J.G. Herder and the Philosophy
and History of Science

by

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VOLUME I

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PART I:

Herder and the Philosophy of Science
CHAPTER I

Introduction.

1. Herder's intellectual personality.

In studying Herder's place in the philosophy and history of science, we shall be obliged to assess the relative importance of the many sources from which he derived facts and ideas related to science — usually the works of various scientists or thinkers acquainted with scientific procedures; we shall also find it necessary to decide beforehand whether any predisposition was at work in his mind such as would determine his choice of data and ideas concerning science, or subordinate such new material to some previous set of values acquired before his study of science began. Only then shall we be free to discuss in more detail his attitude to particular scientific methods, facts and discoveries: for no major thinker's mind can with justice be considered merely as the sum total of the sources upon which he drew.

The selective principle applied in a thinker's reaction to new facts and ideas, or the fundamental pattern to which they are related and into which they are integrated, may be said to characterise that thinker's intellectual personality. Such a set of attitudes is traceable, as a rule, through all the departments of knowledge within which his mind is active, and is thus, especially in a mind of polymathic interests such as Herder's, too general to be interpreted in the light of any one department alone. Such basic attitudes are usually evident from the earliest stage of the thinker's career as the abstract form into which all the content of his experience is subsequently assimilated, and are often adhered to so tenaciously that we must assume that they originate emotionally in his psychological constitution.

In Herder's case, such a fundamental attitude has been aptly seen in his great desire to reconcile opposites, usually generalised by critics into such
abstract dualities as Unity and Variety, General and Particular, Synthesis and Analysis, or Absolute and Relative - although the list of equivalents to these pairs of words can be extended almost indefinitely, according to the aspect from which his thought is considered. Most writers, however, relate this tendency to some particular phase of Herder's thought, for example to the well-known dualism of a Divine Providence and a relativistic process as it appears in his historical writings. Nonetheless many have drawn attention to it; an excellent recent essay of W. Dobbek first elevates this pattern of thought to the rank of a psychological principle at work throughout Herder's thought. Dobbek justly remarks:

Woher diese Widersprüche stammen, ist eine Frage der Psychologie.

Dobbek himself suggests several sources of conflict in Herder's life, especially in his early years, and of the compulsion leading him to attempt the reconciliation of the conflicting influences. The traditional picture of the young Herder as torn between the empiricism of the pre-critical Kant and the transcendentalism of Hamann, or, alternatively, between the rationalism of the Enlightenment and the irrationalism of Hamann, still has much to recommend it. At all events, it is clear that a desire to reconcile opposites is at work throughout Herder's career. A few quotations should show how many critics concur that such a tendency exists in some form in Herder's mind:

Dies doppelte Streben zur Mannigfaltigkeit und zur Einheit, welches in Herders Forschungen stets und durchaus einheitlich wirkt --- (Kühnemann) 4)
--- die grundlegenden Tendenzen zur Individualität und Totalität --- (Dachauer) 5)
[Hoffart sees Herder's philosophy as] --- eine Versöhnung des Spinozistischen Universalismus mit dem Leibnizischen Individualismus.
[McEachran speaks of] --- the two poles of Herder's thought, the ultimate unity and the apparent multiplicity of the world. Die doppelte Tendenz, sowohl zum Einzelnen als zum Allgemeinen, ist der Schlüssel zu seiner Pädagogik und persönlichen Lebensführung ebenso wie zu seiner Geschichtstheorie (Stadelmann). 9) Similarly, Haym10) writes of Herder as „der empirische Skeptiker mit idealischen Bedürfnissen“, Kühnemann11) refers to his „religiöser Naturalismus“, and Siegel12) classifies Herder's philosophy as „objektiver Idealismus“. Herder himself emphasises the dual nature of experience, for example before he proceeds to reconcile the two poles of cognition:13) Erkennen ist Glanz der Sonne genießen --- Empfinden ist ein Farbenspiel des Regenbogens ---

He frequently uses the image, later adopted by Goethe, of the sun and its „Abglanz“ to denote the absolute and relative aspects of existence.14) At the beginning of the „Ideen“, he again emphasises the equal importance of both poles of experience, remarking that he valued both from his earliest years:15) Es ist ein Zeichen der tiefen nordischen Barbarei, in der wir die Unsrigen erziehen, daß wir ihnen nicht von Jugend auf einen tiefen Eindruck dieser Schönheit, der Einheit und Mannigfaltigkeit auf unserer Erde, geben. Ich wünschte, mein Buch erreichte nur einige Striche zur Darstellung dieser großen Aussicht, die mich seit meiner frühesten Selbstbildung erfaßt hat und mich zuerst auf das weite Meer freier Begriffe führte.

Since, by Herder's own admission, this tendency to look for and to find
in everything two distinct formal principles obtains in his thought from the earliest period, further enquiry into its origins is unnecessary for our present purposes, and the reader is referred again to Dobbek. Whatever its particular origins, the tendency soon became generalised.

Herder is by no means unique in constantly seeking to combine and reconcile conflicting elements. The distinctive quality of his striving for reconciliation, however, is that he possesses in such unusual measure both the romantic sense for variety in all the concrete abundance and colour of the natural and cultural worlds, and the Classicist's, or Rationalist's sense for grandiose yet simple generalisations or absolute principles. The conflict of these two natures is the productive force behind much of his work. Too many critics of Herder have emphasised the one aspect to the detriment of the other, be it the rational at the expense of the irrational, the logical at the expense of the empirical, the scientific at the expense of the religious, or vice versa. It is the achievement of Dobbek's "dialectical" approach that it emphasises the indispensability of both facets. We shall now endeavour to show how, in the greatest syntheses in Herder's thought, especially those which will facilitate our understanding of his attitude to science, both the Uniformitarian and Diversitarian (to borrow the terms of A.O. Lovejoy, the historian of ideas) phases are equally, or almost equally, represented.

This is not for a moment to deny that one or other of these phases may gain the ascendancy at any particular time in Herder's career or in any particular context within his works. To deny this would be to deny all possibility of development in his thought. Each period of his intellectual development, in fact, achieves its own peculiar synthesis, its own compromise between the two elements, before a new advance begins. Furthermore, when we
speak of "major syntheses", it is understood that these may encompass many others, similar in composition, but applying to more limited areas of his thought. That many of these syntheses are mutually exclusive (e.g. Herder's several conflicting attempts to reconcile the real and the ideal in history) adds not a little to the richness, as well as to the ambiguity of Herder's ideas. Finally, it remains that although, for example, religious elements may predominate in some of his syntheses, the dominant trend in his development as a whole is to reconcile the two poles, while preserving the integrity of each. Such reconciliations, we believe, result in the distortion of both poles, if any distortion takes place at all, as it often does in the process of mutual accommodation: for example, Herder's religious beliefs become suspect to the orthodox, while the empirical basis of his secular philosophy becomes infiltrated by religious values. We shall disagree with other critics in the course of this study in so far as they attempt to derive one pole from the other, or to subordinate one to the other: thus we shall disagree with R.T. Clark Jnr., 19) who portrays Herder's irrational leanings as nearly always secondary to his rational ones, or his religious beliefs as subordinate to his "positivistic" ones; conversely with M. Rouché, 20) who subordinates Herder's scientific interests to his religious ones:

Toute son œuvre scientifique a consisté à mettre la méthode des sciences modernes --- au service de thèses religieuses
or, --- les sciences telles qu'il les conçoit ne sont que la théologie appliquée à la nature. 21)

We shall attempt to show in the course of this work that Herder is not simply a religious apologist, and that behind both the religious and scientific poles of his thought lies an unqualified desire for synthesis. It is not then a search for Unity in Variety or for Variety in Unity which characterises
his thought. Dobbek appropriately quotes a passage from Herder's "Plastik" which indicates that both tendencies are of equal importance:

Alles Allgemeine ist nur im Besonderen und nur aus allem Besonderen wird das Allgemeine.

