendencies, and yet prevent the outward effect of these tendencies. Thus God could, and did, enable the Hebrew youths to walk unharmed in the midst of the fiery furnace, their feet unscorched, their garments swayed as in a pleasant breeze. This miracle (and we shall discuss miracles directly in the next Article) did not consist in the fact that God transformed the fire into something else that merely resembled fire but had not its activity of burning, that is, of consuming combustible substances that are put into it. This He might surely have done, and it would have been a work of wonder. But this He did not, as a fact, do. The fire remained fire; its essence was left unchanged; and therefore its normal tendencies and operations were, in themselves, unchanged; we know this from the fact that the fire burned up the men who had cast the youths into the furnace. What God did was to prevent the activities of actual fire from having their normal outward effect upon the three young men. Or, we might put the matter the other way about, and say that God prevented the capacity for being burned (which the youths certainly had) from being actualized in fact. Here the laws of na-

ture (on the part of the fire or on the part of the combustible objects) were prevented from having their final and outer effect. Thus the laws of nature are *contingent* with reference to God. But the fire could not remain fire and not have the *tendency* to burn up combustible material; it could not be the thing that it is, and not have the capacity to burn such material; there is nothing in the essence of fire itself to make possible any exception to its normal activity. And thus we say that the laws of nature are *necessary* with reference to proximate causes.

### c) THE ORDER OF NATURE

*Order* is defined as *a fit arrangement of a plurality of things in view of some end to be served or attained*. Thus order is essentially a good arrangement. And the arrangement is good if it is desirable. A man is said to have his affairs "in order" when his bills are paid, his books are balanced, his requirements provided. Spiritually, a man is said to be "in order" when he is ready for judgment, his sins pardoned, his life marked by works of penitence and positive virtue. So a room is "in order" when it is well arranged, not only in point of that neatness which pleases the eye, but when the objects in the room are arranged in a manner that *suits the purposes* of the occupant. Usually it is possible to combine neatness with order, but the two are not to be



identified. A business man may not be able to arrange the papers on his desk in neat piles, putting all documents of a size together, or all of one color in a single pile. No, his papers are in good order when they are properly and readily available for his purposes. A housekeeper might find the desk unpleasing, and might call it "without order," whereas, as a fact, despite its appearance, it would be in perfect order. And if the housekeeper, with the fine spirit of her kind, were to "make order" out of the apparent chaos of the desk, it is likely that the man of business, when he comes to his work, "won't be able to find a thing"; and the desk will not be in true order until he has upset the neat stacks and brought out again the various unsightly objects which the housekeeper has tucked so carefully away. Order is a *suitable* arrangement of things in view of the purpose for which they are to be used; it is not merely a *neat appearing* arrangement of things.

Now, natural bodies are things with *final tendency*, as we have already learned. They tend to their proper and proportionate *ends*. In view of these ends they are inclined and regulated by the laws of their nature. Therefore, the order of a particular nature is *the fit arrangement of a nature (a working essence), according to set laws, for the attaining of its end*. And the order of nature in general, the order that we may call universal, is *the fit arrangement of*

*bodies in the material world, by which they all tend harmoniously, through their tendency towards their respective ends, to achieve the common end of the universe.* The arrangement and balance of parts and of functions in any plant or animal illustrate the order of a particular nature. The harmony and consistent activity of all the various bodies in the world, in their relations to one another as well as in their respective tendencies, illustrate the general order or *universal order of nature*. It is the recognition of this universal order of nature which justifies us in calling the world a *cosmos* (a thing well regulated) and a *mundus* (a thing orderly and clean).

The universal order of nature is not to be regarded as *essential* and *necessary*, but as *contingent*. The factors of this order are the multitude of various objects in the world, their mutual influence or interaction, their arrangement in the general scheme. But these things (multiplicity, variety, interaction, arrangement) are not essential to the world itself; if one individual, or one class or species of individuals, were suddenly to perish and disappear, the world would not be essentially upset. Nor can we say that the arrangement of things on earth, the disposition of heavenly bodies, the movements of planets, the recurrence of day and night and of seasons, are things that constitute the essence of the world; for we can well envision a true and orderly world in which all these items would be different. After all, the actual

order of the universe which we behold is the outer and ulterior effect of the bodies which make up the world, each acting under its physical laws. And, as we have seen, while it is necessary that bodies have their essential tendencies and their essential modes of action, it is not necessary that the action itself, as an outer achievement, should actually follow. That a tree should *tend* to grow to maturity and fruitfulness, is of its essence. That it should actually achieve maturity and fruitfulness is not of its essence. *Tendency* to definite activity is essential in a body; actual and complete realization of activity is not essential, but contingent. The order of the universe is the expression of actual and complete realization of activity. Therefore the order of the universe is not essential or necessary; it is contingent. In other words, the order of the universe happens to be what it is; it might well be *another arrangement* without inducing essential change in the world itself or making the universe disordered.