We shall now attempt to determine exactly in what sense the general and the particular can be said to play equally important parts in the philosophical attitudes which underlie Herder's treatment of scientific material, by an examination of the roles of synthetic and analytical methods in his works. Dachauer's remark may well serve at this point as a reminder that complete systematisation of Herder's philosophy is impossible:

Es ist schon öfters versucht worden, eine "Philosophie Herders" aus dem Gesamtkern zu extrahieren. Bei diesen Versuchen wird es immer auf's neue klar, daß es einfach keine Herdersche Philosophie gibt, die sich in eine Geschichte der philosophischen Systeme einfügen ließe, ohne den Eindruck größer Dürftigkeit zu erwecken.

We have contended on the one hand that the general and the particular, synthesis and analysis, play equally important parts in Herder's thought. Yet on the other hand, we have asserted that the striving after reconciliation of opposites is his most characteristic tendency. But cannot such a desire to overcome differences and to reconcile opposites in itself be justly called a preference for the general as against the particular, for synthesis as against analysis? Does not what Litt calls "sein unseliger Hang zur Allversöhnung" imply exactly this?
Up till now, we have, of course, used the words "synthesis" and "analysis" in a non-specialised sense, so that "synthesis" denotes a tendency to prefer generalisations to particular or concrete instances, and "analysis" signifies a preoccupation with particulars and a turning away from more general categories. We shall now, however, discuss the more technical, philosophical use of the terms, whereby "synthesis" denotes the extension of knowledge by generalisation from inductive, empirical premises, and "analysis" the a priori process of breaking down any given general concept in order to arrive at more fundamental ones. This may remove part of the confusion which the use of these terms by critics and by Herder himself has often created in Herder studies, and help to clarify the sense in which we shall use the words ourselves.

Haym, and others have emphasised Herder's early advocacy of an "analytical" method (in the technical sense), which they rightly trace to the influence of the pre-critical Kant, and they quote such passages as this from Herder's works:

Die wahre und einzige Methode der Philosophie ist also die analytische. --- 26)

Yet Dachauer insists: 27)

Es soll noch gezeigt werden, wie stark gerade das gegenteilige Streben nach Synthese schon in den "Fragmenten" mächtig ist.

Steinborn puts forward a similar contention: 28)

--- im Gegensatz zu seinem großen Lehrer Kant ist Herder --- Überall ein Anhänger der synthetischen Methode --- Überall sucht er zu verbinden und das Gemeinsame herauszuarbeiten.

It is not entirely clear in what sense these critics are using the terms, but
it seems that they are opposing the non-technical sense of "synthesis" to the technical sense of "analysis", which is, of course, confusing. However, it cannot be doubted that Herder not only advocated, but also employed the analytical method in his early philosophical and aesthetic writings. It was firstly by analysis that he exposed the vague "Grundgefühle" which plagued contemporary aesthetics, such as the theories of the Klotszian Riedel. Logical analysis broke down these generalisations into more exact, empirically verifiable ideas, from which Herder's new syntheses could begin. Furthermore, in Herder's basic metaphysical triad of "Raum", "Zeit" and "Kraft" which appears in various works throughout his life, the "Kraft" component at least is arrived at by a priori logical analysis of first concepts, beginning with "Sein", as for example in the "Metakritik". As we shall see, the idea of "Kraft" as used by Herder is arrived at firstly by a priori analysis, and then employed synthetically in that it is applied to the empirical world and used as a universal generalisation from physical phenomena such as electricity, magnetism, and gravity. We must not allow the words of Rink, who, seconded by Kant, accused Herder of plagiarising the "Raum" "Zeit" "Kraft" triad from the pre-critical Kant, saying that Kant had formerly used the terms to denote "die einzigen synthetischen Begriffe der Metaphysik" to mislead us. This would certainly have been in keeping with Kant's "synthetic" use of the terms to refer to the scientifically investigable world. Herder, however, combines an analytical, a priori element with the synthetic usage in his all-important concept of "Kraft". Siegel writes, on the other hand:

Es hat sich Kants Einfluß nach dieser Richtung nicht als dauernd erwiesen ---. Herder geht nicht von Zusammengesetzten zum Einfachen zurück, sondern er will umgekehrt von dem Einfachen ausgehend das Zusammengesetzte entstehen sehen ---
Yet as late as 1799, Herder himself writes:

--- in der Philosophie fängt die wahre synthetische Methode von Erfahrungen, als dem Gegebenen an und steigt hinauf; die Analyse von allgemeinen Begriffen steigt hinunter; jede dieser Lehrarten ist an Stelle und Ort gut, ja keine kann ohne die andre lange ihr Werk treiben.

He had indeed employed philosophical analysis himself everywhere in his "Gott" when discussing the nature of God and such subordinate ideas as the metaphysical "Substanz" of Spinoza and the "Kräfte" (monads) of Leibniz. His "Kategorienlehre" of the "Metakritik", set up as a rival to Kant's, is likewise founded upon analysis of first concepts. Herder's frequent condemnations of a priori methods must not confuse us here. For many of his own basic concepts are of an a priori nature, as Haym points out. We should further note the phrasing of an approving reference to Spinoza by Herder in a letter to Jacobi of 1785:

Spinoza hat keinen Begriff vom Werden, vom Nichtgewordensein, Entstehen und Nichtentstandensein. Sein ganzes System ist gebaut, damit man dieser dunkeln Worte entbehre; sollte es also gut sein, damit ansfangen? Sein ist bei ihm das Erste und Letzte --- sein System baut sich im höchsten Verstande a priori.

Thus, Herder sees his much-vaunted "genetic" and empirical methods as necessarily preceded by a priori analysis of basic concepts, at least in philosophy and metaphysics.

In the technical sense, therefore, Herder cannot be said to be an exponent exclusively, or even principally, of the synthetic method, as critics after Haym have tended to claim. Haym's own view of Herder as primarily an analyst in philosophy likewise requires correction, for most of Herder's new
ideas are arrived at synthetically. But the constant presence of metaphysical categories such as "Kraft", arrived at in Herder's case by a priori analysis, remind us that he never abandons the analytical method when formal philosophy comes within his purview. Where synthesis predominates, it is due mainly to his customary avoidance of formal philosophy, to which, we repeat, he nevertheless owes many of his basic concepts.

When we now return to the non-technical usage of the terms "synthesis" and "analysis", we find that the situation has become complicated because the non-technical sense of both terms is included within the technical definition of "synthesis" in so far as both are made to refer to the empirical world. "Analysis", in this non-technical sense, is represented, for example, by Herder's interest in the individualities of natural and cultural phenomena, and his distrust of the sweeping generalisations of "mechanists" and "cosmopolitans", whereas "synthesis" would denote his attempts to find, by inductive generalisation, some quality common to all these phenomena, or some uniform causal explanation for them all. The latter procedure is well characterised by Buffon in a passage known to Herder:

--- mais il faut tâcher de s'élèver à quelque chose de plus grand et plus digne encore de nous occuper, c'est de combiner les observations, de généraliser les faits, de les lier ensemble par la force des analogies, et de tâcher d'arriver à ce haut degré de connaissances, où nous pouvons juger que les effets particuliers dépendent d'effets plus généraux ---

Many chapter-headings of the "Ideen" imply judgements of this type, e.g.:

Der Mensch ist zur Vernunftfähigkeit organisirt.