#### d) THE COURSE OF NATURE

*The course of nature* may be briefly described as the actual working out of the order of nature; or it may be called the actual exercise of the laws of nature. The *laws* of nature explain the constancy, consistency, and uniformity to be observed in the operations of natural bodies. The *order* of nature explains the arrangement (in individual bodies and

in the general scheme of the world) which characterizes bodies active under the regulation of their laws. The *course* of nature is *the constant and harmonious succession of effects* produced by bodies (arranged by *order*; regulated by *laws*) in the world. Since the course of nature is the actual working out of the order of nature, or the actual ulterior and outer achievement of applied laws of nature; and since the order of nature, and the outer and ulterior effect of the laws of nature are not necessary but contingent, it follows that the course of nature itself is *contingent*.

#### SUMMARY OF THE ARTICLE

In this Article we have studied the meaning of *law*, and have seen how the term was transferred from its normal field of application in *the moral order* to the order of bodily beings which we call *the physical order*. We have classified *laws*, and have defined the *Eternal Law*, *the natural law*, and *laws of nature*, *physical* and *cosmic*. We have discussed the *necessity* of each type of law, notably of the *laws of nature*, which we have seen to be *contingent* with reference to God, and *necessary* with reference to proximate causes. We have defined and explained *the order of nature* and *the course of nature*.

## ARTICLE 3. MIRACLES

- a) Meaning of *Miracle*
- b) Kinds of Miracles
- c) Possibility of Miracles
- d) Identification of Miracles

## a) MEANING OF MIRACLE

The word *miracle* is from the Latin *miraculum* "a wonderful thing; a marvel." But the world is full of wonderful things. Every sunrise, every stick and stone, every living thing, is full of marvels, and the best efforts of scientists and scholars have not unfolded to our view a hundredth of them. We who have minds to recognize the wonders of the universe are dull of wit, and we allow ourselves to grow quickly accustomed to a round of daily and hourly experiences which, taken singly and with attention, would stir our souls with awe, admiration, and loving worship of Almighty God. "The world," says G.K.C., "will never perish from lack of wonders, but only from lack of wonder." Think, to press home the point, how great a marvel would be a sunrise if only one such event were recorded in the experience of mankind. There would be libraries about it. Scientific treatises, doctoral theses, imaginative reconstructions, romances in its setting, would fill almost endless bookshelves. And, unquestionably, there would be other libraries, quite as extensive, written by the persons who proclaim themselves cool and level-headed appraisers of fact; the agnostics, the skeptics,

the whole evil army of "debunkers." These would prove to exhaustion (in all senses) that the sunrise was a silly fabrication of some ancient joker or gullible rustic; likely enough, it would be attributed to the craftiness of some medieval monk. Of course, the cool and level-headed gentlemen would assure us, it never occurred at all. "Sunrises," they would say smugly, "simply do not happen."

Yes, the world is an overwhelming complexity of marvels. But we do not call the world or its marvels by the name of *miracle*. For *miracle* means, in our technical use of the world, something not only marvelous but *extraordinary*. In other words, a miracle is something not in *the usual course of nature*. Further, *a miracle* is an event produced (directly or through an instrument) *by the power of Almighty God*. Finally, *a miracle* is an event which can be observed in this world of bodies; it is a *sensible* event. When, for example, God, through the ministry of His ordained representative, causes bread and wine to be changed substantially into the Body and Blood of Christ, we have an overpowering marvel, an extraordinary marvel, and a marvel divinely produced. Yet we do not call this marvel by the name of *miracle*, since it cannot be observed with bodily eyes. Again, when a soul is pardoned, its sins taken away by the divinely given power of the Sacrament of Penance, there is a change wrought in the soul more startling and more glorious than the raising up of a

dead man to life. Yet we do not call this a miracle, for the *senses* of man have no means of laying hold of it directly. Such a marvel is often called a *moral miracle*, but this is an extension of the term *miracle*, and not an employment of the word in strict and proper meaning. For a miracle is, strictly considered, an event in the sensible order.