Used in this sense, we find that synthesis, as well as analysis (as manifest in his constant interest in particular details) again play equally important parts in Herder's works. Compare his statement:
--- je fester und herrlicher die Gesetze sind, auf der ihr
[= dieser Erde] und aller Welten Daseyn ruhet, je mehr ich
bemerke, daß in ihnen Alles aus Eitem folgt und Eins zu Allem
dienet

with the dictum of the microscopist Needham whose works Herder knew: 39)

--- quelques différentes qu'elles [= les productions naturelles]
soient, elles pourront être l'effet d'un petit nombre de
principes, dont les différentes combinaisons produiront une
variété inconcevable.

Likewise, apart from the study of the natural world, Herder again and again
affirms the necessity of both generalising and particularising approaches: 40)

Wenn der Witz wie jener Ana, Maulesel erfindet in der Wüste, so
löst sie der Scharfsinn und läßt sie unbesaamt sterben.
Locks Philosophie war das Federmeß zu Des-kartes Gespinsten:
was der witzige Baile verband, trennte Leibniz. Beide Kräfte
sind also zwo Hemisphären, sich einander entgegensetzt; die
Kugel und der ganze Geist verbinden sie beide.

Before leaving this part of our discussion, we may simply note that a
broad tendency to prefer general statements, such as "natural laws" covering
a multiplicity of single cases, asserts itself progressively as Herder's life
advances. We shall return to this point in more detail later.

We have so far attempted to justify our original assertion that
analysis and synthesis, in technical and non-technical senses alike, play an
important part in Herder's works. Let us now examine our second assertion
that Herder's fundamental striving to reconcile opposites in itself consti-
tutes a preference for synthesis as against analysis. We are now in a
position to conclude that this application of the word "synthesis" constitutes
yet a third usage. This desire for synthesis manifests itself in his efforts
to reconcile, in a supremely general sense, what we have called the
analytical and synthetic sides of his personality and interests, without
doing injustice either to his relativistic interest in individuality or to
his predilection for generalisations, whether arrived at inductively or by a
priori analysis. In short, these ultimate syntheses themselves comprise a
synthetic and an analytical factor. It is in this sense that we should
interpret his eulogies of the ultimate unity of all things, statements which
appear increasingly from the beginning of his mature period, as he seeks
more complete and less one-sided syntheses than those of his early
rationalistic period or of his religious period in Bückeburg:41)

Ich schäme mich nicht, an den Brüsten dieser großen Mutter Natur
nur als ein Kind zu saugen, laufe nach Bildern, nach Ähnlich-
keiten, nach Gesetzen der Übereinstimmung zu Einen, weil ich
kein anderes Spiel meiner denkenden Kräfte kenne ---

Herder's desire for ultimate syntheses reveals itself in several ways:

a) Conceptual syntheses of disparate phases of existence giving unitary
explanations in terms of content shared in common.

Herder achieved these syntheses by creating a few key concepts, each of
which is not only an inductive generalisation based upon a multitude of
concrete observations, but also an absolute metaphysical idea. Each is a
bridge between two opposite spheres which he seeks to reconcile, or a unitary
concept masking two distinct functions - a relativistic/empirical and a more
absolute/metaphysical function. The idea of a Faustian „geistiges Band"
(1778) linking physical and spiritual principles in man, the idea of a
„Hieroglyph“ (1774) revealed to the first men, seen as both divine revelation
and as the natural basis of all practical knowledge in every early society,
as well as the „Humanität“ idea42) of the 1780's, are among the more
contrived and weaker conceptual syntheses of this kind. More far-reaching
is Herder's idea of "Kraft", which is seen from the earliest time as possessing both physical and spiritual aspects. It is our belief, as we shall attempt to show in the case of the "Kraft" idea, that all such conceptual syntheses proved of less value to Herder's philosophy of science than did the next class:

b) **Formal syntheses** of disparate phases of existence giving parallel or even identical explanations by means of some common formal quality.

Such are Herder's idea of an "Analogie" between the laws governing both the physical and the moral world, leading in turn to his constant application of analogical methods, his use of mathematical formulae to describe ethical situations, his idea of a ladder or Chain of Being as the basis both of natural classifications and of a celestial hierarchy, as well as his use of the notion of a productive polarity (or dialectical process) between opposites (e.g. man and God). These, and other formal syntheses, become most highly developed in Herder's mature period, when his search for "laws" behind everything is most intensified.

c) A general desire for compromise.

Such a desire is everywhere endemic in the more abstract levels of Herder's thought, a desire which leads to ambiguity, paradox, and even to outright contradiction. It is from this point of view that we should assess the conflicting statements made by Herder to Hamann and to Sommering about the significance of his "Ideen" in their scientific aspects, when he tells Hamann that the scientific material was merely a concession to contemporary tastes, and when he informs Sommering that Book V, whose content is largely metaphysical and religious, could be omitted without in any way altering his plan for this work. There is no need to adopt the expedient of Kühnemann, who explains the contradiction as arising out of Herder's inability to survey
the Whole of his work, which had grown out of hand, nor do we need to imply, with Rouché,\textsuperscript{48} that Herder's statement to Sömmering involved conscious dissembling, and was completely untrue. Herder wished to preserve both conflicting attitudes, defending the complete integrity of each in the eyes of men for whom only one of them would be valid, as he well knew. Where he could not mask the contradiction from his own eyes, he was prepared to ignore it. His desire for synthesis led him to suppress latent and even manifest contradictions in his own mind. Besides, he had an almost unlimited ability to put himself into the minds of others, so long as an initial liking or respect for them existed in his own mind. Thus he could look at his own work from more angles than most of his readers could, and can, do. Peculiarly paradoxical phrases result at times, for example when he refers to his "geistiger physiologischer Weg".\textsuperscript{49}

We shall outline a few more aspects of this fundamental ambivalence in Herder's thought before passing on to consider its particular scientific consequences.

Herder stands philosophically between the more absolutistic age of Leibniz\textsuperscript{50} and the relativism and positivism of the 19th century, just as he stands in literary criticism on the watershed between the Enlightenment and post-Enlightenment tendencies such as Romanticism. Within his philosophy of science, he combines the Ancient Greek approach, which seeks some simple, wide formula to explain the workings of nature, with more modern methods which put exact descriptions of every part and detail first. Similarly, his interests combine the attitudes of the physical scientist seeking general laws, and of the natural historian, who is content to enumerate and classify the many natural forms he encounters.
The same fundamental antithesis can be seen as one of form and content, the former increasingly in ascendency as the older Herder, partly under Goethe's influence, moves away from his earlier intuitive approach of "Einfühlung" into the multifarious "Kräfte" at work in history, art and nature, towards the less dynamic ideal of changeless, beautiful laws of harmony and order obtaining in history and nature alike. We shall see, however, that the former side, so fruitful in his youthful studies of art-forms, was his weaker side in scientific thought, leading as it did to a misplaced subjectivity and a search everywhere for particular "Kräfte" behind natural forms, their qualities being as much metaphysical or even poetic as scientific. His interest in the content of the natural world proved beneficial to his philosophy of science only in so far as it stimulated his sense for the determinative influence of every nuance of the natural environment, or his keen awareness of the Dionysian struggle for existence between all living entities. However, this side of Herder's scientific thought has been most frequently emphasised, often to the exclusion of the formal or methodological side. But his attempts to unite both phases led him to achieve, in his mature period, a delicate balance between form and content, with the ultimate syntheses, both conceptual and methodological or formal, rising above the main body of his thought.

From this point of view we can clearly appreciate the subjective basis of Herder's "monism". For he has a predisposition to regard the universe as One, as an ultimate unity. We shall discuss objective monism, or the unitary theory of the nature of matter, when we come to his particular scientific ideas. Let it suffice to say here that while modern (materialistic) "monists" achieve unity by denying the existence of one pole (in this case,
spirit) of the traditional dualism, Herder preserves both in the higher common factor of "Kraft".

Out of this ultimately monistic endeavour there arose as a matter of course a host of pseudo-scientific theories, far too subjective to be even compared with modern scientific thought. But the methods themselves which were born of the monistic endeavour, the resultant patterns of thought, are in many cases common to both mystical, aesthetic, subjective monism and modern, scientific, materialistic monism, in virtue simply of their common quest after unitary explanation. For Herder was a synthesising mind par excellence, faced by tasks so difficult that he initiated methods adopted by later philosophers of science. In this respect again he was not merely a theologian imposing his values upon scientific thought.

Since the chemical and mathematical senses of the terms "synthesis" and "analysis" play no part in Herder's activities, we believe we have now discussed all their major senses as they occur in his thought. 51a)

Hitherto, we have discussed only the most general aspects of Herder's intellectual personality. By themselves, they are too vague to tell us much about his philosophy, far less about his philosophy of science. But perhaps we have at least said enough to confirm Jean Paul's words in a letter to Herder: 52)

--- so findet jeder in Ihrem weiten System leichter seines als Ihres. Niemand istverständlicher als der Einseitige, und dem Kurzsichtigen glaubt man am ersten, weil seine Gegenstände vor uns liegen.

It will be the task of our investigation into Herder's ideas on scientific methods to show how the general tendencies we have discussed here are translated into particular techniques applied by him to the study of the
Meanwhile, we must first outline the course we intend to adopt in studying the history of scientific ideas, and Herder's place in this history, comparing our approach to that of other critics.

2. Herder criticism and the study of the history of scientific thought.

Preliminary definitions: We shall first define what we mean by the term "scientific methods" in the wider sense in which we shall employ it. The term will be used to cover three senses. These are:

(i) The methods, or techniques, of experimental scientific investigation. These will later be mentioned in so far as they play an actual, but insignificant part in Herder's study of the natural world. This is the most limited and best known sense of the term.

(ii) The methods employed in the immediate theorising activity by which data directly acquired through observation (whether by the theorist himself or by others whose observations are available to him) are classified or grouped into regular patterns; these may remain a descriptive classification, or may be made the foundation of "natural laws" (inviolable regularities), or serve as a basis for hypotheses and theories which further investigation may test. Some of Herder's ideas have a claim to be evaluated in this light.

(iii) The methods employed in making more generalised pronouncements upon the structure and content of the natural world and the processes at work within it. Herder's ideas will be studied in detail from this angle. To this class belong a thinker's own pronouncements about the nature and scope of scientific knowledge. These include pronouncements upon the methods he believes to be imposed upon the investigator by the nature of the objective world, as well as by the subjective limitations or epistemology of scientific
Many of Herder's pronouncements are of this kind, and will be compared with his own procedure when he puts them into practice.

These senses can be called, in short, the techniques of observation (i), the theory of science (ii), and the philosophy of science (iii). It has not seemed necessary to carry this classification into our ensuing enquiries so explicitly as this. Each particular context should itself reveal the sense in which the term is used and the degree of Herder's nearness to, or remoteness from, the active scientist's situation.

We shall next define what is meant by the "content" or "results" of scientific enquiry and thought, as distinct from the "scientific methods" by which the former are arrived at. They can signify:

(i) the data of observation collected by the thinker himself or by others;

(ii) new data of observation, constituting a "discovery". This sense has no real place in Herder's thought;

(iii) the final results obtained from theorising about the data of observation, embodied in statements of regularities, "laws", hypotheses, and theories. This makes up the body of what we call "science" as distinct from the data available to scientists, as well as from the methods by which the theories etc. about these data were formulated. Herder's works have often been searched for such material;

(iv) statements explaining the ultimate nature of the observable universe in terms which can in no way be verified. These are illegitimate statements about the content of the universe, explaining instead of describing. Such is Herder's "Kraft" idea, which is qualitative instead of quantitative.
a) Criticism of Herder's scientific thought:

Almost all the critics of Herder's scientific thought have hitherto occupied themselves with his results rather than with his methods. Since Kant's famous reviews of the "Ideen", Parts I and II, raised grave doubts about the legitimacy of Herder's methods of enquiry, and the greatest founders of modern Herder criticism, Haym and Kühnemann, endorsed and amplified Kant's opinion, Herder's scientific methods have usually been ignored, dismissed in a few words, justified retrospectively by his allegedly "modern" results, or subordinated to methods used in other areas of his thought.

The detailed study of Herder's scientific ideas began, furthermore, from completely false premises, with Bärenbach's notorious "Herder als Vorgänger Darwins", which in turn was followed by a spate of related works, either supporting or rejecting Bärenbach's thesis, but never fully investigating the premises upon which the whole largely futile controversy rested. Rouche's "Herder, précurseur de Darwin? Histoire d'un mythe" made an exhaustive study of this literature, exposing the great majority of articles as a farrago of prejudice and short-sighted partisanship, of ephemeral significance in the history of Herder scholarship. Rouche's second, more voluminous work, "La philosophie de l'histoire de Herder", already referred to, presents Rouche's examination of Herder's own writings on history, and also on science, in so far as passages of scientific purport appear in the "Ideen". This work, although primarily a study of Herder's philosophy of history, is the most valuable contribution to the study of his scientific thought up till now, being full of extensive and scholarly information. But Rouche came from his study of the history of Darwinistic theories with an interest primarily in the results or content, not in the methods, of science. He sees the history of science as the history of the
evanescent, ever-changing theories themselves, not of the methods by which they were formulated. Indeed, he goes so far as to say that theories and philosophies of science are reducible to contemporary religious and social influences:

L'histoire religieuse et sociale est la clé de toutes ces controverses sur les sciences naturelles.

He refers to "--- la science, instable et toujours recommencée ---" and declares: "--- montrer l'origine politique d'une thèse qui se prétend scientifique en est la meilleure réfutation." True to these beliefs, Rouché proceeds, in his larger work, to subordinate all Herder's scientific thought to his religious beliefs, just as he derives Darwinian beliefs from political or religious predispositions:

Le Darwinisme à la fin du 19ème siècle est un "mythe de gauche", comme auparavant le matérialisme auquel il s'allie et qui lui a frayé la voie: il combat le christianisme officiel ---

Those who base their social or religious doctrines upon science, in particular upon the theory of evolution, condemn their ideas to eventual oblivion as the scientific theories of their own age are superseded:

Appuyer des doctrines politiques ou religieuses sur les sciences de la nature, c'est se condamner peut-être à mentir, et certainement à dater.