We may, therefore, define *miracle* as a *marvellous event in the sensible order, outside the usual course of nature, produced by the power of God.*

St. Thomas Aquinas (*Lib. Sent. II, d. 18*) wisely points out the fact that the phrase, "outside the course of nature" means just what it says. This phrase does not mean that a miracle is *of rare occurrence*; it means that miracles, whether rare or frequent, are not events within the usual course of nature; they are not things which nature includes in her normal processes or, to resort to expressive slang, "takes in her stride." Thus St. Thomas: "It (a miracle) does not involve rarity of occurrence; it excludes the accustomed course of nature. Therefore, if sight were given to the blind every day, this would still be a miracle, for it would be something beyond the natural course which we recognize as usual in things."

## b) KINDS OF MIRACLES

1. We may distinguish miracles on the basis of *substantial fact*, of the *subject in which or to which*

*they occur*, and of the *manner* in which they occur.

a) Miracles of substantial fact (*miracula quoad substantiam facti*) are such divinely produced events as nature and natural forces could in no wise produce or explain. The very *event* or *fact* is miraculous. Such a miracle would be, for instance, the simultaneous location of two bodily beings in one and the same place.

b) Miracles of subject (*miracula quoad subjectum*) are divinely produced events or effects which could be produced by natural forces *but not in the person or thing* in which, as a fact, they occur. For the thing or the person *in* which or *to* which an effect occurs is called *the subject* of the occurrence; in a more familiar phrase, the thing or the person *is subjected to* the process of activity which produces the effect or event. As an example of a miracle of subject, Father Lortie (*Elementa Philosophiae Christianae, Vol. II, p. 80; ed. 1929*) offers the calling back to life of one dead. "Nature," he says, "gives life, *but not to a corpse.*" It is not miraculous for a man to be alive; it is miraculous for a corpse to serve as *the subject* of life-giving powers.

c) Miracles of manner or mode (*miracula quoad modum*) are divinely produced events or effects which could indeed be produced by natural powers *but not in the same way* as they are miraculously produced. Thus, the sudden healing of an open



wound is a miracle of manner. Nature tends to heal wounds, but not *instantaneously*.

2. Miracles may be distinguished as *above nature*, *beyond nature*, and *contrary to nature*, or, in other words, as *supernatural*, *preternatural*, and *contra-natural*. Of course, all miracles are supernatural in the sense that they are wrought by the power of God. But the present distinction is based upon the remoteness or approximation of the miracle to the course of nature. This distinction of miracles is one that overlaps the triple distinction made above; but it is valuable, in that it gives a new angle, a new "slant," for the mind which seeks an adequate classification of miraculous events.

a) A miracle is supernatural or *above nature* when it is an event wholly beyond the powers of nature to produce, whether this be a matter of substantial fact or of the subject in which or to which the miraculous effect is wrought.

b) A miracle is preternatural or *beyond nature* when it lies in mode or manner outside the usual course of nature.

c) A miracle is contra-natural or *contrary to nature* when it conflicts with the natural tendencies of the subject in which it is done. Thus, as we have elsewhere noticed, the miracle which allowed the Hebrew youths to walk unscathed in the fiery furnace, was not only *beyond* the natural tendencies and

powers of the fire to burn (or of the combustible matter to be burned), but it went flat against these tendencies. Indeed, a miracle contrary to nature seems to have the character of the miraculous on all three counts: substantial fact, subject, and mode.

### c) POSSIBILITY OF MIRACLES

A thing is *possible* when it can become an actuality; when it can *exist* or *be done*. A thing is *intrinsically* or *metaphysically* possible when there is no self-contradiction in the very thought which represents it as an actuality. A thing is *extrinsically* possible when there exists a power which can cause it to become actual. Of course, such a power always exists when we extend our view of things possible to include the omnipotence of God as well as the powers of nature. A thing intrinsically possible is thus extrinsically possible to God; if it lies within the power of created nature to produce, it is called *physically* possible; if it lies within the range of human powers when used in the normal way (that is, without extraordinary effort), it is called *morally* possible. To put the whole matter in other words: A thing that can be thought of as existing,—whether, as a fact, it exists or not, or is ever to exist,—is *intrinsically* possible. A thing for the actual production of which an adequate cause exists is *extrinsically* possible. All things intrinsically possible are extrinsically possible to God. Things intrinsically possible which are also

extrinsically possible to the powers of created nature are *physically* possible. Things physically possible which *man* can produce without unusual and undue effort or sacrifice are *morally* possible.