Rouché appears to imply here that Darwin's theory is destined to disappear into limbo with the further advance of science.

Although much of what Rouché says is true of the Herder-Darwin controversy, his approach scarcely does justice to science as an independent organ of enquiry and discovery, possessing techniques, methods and attitudes which are shared by men whose lives may be separated by centuries.
As a true student of Herder, Rouché applies Herder's own doctrine of spatio-temporal relativism to the charlatans of the Herder-Darwin controversy:

 Tout dépend ici de l'événement, spirituel ou politique, qui a "fait époque" dans la vie des personnes considérées; et cet événement à son tour varie selon le milieu historique et social où ils ont vécu -- Il conviendrait donc de prendre conscience non seulement de nos tendances héréditaires mais des événements dont nous datons intellectuellement, afin de juger leur influence, et au besoin de l'éliminer.

This is a dangerous argument. When can a person justly say that he is able to exorcise the influences of his age and situation, yet that those whom he studies have failed to do so? Rouché treats Herder throughout as decisively influenced by Hamann's religion, for example, and we have seen that he applies the same deterministic approach not only to the Herder-Darwin controversy, but also to all controversies dealing with scientific issues. Must we not then either admit that this argument must hold true in some degree for all men, or postulate a class of persons who can, as it were "escape their past" at will? Otherwise, we must modify the argument considerably. We cannot accordingly agree with Rouché's method of examining parish records and the like with a view to detecting religious or political affiliations in other critics' lives. We believe that it is enough to test the logic with which other critics manipulate their prejudices, and the evidence they adduce in support of them.

Rouché's statements about the ephemerality of science are indeed true, in many cases, of the results or content of scientific theory. Science, after all, can progress only by discarding successive hypotheses. Yet while individual hypotheses may be superseded, a core of known observations and established laws is built up, and, even if exceptions to such laws should
be discovered, the laws do not cease to apply to the relative situations within which they were first formulated. One might also argue that our beliefs about the ultimate nature of matter, say, or of life, have never yet reached final form (we shall discuss the legitimacy of such questions later); some scientists would contend that final definitions will eventually become possible. However, among the prerequisites of such definitions are data established by exhaustive observation and experimentation, evaluated by universally accepted methods. It is no wonder that the views of Herder, for example, upon these matters at least, have been summarily rejected by a seeker after exact science such as R. Noll:

Einen Naturwissenschaftler Herder gibt es nicht.

Robert T. Clark, Jnr., already mentioned, has also devoted some attention to Herder's scientific thought, but has likewise confined himself chiefly to an evaluation of the scientific results supposedly achieved by Herder. Clark and the school of American critics to which he belongs contest the opinions of Haym, Kühnemann and the Kantian opponents of Herder's methods, from the viewpoint of a modern positivistic humanism, which hails Herder's lack of systematic metaphysics as an outright advantage. Since we have already contended that Herder's thought partakes of both rationalistic and empirical traditions, however, and that his greatest achievement lay in his attempted syntheses of the two modes of thought, we believe that we should avoid both extremes of rejecting his ideas from the standpoint of Kantian critical rationalism, and of lauding them as the work of an early scientific empiricist. Instead, we should follow up their influence in the several new traditions which arose with the breakdown of classical philosophy in the early 19th century.

It is singular that Clark and Schütze attempt to bring about a
rapprochement between Herder and modern scientific thought by two quite opposed expedients: the first is the attempt to portray Herder as more of a positivist than he was, and the second is to isolate doctrines, found among modern theorists of science, which are anything but empirical (e.g. the vitalism of Bergson and Driesch), and which true positivists would at once reject as metaphysical, and to compare these to Herder's ideas. The former procedure is common in Herder criticism, and Sarton's words on the study of early science aptly apply to those who equate Herder's "Kraft" to modern energy, as well as to those who see him as an early evolutionist:

One of the most pernicious types of error to which a false or shaky knowledge of living science leads is the reading of modern conceptions, such as atomic ideas, energy, evolution, into ancient texts.

A considerable number of other works, such as those of Bruntsch, Grundmann, Sauter, Temkin, as well as numbers of works on Herder's idea of environmental and geographical determinism and his views on psychology, constitute valuable studies of limited areas of his scientific thought. Grundmann's work is particularly valuable because it is the first really to come to terms with Herder's sources and his relationship to the scientific ideas of his age. None of these works, however, presents a thorough analysis of Herder's methodological equipment, and they all confine themselves to studying the "Ideen", which, though important, represent only one stage in the development of his scientific ideas.

b) The study of the history of scientific thought:

The true history of science --- should be rather a history of method than of results, for the latter are often accidental
and only seem impressive to later generations when they have been rediscovered by improved methods (Benjamin Farrington). 71)

We have indicated the dangers inherent in comparisons between the results of scientific enquiry in different ages. In what sense, if in any, can we make comparisons between past and present scientific ideas? Are such comparisons, in Herder's case, indicative merely of a misplaced worship of literary idols, as Rouché and Kohlbrugge 72) suggest? These questions lead us to a brief examination of the eternal problems of "prophecy" or "anticipation".

A minimum of empirical evidence can give rise to a daring hypothesis (as for example the atomic theory in ancient Greece). Such ideas may be taken up by non-scientists (in this case, a long line of philosophers from Lucretius to Gassendi), publicised, and so become part of the general climate of ideas. They may then provide ready-made hypotheses to account, ex post, for new empirical observations, sometimes even expressly encouraging actual scientists to test the conclusions they have heard of as speculations. In the latter case, we could speak correctly of a direct influence of non-scientists upon the progress of science; if, however, scientists were to adopt such ideas only after new observations, which the ideas might explain, became available, the influence would be indirect and fortuitous.

For the number of ideas of non-scientific origin which do provide a direct influence, there are many more whose influence is coincidental, and many more again which prove fantastic by later standards, and are speedily forgotten.

Those ideas which do influence later scientists must never be seen as marvellous foreshadowings, implying some undefined superior insight or
prophetic faculty. They are often bold, imaginative guesses, possessing an almost aesthetic quality in their search for harmony or symmetry (as for example the aesthetic considerations of the universe which led Kepler towards formulating his laws of planetary motion), and, seen purely as such, are examples of Bacon's "idola tribus":\textsuperscript{73}

For the human understanding is of its own nature prone to suppose the existence of more order and regularity in the world than it finds --- Hence the fiction that all celestial bodies move in circles; spirals and dragons being (except in name) utterly rejected.

It would be interesting to study the rôle of such "idola" and erroneous conceptions in contributing, despite themselves, to scientific progress; but this would be a study rather of exceptions than of the rule in the history of science because careful empirical observation and exact calculation have always provided the solid ground upon which hypotheses, however inspired and epoch-making, must eventually repose.

How then can a thinker such as Herder influence scientific thought?

(i) The influence can be such as we have just described. "Literary idols", because of their prestige, are in an excellent position to publicise ideas, even second-hand ones, which may influence scientific thought.

(ii) The biological theorist von Bertalanffy\textsuperscript{74} writes of "--- the historical fact that the beginnings of every science, physics included, often were rather philosophical, general, anthropomorphic, even metaphysical." In Herder's day, the modern sciences of chemistry, geology, palaeontology, physiology, biology, psychology and anthropology were in the process of emerging from just such beginnings as this writer describes, and the influence of non-specialised thinkers upon them was not insignificant. In this connection, we should recall the enormous influence of such thinkers as
Aristotle, Descartes, Leibniz, Bacon, Kant and others upon science.

(iii) To this day, the influence of philosophy upon science in monitoring and correlating scientific theory, studying its logic, and relating science to the rest of knowledge, is emphasised by many philosophers and scientists. A.J. Ayer\textsuperscript{75} writes:

\begin{quote}
--- philosophy must develop into the logic of science.
\end{quote}

And von Bertalanffy remarks: \textsuperscript{76}

Just as it is scarcely possible, in relation to the fundamental questions concerning space and time, action, deterministic or statistical, etc., to draw a sharp line between physical theory and theory of knowledge, so will it also be the case in biology, in which the most general concepts (first of all that of "organism") on the one hand require logical clarification, and, on the other, form the foundation of biological explanations and theories.

We have hitherto contested and qualified the value of comparisons between the results, content, or particular theories of science arrived at in different ages by different methods. In what sense can we proceed to compare Herder's methods with more modern ones?

While noting that the largely subjective basis of Herder's methods renders most of his results unacceptable, we conclude that his methods, where applied objectively by him, or where applicable objectively in the present, are partially acceptable to modern science and its associated logical philosophies. For past methods often coincide with subsequent procedures when they are applied to incontestable and empirically verified data. For a correct conclusion arrived at by a questionable method deserves less respect than a conclusion arrived at by a logically
unimpeachable method, but superseded as more facts become available. The actual conclusions reached in Herder's day in the new and emerging sciences can rarely be compared directly with those of today, because of the many technical methods which have since become available. We can thus, especially in these newer sciences, compare only theoretical methods and attitudes. It is in this sense that we mean that the history of science should be first and foremost a history of methodology. As Hallam says: 77)

It has been justly said that he alone discovers who proves --- Pascal quotes Montaigne for the shrewd remark, that we should try a man who says a wise thing, for we may often find that he does not understand it.

Taken out of context, results, as embodied in some theory which claims to describe the content of the natural world, can be highly misleading, perhaps having been reached by scientifically suspect methods. For example, Herder's "Kraft" and modern energy do indeed share something in common, as Clark 78) points out, both being hypothetical entities, or even "metaphysical" ones, as Clark says. But, as was realised already by Kant, science can deal only with relations between such entities, not with their intrinsic quality. As Lange says: 79)

So werden wir mit dem Fortschritt der Wissenschaft immer sicherer in der Kenntnis der Beziehungen der Dinge und immer unsicherer über das Subjekt dieser Beziehungen. Alles bleibt klar und verständlich, so lange wir uns an die Körper halten können, wie sie unsern Sinnen unmittelbar erscheinen oder so lange wir uns die hypothetischen Elemente derselben nach Analogie dessen, was in die Sinne fällt, vorstellen können; allein die Theorie treibt stets darüber hinaus ---

Clark takes "Kraft" and energy out of their contexts, which, in the case of
energy, is a system of quantitative relations. Only in their contexts does their difference become clear. Otherwise, we might justly compare energy with supernatural and spiritualistic agencies, as indeed is sometimes done.

All this discussion of the history of scientific ideas has seemed particularly necessary simply because so many critics, tacitly or explicitly, raise the question: "How scientific, or how modern, are Herder's ideas?"

We have therefore outlined the principles according to which we shall attempt to answer it. But before examining Herder's methods in detail, we shall attempt to illustrate and prove the major contentions which we have hitherto put forward in this introduction, by analysing his central idea of "Kraft".

As we have already noticed, R.T. Clark Jnr. published an article on this conception of Herder's. But since we disagree fundamentally with Clark's presentation of the idea as essentially empirical and modern, we feel justified in expounding our own views here. Moreover, since Clark concentrates his attention upon the scientific and aesthetic connotations of the idea, no exhaustive study of all its numerous shades of meaning yet exists. Our specifically scientific refutation of Clark's thesis will come later.

3. The idea of "Kraft" in Herder's thought.

The activity of the scientist consists for Herder essentially in following up the all-pervading "Kraft" as the reality behind all natural phenomena, and, in particular the numerous individual "Kräfte" in which the universal "Kraft" manifests itself. For all forms and phenomena are ultimately reducible to "Kraft", the content of the natural world. But, since the same concept has an important function in several other major areas of Herder's thought, a study of his scientific ideas will benefit from a preliminary account of the range and limits of the idea in his thought as a
whole. Only then will it become possible to define the term in its purely scientific connotations (which we shall mention only briefly for the present) without the risk of confusion.

The idea fulfills many functions which are at bottom discrete, and we must not allow Herder’s customary vagueness to lead us to confuse them. While Clark, as we have said, overemphasises the physical significance of the concept, Rouche[81] sees the religious background of it as most important, and Siegel[82] confines himself to an excellent analysis of some of its philosophical aspects. It is our contention that all these roles, as well as many others, are fulfilled by the idea, and that only out of their combination does the characteristically Herderian usage emerge.

In discussing the various senses in which the term is employed, we shall follow Irmscher’s maxim that the earliest statements of an idea are usually the most illuminating:[83]

Diese Quelle der Gedanken aber, die schon alles in sich faßt, was „spätere" Entwicklung und Darstellung nie ganz auszuschöpfen vermag, ist greifbar in den ersten Äußerungen und Produktionen eines Menschen —-

a) The philosophical usage, its sources and applications:

The ultimate sources of the idea in this, as in other applications, are to be found in the Platonist tradition. Max Jammer, in his outstanding history of the idea of force, writes of Plato’s theory:[84]

The actual and particular differentiation of the one being is realised through the activity of forces, emanating from the world-soul, an idea that through Neo-Platonic interpretations was to have great influence on the concept of force.

We shall later return to these interpretations in connection with the
religious usage of the idea.

Let us, however, seek Herder's earliest mentions of the idea. Haym writes:

Er hatte von dem damaligen [i.e. pre-critical] Kant gelernt, den Begriffen des Raums und der Zeit den der Kraft zuzugesellen.

Haym's evidence for this is that Rink's counterblast to Herder's "Metakritik" brought the accusation, vouchsafed for by Kant himself, that Herder had borrowed this metaphysical triad straight from Kant, who, in his early lectures, had set up the three concepts, as we mentioned earlier, as "die einzigen synthetischen Begriffe der Metaphysik". Herder uses the triad throughout his career as his basic table of categories.

G. Martin's publication of Herder's early "Versuch über das Seyn" (of around 1764), which was supposedly written under the immediate inspiration of Kant, brings further evidence that Kant was Herder's source. Herder writes of cause and effect:

--- so müßte, wenn das Sein der Folge aus der Möglichkeit erklärt wird, diese Erklärung im Begriff der Kraft liegen ---

The truth of Haym's (and Kant's) statement becomes a certainty, however, when we find, in two unpublished Herder manuscripts based upon early lectures by Kant on mathematics, the division of the applied mathematical sciences into those which study objects according to "Raum", "Zeit" and "Kraft" respectively. Thus it was definitely from Kant that Herder first derived the concept of "Kraft" as a fundamental existential category.

Herder, however, soon began to employ the idea in ways which Kant would scarcely have encouraged. His primary definition of the concept in the "Metakritik" shows that it has acquired a completely new sense at Herder's hands:
But, since scientific investigation can take place only according to measurements in time and space "von außen", this definition shows us at once the essentially metaphysical and non-scientific fundament of the idea as it is used here.