Things which are not intrinsically possible cannot be produced at all. This is not saying that the power of God is limited. For what is intrinsically impossible is a contradiction in itself, and amounts to nothing at all. Thus, "a square circle" is an inconceivable thing; it is not a thing but the denial of a thing; it means a circle that is not a circle; the terms "square" and "circle" cancel each other. Therefore a square circle is simply a non-entity. Hence when one hears the question, "Can God make a square circle (or any self-contradictory, and hence intrinsically impossible thing)?" one knows that the answer is, "No, for what you propose as a thing for God's making is not a thing at all; it is nothing whatever."

Here, where we are considering *miracles*, the question of possibility does not extend to *physical* and *moral* possibility at all; for a miracle is, by definition, outside the course of nature (human and non-human), and is produced by the power of God. Now, all things that are things, all that have no conflict and contradiction in the very concept by which the mind grasps, or tries to grasp, them, are intrinsically possible, and also extrinsically possible to God. Yet, indirectly, some such thing might be *relatively impossible* to God; that is, while possible, considered in

itself or *absolutely*, it would be in conflict with God's wisdom, goodness, justice, or other perfection. Thus, while it would be possible, absolutely speaking, for God to annihilate a human soul, such an action would conflict with the goodness and justice of God, as well as with the divine wisdom (for it would surely not be the work of wisdom to create a spiritual being capable of endless life and naturally desirous of such life, and at the same time to doom it to utter extinction). Hence, annihilation of a soul is *absolutely* possible, but *relatively* impossible to God; it is called *relatively* impossible because its impossibility arises out of its *relation* to the divine perfections. The technical manner of expressing all this is to say that the annihilation of a soul is possible to *God's absolute power*, but not possible to *God's ordained power*, that is, to God's power as viewed in its essential ordering or relation to the other divine perfections (with which, indeed, it is substantially one and indivisible).

We assert that miracles are intrinsically possible, and by this assertion we mean that miracles are not self-contradictory things which are not even conceivable as actualities. Further, we assert that miracles are extrinsically possible, and this means not only that miracles are possible to God's absolute power (so much is evident from the fact that miracles are intrinsically possible) but that they are possible to God's ordained power as well. In other words,

miracles are possible *in themselves*, and they *involve no conflict with God's perfections*.

1. *Miracles are intrinsically possible*—The intrinsic possibility of miracles is denied by materialists and rationalists. The materialists blindly maintain, in the face of overwhelming evidence against them, that nothing exists but *matter*, or bodily being, with its connatural powers; hence they are constrained to exclude miracles as self-contradictory, that is, as involving a conflict of matter with itself, since matter would be manifestly not itself but *above* itself in producing a miraculous effect. The rationalists deny that anything exists or can exist which human reason is incapable of explaining to the full; hence they find miracles self-contradictory as involving supernatural and mysterious power.

We assert that miracles are intrinsically possible. If they were not; if they were intrinsically *impossible*, so that the very concept of a miracle as an actuality would involve self-contradiction, this state of things would find explanation in one of two reasons, viz., either that the order of nature is absolute and changeless, and so essentially necessary that it can have no exception or derogation; or that the powers of nature are infinite and cannot be exceeded. But neither of these two reasons is verified in fact. We have already seen that the order of nature is

not essential or necessary, but *contingent*. And we learned in our very first lessons in cosmology that the world of bodies is necessarily *finite*; and what is finite in being is essentially finite in its powers. Hence it is not true that the order of nature is absolute, essential, necessary, changeless; nor is it true that the powers of nature are infinite. It follows that the concept of miracles involves no self-contradiction. But when the concept of a thing involves no self-contradiction, the thing is intrinsically possible. Therefore, miracles are intrinsically possible.

2. *Miracles are extrinsically possible*—Anyone who acknowledges the existence of God, the Creator and Conserver, must acknowledge that all things intrinsically possible are extrinsically possible to the absolute power of God. The extrinsic possibility of miracles is denied by atheists, who deny God's existence; by the deists, who deny God's conserving and governing activity in the world (for they affirm that God, having created the world, has, so to speak, tossed it aside, and has no further interest in it); by the positivists, who will accept no suprasensible explanation of even sensible events. None of these doctrinaires will acknowledge the existence of any *available* adequate cause for miraculous events, and hence they deny the extrinsic possibility of miracles.