For Herder's more particular philosophical applications of the idea, Leibniz, as is almost universally agreed, 91) is the principal source. Herder, of course, explicitly acknowledges 92) and praises Leibniz on account of his idea of "Kräfte" [i.e. monads], which he sees as Leibniz's greatest contribution to metaphysics. All these "Leibnizian" usages, as transformed by Herder, are characteristic of Herder's method, which we have earlier discussed, of combining disparates, or even logical opposites, under one classification. For example, in his "Vom Erkennen und Empfinden" of 1778, he bridges Leibniz's (albeit veiled) dualism of body and soul by the "Kraft" idea. As Haym 93) remarks:

--- wenn man Leibniz durch Leibniz selbst verbessert ---, [tritt]
an die Stelle der prästabilierten Harmonie zwischen Leib und
Seele --- die Harmonie zwischen Kräften und Kräften.

We shall return to this usage in connection with Herder's psychology later, but we may note here that Lambert 94) had "corrected" Leibniz in this way even before Herder (who knew Lambert's works). The second traditional dualism of mind and matter is bridged by the same concept, which we shall mention in this connection when we evaluate Herder's ideas on matter. The third dualism of subject and object, the eternal problem of perception, is disposed of in the same way. We shall touch upon this in our later assessment of the rôle of subjectivity in Herder's scientific thought. But these three
applications need not be discussed in detail philosophically, since Siegel\textsuperscript{95} gives an admirable philosophical exposition of them elsewhere.

Thus, the chief function of the "Kraft" idea in Herder's more strictly philosophical argumentation is as a synthesising concept, which, by its very generality, is put to questionable use in overcoming traditionally irreconcilable antitheses.

There are some further metaphysical usages of the idea which have so far escaped the attention of critics. For example, there is Herder's notion that "Kraft", when used as a causal principle, is derived from man's experience of himself as a causal agent (an idea later adopted by Marxist anthropologists). Herder is fully cognisant of this derivation:

\begin{quote}
Der Mensch --- findet sich am innigsten als Kraft, als Ursache.\textsuperscript{96}
\end{quote}

Also: Er [i.e. man] ist, so fern er vermag.\textsuperscript{97}

But, as Jammer says of Plato's idea of force:\textsuperscript{98}

--- power means motion, which reduces [sic] to the principle of self-motion or the soul.

It was accordingly realised by thinkers such as Maupertuis that, if the idea of force as an explanation of motion or causal action were applied to the non-human world, it might be done only with this inward reservation:\textsuperscript{99}

\begin{quote}
Nous nous souviendrons toujours que la force motrice --- n'est qu'un mot inventé pour supplier à nos connaissances, et qui ne signifie qu'un résultat des phénomènes.
\end{quote}

A similar reservation is expressed in Hume's idea that causality cannot be understood in itself. Kant repeated this idea at an early date,\textsuperscript{100} as also in his later "Über den Gebrauch teleologischer Principien in der Philosophie" of 1788.\textsuperscript{101}
Von einer Grundkraft aber --- können wir keinen andern Begriff geben, und keine Benennung dafür ausfinden, als der von der Wirkung hergenommen ist und gerade nur diese Beziehung ausdrückt.

This idea, in fact, became a commonplace of philosophy in Herder's day. It is therefore no wonder that "jener skeptische, Hume-Hamannsche Satz", as Haym calls it, is reiterated by Herder himself to the point of monotony:

Kein kluger Philosoph hat sich je unterwunden, zu wissen, was Kraft ist, oder wirkende Wesen nach innern Gesetzen und Zuständen zu ordnen --- [etc.]

Nonetheless, Herder proceeds to do the very thing he so often warns against:

--- wir schließen mit Recht, daß der Wirkung eine wirkende Kraft, mithin ein Subject zum Grunde liege.

The word "Subject" betrays Herder's logically fatal step towards personification of inanimate causal agencies. A remark of Gillies is appropriate here:

The "Ding an sich" was, thus, not unknowable; it could be known, though not perfectly, except by God.

Du Bois-Reymond, quoted by Lange, writes:

Die Kraft (insofern sie als Ursache der Bewegung gedacht wird) ist nichts als eine verstecktere Ausgeburt des unwiderstehlichen Hanges zur Personifikation.

Irmscher's recent publication of a 1769 manuscript of Herder's shows how Herder had proceeded, at this relatively early date, to personify causal agencies in this impermissible way. Herder writes:

Wie hat sich mein Körper gebildet. Durch Anziehung und Zurückstoßung? was will das sagen, wenn ich nicht eine Monas setze,
The term "Monas" here betrays once again the Leibnizian inspiration of Herder's use of "Kraft" as a personified causal principle. Thus, we have seen that Herder on the one hand warns against attempts to define the inner nature of force or to personify causal agencies, yet on more than one occasion does exactly that himself. Once more, the ambivalence of his "Kraft" appears.

The situation becomes still further complicated when Herder proceeds to confuse the above-mentioned a priori idea of "Kräfte" as causal agencies, which are intrinsically unknowable, with the purely empirical problem of whether we can determine the nature of various natural agencies, also styled "Kräfte", such as electricity, magnetism, and gravity:

Wo Wirkung in der Natur ist, muß wirkende Kraft seyn ---. Es mögen viele Medien in der Schöpfung seyn, von denen wir nicht das mindeste wissen, weil wir kein Organ zu ihnen haben.

The reason here advanced for our inability to comprehend such natural "Kräfte" is no longer the logical one used elsewhere to explain our lack of knowledge of causality (although Herder never makes this distinction explicit); our lack of an "Organ" is here held alone responsible. The inference is clear that, if we possessed more sensitive organs or instruments, we might detect the existence of many more "Kräfte". Just as Herder had earlier, against his own warnings, attributed real existence to "Kraft" as a metaphysical soul, a personal agent in the formation of the human body and of the planets, he now alternatively gives it reality by identifying it with practically detectable physical principles. That Herder definitely indicates physical
agencies in this last passage becomes clear when we read a remark in his preparatory notes to his "Plastik" of 1769: 109)

Der Magnet müste so sehr verstärkt werden, daß seine Kraft fühlbar würde. Ich halte es für möglich.

Herder, in fact, goes on to people the whole physical world with manifold "Kräfte", beginning with his famous dictum: 110)

Unser Erdball ist ein großes Laboratorium zur Organisation wirkender Kräfte.

As Engels puts it: 111)

In order to save having to give the real cause of a change brought about by a function of our organism, we fabricate a fictitious cause, a so-called force corresponding to this change. Then we carry this convenient method over into the external world also, and so invent as many forces as there are diverse phenomena.

Herder sees such forces, contrary to his earlier statements, as potentially completely knowable. It is in this sense that we should interpret his blaming Newton 112) for his failure to define the inward nature of gravity, in turn praising Kepler's animistic explanation.

Thus we have already noted three distinct ideas, logical, metaphysical, and physical, closely related and barely distinguishable in their earliest formulations by Herder, yet all disguised under the same word - "Kraft". Once again, the synthesising function of the concept becomes apparent.