Against positivists, atheists, deists, and shallow doubters, we assert the fact of God's activity in the

world, and the further fact that God can intervene to cause the wondrous effects called miracles. The science of theodicy proves that God is not only the Creator, but that He is the Preserver, the Governor, and the Provider, whose activity, under these titles, is required for the existence and functioning of the world. Further, theodicy proves that God concurs in all the positive activities of His creatures. We cannot pause here to repeat several chapters of theodicy, but we may briefly present an argument,—perfectly conclusive and sufficient in itself,—against the mistaken opinion that miracles are extrinsically impossible.

A miracle takes place in one of three ways. God either (*a*) produces an effect of creatural causes without employing these causes; or (*b*) produces an effect which is beyond the scope and power of creatural causes; or (*c*) impedes an effect which would naturally have to follow from the activity of a creatural cause. Now, God can certainly do any and all of these three things. Therefore, God can produce a miracle. For God can (*a*) produce the effect of a creatural cause without employing such a cause; for God *gave* to creatures all their being and all their powers for operation, and what He can give He Himself possesses. Further, God can (*b*) produce an effect which is beyond the scope and power of creatural causes, for creatural causes are finite, whereas God is infinite in being and in power. Finally, God can (*c*) impede an effect which would naturally have

to follow from the activity of a creatural cause, since the actual effect of creatural activity does not belong to the essence of the active creatures. Even man can impede the natural effect of a creatural cause,—as, for example, a man can impede the destructive action of fire by protecting combustible material with a heavy envelope of asbestos; or he can impede the growth of a plant by placing it in unsuitable soil or by giving it insufficient light,—and what man, a creature can do, is surely not to be denied to the infinite might of God.

Objections against the extrinsic possibility of miracles are usually framed in such wise that miracles appear to be in conflict with the divine perfections, and hence impossible to the *ordained* power of God. It will be of profit here to consider a few of these objections.

a) God's eternal and changeless will has set the course of nature by establishing physical laws. Hence, a miracle would come into conflict with the *immutability* or *changelessness* of God. We answer that the immutable will of God decrees everything *from eternity*, and the miracle, which we regard in the light of *an exception* to the course of nature, is just as much a matter of eternal decree as the course of nature itself. In other words, the miracle as well as the continuous and regular course of nature, is eternally and changelessly decreed. Hence, the mira-



cle involves no conflict with divine immutability.

b) The laws of nature, like the moral law, are from God. Since it would conflict with God's *holiness* to derogate or change the moral law, or to permit any exception, it seems that the same thing must be said about the laws of nature. We answer that there is no parity between the laws of nature and the moral law. The moral law directs free creatures towards God; the laws of nature regulate creatures primarily in their relations with one another. The laws of nature have no conceivable direct bearing upon the holiness of the Creator.

c) The laws of nature are expressions of the divine *wisdom*; hence, any derogation of these laws would be in conflict with God's wisdom, and is therefore extrinsically impossible. We answer once more that the divine wisdom is expressed not only in the ordinary course of nature but also, and more markedly, in miraculous events which lie outside that course as determined by the laws of nature. God's wisdom has planned not only the usual course of nature, but the exceptional things which we call miracles. All are part of one eternal plan, and the plan is divinely wise.

#### d) IDENTIFICATION OF MIRACLES

When we *identify* a thing we know it for what it is. The point here to be undertaken is the proof that we can *know* a miracle, can *recognize* it as such. There are persons who maintain that, while miracles

must be admitted as possible, they are *unknowable*. These persons say, "Of course, you can know that a sensible event, even a marvellous and unusual sensible event, has occurred; but you cannot know that this event is truly miraculous. Perhaps it is the effect of some hidden powers of nature with which science has not as yet acquainted us." Thus, in effect, spoke Jean Jacques Rousseau (1712-1778). Others, like Ernest Renan (1823-1892), say that miracles could be known *as such* only if some bench of experts could choose the subject for the miracle and have it performed under their careful scientific scrutiny.

We assert that we can have true knowledge of miracles. We can know them as *historical facts* and we can know them as *things divinely produced outside the course of nature*. To employ the technical language of philosophy, we can know miracles as true events both on the score of their *historical truth* and on the score of their *philosophical truth*; that is, we can know them as *true happenings*, and as *truly miraculous* happenings. We must say a word on both points.

*I. We can know miracles on the score of their historical truth*—Miracles are, by definition, sensible effects or events. They take place in the world which we view with bodily eyes and touch with bodily hands. Therefore, *as facts*, miracles are quite as readily to be observed and known as any natural

facts. Indeed, since the miraculous facts are extraordinary, they attract our more eager and watchful notice, and we are likely to study and examine them with far greater attention than we devote to the ordinary events which we see happening daily. When, for example, there is a sudden healing of a wound at Lourdes, the fact is attested by eminent physicians who have examined the wound and the patient with great care both before and after the miraculous happening. Certainly they are not in doubt about the wondrous event as a fact, however they may doubt or differ in explaining the fact. The famous Doctor Carel has declared, in answer to the objection currently heard that it is "unscientific" and "not the thing" to believe in miracles, that he believes in the miracles of Lourdes because he must trust the testimony of his own senses. Miraculous facts, as marvellous and unusual facts, are certainly *knowable*. In technical terms, miracles are knowable on the score of their *historical truth*.

2. *We can know miracles on the score of their philosophical truth*—To know a miracle as such, as a supernatural rather than a natural happening, it is enough to be able to recognize as a fact: that natural powers could not produce *this effect*; that they could not produce such an effect *in this precise subject* in which the effect is discerned; or that natural powers could not produce such an effect *in this precise man-*

*ner* in which it is seen to occur. Now, on all these points we can have true and certain knowledge. If, for example, we consider the tree which withered away at the word of Christ, we recognize the fact that natural powers cannot explain the event. The natural powers of the tree itself tend all the other way. And if it be objected that certain mysterious powers,—normally hidden and inoperative,—of atmosphere or of light or of other natural element have produced this sudden and startling effect, we ask why these powers operated in such an astounding fashion *at a word of command*; there appears to be a miracle still, at least a miracle of mode or manner. Take the event all around, and it is manifestly an effort which natural powers, naturally acting, cannot produce, no matter what the hidden resources of nature may be. Again, when Christ restored sight to the man born blind, as recorded in that masterful ninth chapter of St. John's Gospel, we have a clear example of an effect which could not, by any natural power, recognized or hidden, be produced in this *subject* in this *way*. For, while natural powers operate in the development of the human body, and tend to build up the seeing eye, these powers do not operate to give sight to an adult who has lacked it since birth; nor do they operate to build up the organ and faculty of vision in an instantaneous way in consequence of the use of a little common clay and water. It is a mere quibble to assert that miracles cannot be known to

stand outside the ordinary course of nature. If miracles can be known at all,—and we have seen that they can be known,—they can be known in their philosophical character as meeting the definition of truly miraculous events.

When a person suffering from organic lesions, or wasted by years of disease, is cured by immersion in certain waters, it will not do to seek the explanation of the event in “hidden powers of nature.” Why do these hidden powers operate for the instantaneous cure of one person and not at all for the cure of another person suffering a like malady? Why do they operate today for a person for whom they have proved utterly ineffective on many previous days? Nature is not a conflict and a contradiction in itself. It is the very core of the gospel of science that nature is consistent, regular, not given to exceptional or capricious action. Why appeal to such a nature to explain what is in flat disagreement with its recognized mode of operation? To heal even a slight wound, to cure even a minor disorder, nature requires the coöperation of time, and of considerable time. This is the *way* of nature; in this manner nature always acts. Nature builds bit by bit; nature adds cell to cell, protoplasm to protoplasm. Therefore, a sudden healing, an instantaneous cure, is clearly outside the course of nature. It is merely silly to appeal to hidden powers of nature which would negative all the science which is built upon the recognized powers

and modes of nature's operations. It would be like saying that perhaps this phenomenon called daylight is due to some hidden powers of darkness, not realizing that if darkness acts in this fashion it exhibits a suicidal tendency never observable in the whole realm of natural objects and phenomena. Natural things do not operate in such fashion as to negate or destroy themselves. Yet the "hidden power" theory blandly assumes that they do so operate.

Therefore, there is no force in the assertion that we cannot say that an effect or event is outside the scope of natural powers until we have recognized and examined all the laws of nature in all their most minute expressions and details. We may not know,—indeed we do not know,—all the powers of nature or all the applications of nature's laws. But we know nature sufficiently to know that it is not, at the same time, something else. To explain, by an appeal to what is known as constant and uniform, an event which is at variance with constancy and uniformity, is to admit that there may be *mutually contradictory laws* in nature. And if we admit that, we may as well have done at once with all talk of science and of laws. Then no scientific conclusion could ever again be relied upon as certain. We are not prepared to surrender to the absurdity and enforced silence of skepticism in this abrupt fashion. Therefore we reject as specious the statement that we must know all the complex details of all of nature's plans and workings

before we can say that an event is outside her powers.

But can it be known that a wondrous event outside the ordinary course of nature is really produced by the power of Almighty God? May it not happen, at least occasionally, that an event described as miraculous is the work of malign spirits? The answer is that there is a test and a criterion of works. "By their fruits you shall know them" is not only a common-sense truth to guide us in the choice of associates or in the judgment of a human enterprise; it is a sure criterion of works and effects in nature. The character of a person used as the instrument of a miraculous happening, the whole complexity of circumstances in which the miracle occurs, the doctrine it is meant to establish, the end sought by the persons concerned in it,—all these things will manifest clearly enough whether or not "the finger of God is here."

Miracles can be known as facts, and in their true character as miraculous events. But it is not the part of wisdom to proclaim an event miraculous until that event has been soberly examined and tested by common sense and common reason against the background of common human experience. One must not cry "Miracle!" as soon as something startling is encountered. We do not justly exclaim so over the radio, the telephone, or even over those subtle and little known influences of mind upon mind which we call by the creepy name of telepathy. No, nature must be allowed to press her claims and, if possible, made

to prove her case. Only when it is quite manifest that an occurrence does, as a fact, lie outside the course of nature; only when it is evident beyond prudent doubt that the occurrence is an event divinely wrought, are we free to call it miraculous. It is true that rarity of occurrence does not touch the essence of the miraculous; nevertheless, it is a fact that miracles do not happen very frequently, and this fact should be a sobering and steadying influence in the face of the unusual or the astounding; it should induce caution; it should help one to defer judgment until the case has long lain under the calm and steady view of reason. For it is as nonsensical to call every new and exciting discovery or experience miraculous as it is to deny that any experience can be miraculous. Now, it is a telling comment on the state of mind of the skeptics, the doubters, and the antagonists of the miraculous, that they are the very first to cry "Miracle!" when they encounter anything which their little equipment of science or prejudice is unable to handle and explain. It is they who trample the sod of the cemetery when the rumor gets abroad that wondrous things are happening at a certain grave. It is they who, in lesser matters, swallow wholesale the advertisements which promise "miraculous" results from the use of certain goods or medicines. It is they who take the wonder-working reducing powders, who use the thaumatergic tooth-paste, who invest in get-rich-quick schemes, who renew their youth like the eagle's



by absorbing rays from sun-lamps and swallowing pills vibrant with vitamins. It is they who, while never without the word "superstitious" hanging at tongue's end as a contemptuous appraisal of a sane man's faith, are actually the most superstitious creatures in the universe.

What of those who would have a miracle performed for their express benefit upon a chosen subject and in the presence of those mythical beings called "experts"? It is manifest that man, who cannot perform any miracle, cannot construct the setting in which a miracle must occur or fix the conditions in which it is to occur. The suggestion is flippant, impudent, and, on the face of it, absurd. Says Mr. G. K. Chesterton very wisely in his *Orthodoxy* (p. 282), "One may here surely dismiss that quite brainless piece of pedantry which talks about the need for 'scientific conditions' in connection with alleged spiritual phenomena. If we are asking whether a dead soul can communicate with a living, it is ludicrous to insist that it shall be under conditions in which no two living souls in their senses would seriously communicate with each other. . . . It is just as unscientific as it is unphilosophical to be surprised that in an unsympathetic atmosphere certain extraordinary sympathies do not arise. It is as if I said that I could not tell if there was a fog because the air was not clear enough; or as if I insisted on perfect sunlight in order to see a solar eclipse."

## SUMMARY OF THE ARTICLE

In this Article we have described and defined *miracle*. We have classified miracles as of *substantial fact*, of *subject*, and of *mode*; as miracles *above nature*, *beyond nature*, and *contrary to nature*. We have discussed the possibility of miracles, and have shown that miracles are *intrinsically* possible as involving no essential self-contradiction; further, we have seen that miracles are *extrinsically* possible, not only to the *absolute power* of God, but to His *ordinated power* as well. We have shown that miracles *can be known*, both on the score of their *historical truth* as facts, and on the score of their *philosophical truth* as truly miraculous facts.

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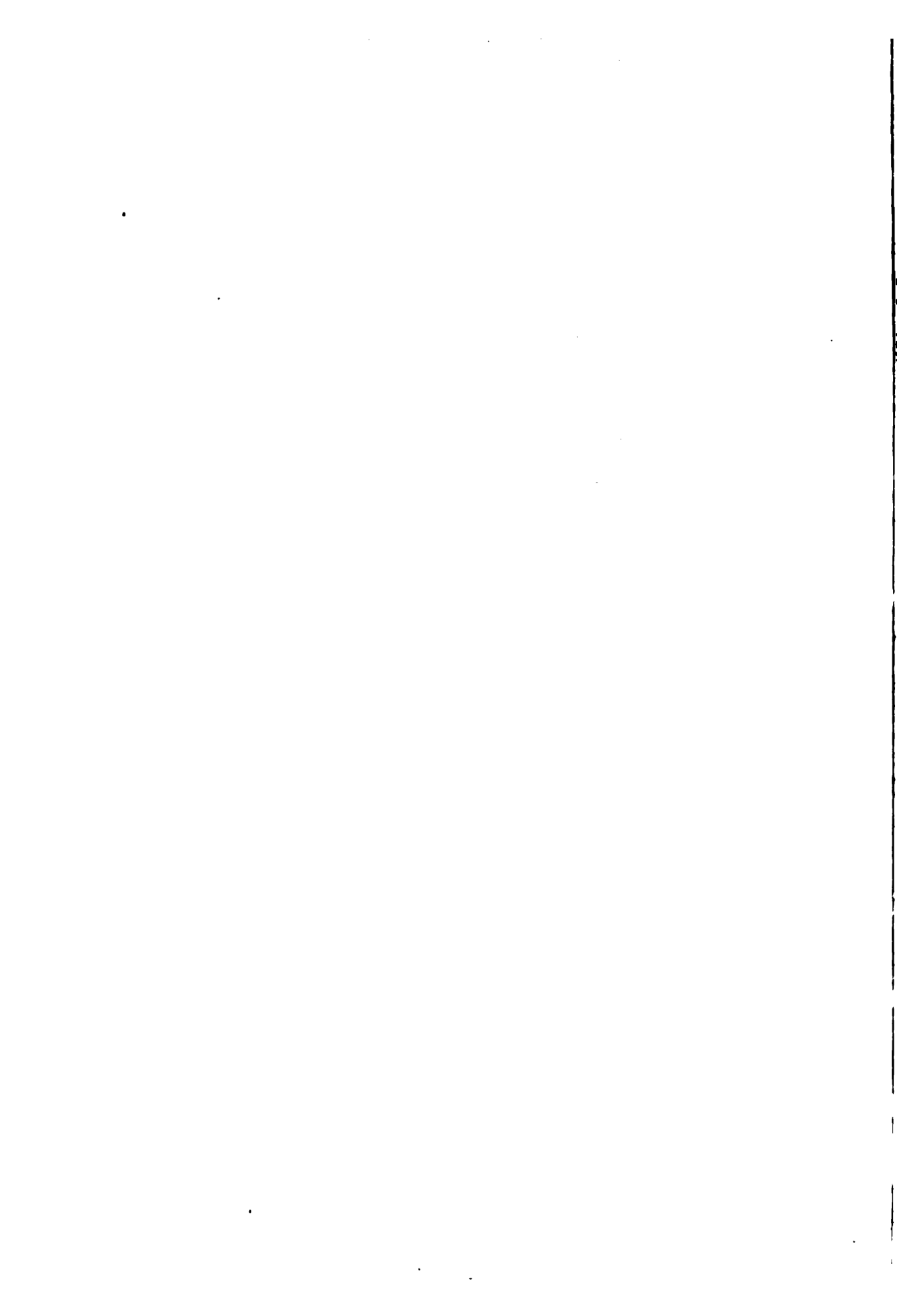
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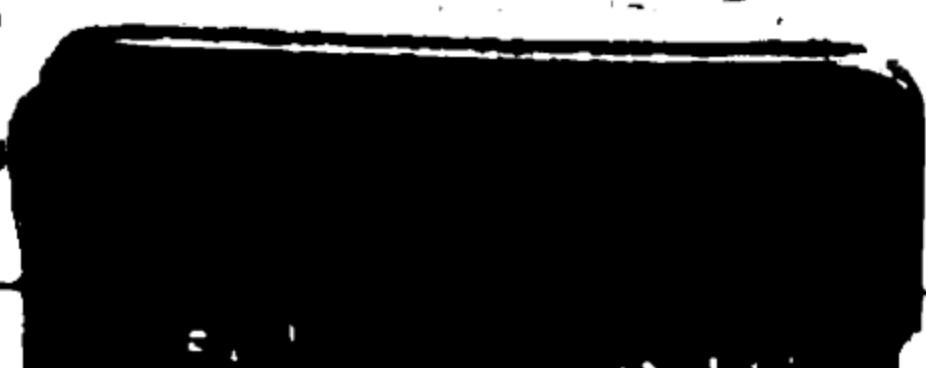
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