Maupertuis' denunciation of such misuse of Leibnizian or cognate ideas is perhaps the clearest and most forthright of any such statements in Herder's age: 113)

D'autres [philosophes] ont cru avancer beaucoup, en adoptant un mot qui ne sert qu'à cacher notre ignorance: ils ont attribué
aux corps une certaine *force* pour communiquer leur mouvement aux autres. Il n'y a dans la philosophie moderne aucun mot répété plus souvent que celui-ci, aucun qui soit si peu exactement défini. Son obscurité l'a rendu si commode, qu'on n'en a pas borné l'usage aux corps que nous connaissons; une école entière de Philosophes [Leibnizians, no doubt] attribue aujourd'hui à des êtres qu'elle n'a jamais vu une force qui ne se manifeste par aucun phénomène.

b) *Animistic and related usages: sources and applications:*

From the personification of non-human causal agencies, it is an easy step to the notion that the inorganic and vegetable worlds are endowed with soul-like principles. We have already mentioned Herder's toying in 1769 with the idea of planetary or world-souls, and shall return to the idea in connection with gravitational theories later. The same manuscript in which this idea appears names (Irmscher's edition) "--- das Leben der Metalle" and "das Leben der Pflanzen" together. The "Kräfte" dwelling in stones and plants are later still represented as analogous to the soul.

Selbst die Pflanze, wenn sie empfindet, muß also empfinden: sie muß wie im tiefsten Traume der Selbsterkenntnis mit Ahnung deßen, was in dies Selbst einfließet, schlummern. Selbst der Stein, wenn er durch innern Trieb fiele, müste seinen Trieb zum Mittelpunkt auf die dunkelste Weise erkennen, d.i. empfinden.

This conception is, of course, linked to that of the Leibnizian ladder of forms, all endowed with monads of an increasing degree of consciousness. As early even as 1766 (approximately), Herder notes:

Vielleicht empfinden die Pflanzen wie wir ——

Such references are to be found in several other works of Herder.

Words such as animism, pananimism, panvitalism, panpsychism,
panspiritualism, panlogism, hylozoism etc. each convey something of Herder's use of this complex of ideas, but, allowing for Herder's characteristic vagueness, and the way in which any one meaning of the "Kraft" idea shades off into others, it is unwise to be over-specific. Perhaps "pananimism" is the most suitable term to cover the present usage.

Let us now consider Herder's forerunners in this doctrine. Probst writes of the new beliefs of Herder and Goethe:118)

Wenn "Gefühl" ihnen als das Höchste galt, so mußte doch der ganze Kosmos als Summe aller Kräfte, zu höchstem Fühlen fähig sein: man sah ihn wieder als allbeseelten Organismus, wie ihn schon Plato erlebt hatte.

Rouché writes:

Herder — se rapproche de l'animisme universel professé par Shaftesbury. Cela sous l'influence de Leibniz, transmise par Robinet qui, se réclamant du principe de continuité, reprochait à Bonnet d'opposer le règne organique au règne minéral. 119)

Burkhardt,120) in his introduction to his translated edition of Herder's "Gott", compares these ideas with the medieval "anima mundi". Schütze121) traces the history of these ideas from Bruno, Eckart, Tauler and Böhme, but in connection with the later German Romantics, not with Herder.

To these possible sources one might add those named by Herder himself in the early fragment "Wahrheiten aus Leibniz".122) They are:

--- Cardan, Campanella, die Gräfin Conneway und van Helmont, die allen Sachen Leben und Empfindung gaben.

Herder appears to have encountered these thinkers' ideas in Leibniz's works. He also seems to have known of the idea, first propounded by Gilbert in his "De Magnete" of 1600, that the earth's magnetism was the palpable
manifestation of the world-soul. Herder writes in 1778:123)

--- der große Magnetismus in der Natur, der anziehet und
fortstößt, ist lange als Seele der Welt betrachtet worden.

We have already seen how Herder later acclaimed Kepler's conception of an
animistic gravity in opposition to Newton's "mechanistic" version. The
"pneuma" of Anaximenes, Erasistratus, Galen and the Stoics is a further
parallel. The aesthetician Sulzer124) appears to have inclined towards
pananimistic ideas. (His work was known at least in part to Herder.)
But Herder objects as soon as the world-soul is made to include man, since
he knows this would jeopardize the doctrine of personal immortality:125)

Auf diesem Wege der Averroischen Philosophie, nach der das ganze
Menschengeschlecht nur Eine und zwar eine sehr niedrige Seele
besitzt, die sich dem einzelnen Menschen nur theilweise
mittheilet, auf ihm soll unsre Philosophie der Geschichte nicht
wandern.

Thus he never fully accepted the idea of pananimism in the form of the
"world-soul" doctrine.

But it is perhaps better not to overemphasize any one aspect or source
of these ideas found scattered through Herder's works, but to see them as
yet another of the alternatives within the complex of interrelated "Kraft"
ideas, related, in this case, to Herder's Leibnizian striving to reconcile
mind and matter in the "Kraft" conception. Knebel, who followed Herder in
so many of his ideas, argues in a similar way in his essay "Über die Natur
des Menschen":126)

Die Materie ist für sie [= die Spiritualisten] durchaus etwas
Grobes, der Empfindung und endlich gar des Denkens ganz
Untheilhaftiges. Sie bemerken nicht, wie diese Empfindung
selbst in den Ordnungen der Natur nach und nach aufwärts
steigt; wie schon im Pflanzenreiche Spuren davon sich zeigen, und wie immer durch feinern Reiz sich solche endlich in der tierischen Organisation erhebt.

c) "Kraft" and belief in the occult in Herder's personality:

Also closely related to the animistic application of the "Kraft" idea is Herder's belief in occult, invisible powers at work around him. This belief does not become obvious in his written works, but our knowledge (derived from biographical sources, etc.) of its existence indicates to us another possible motive behind his intense interest in the "Kräfte" he sees in everything. His wife Caroline relates in her memoirs:

Sein Glaube an noch unerklärte oder unerklärliche Kräfte der Natur war Glaube an die allbelebte, geisterrfüllte Welt, an innere Kräfte der Natur und Seele, die mit andern uns bekannten Gesetzen innig harmoniren, uns aber noch nicht aufgeschlossen sind ---. Er glaubte auch, daß eine reine wohlgebildete Seele, in Augenblicken stiller Einkehr in sich selbst, durch irgend eine innere unbekannte Bewegung, der Ahnungen über bevorstehende wichtige Eignisse allerdings fähig sey. Er hörte und las darum gern von Ahnungen, Träumen, Erscheinungen u. dgl.

It is interesting that Caroline juxtaposes "unerklärte" and "unerklärliche" in a way which recalls Herder's own confusion of the logically "Unerklärliche" with the scientifically "Unerklärte", already mentioned above. No doubt Herder's belief in a personal daemon, named in his poems and his letters to his betrothed, his use of Biblical lotteries, his keen interest in galvanism, and his declaration to Jean Paul "--- daß er sich eine Geistererscheinung wünschte, und daß er gar nichts von dem gewöhnlichen Geister-Schauder dabei empfände und ahnte" are all part of this same
preoccupation.

Yet just as Herder, as we have seen, was prepared to believe in personified causal agencies himself while reiterating the warnings of Hume and others against any attempts to do so, we again find him denouncing all beliefs in mysterious forces in the natural world in a well-known letter to his son August:132)

--- die Raumerfüllungen, geheime Kraft- und Thätigkeitssprinzip, die Ichs, Selbst und Seelen der Metalle und Mineralien etc. etc. etc. Überläß dem Teufel.

But what he saw as a clear weakness in the scientific argumentation of his adversaries on this issue, the Romantics, Herder chose not to see in himself. Once more, the ambivalent quality of his views, especially in the "Kraft" idea, is manifest.

We must further add, in all fairness, that Herder had no sympathy with occultism as a serious or systematic study. He writes to G. Müller:133)

Vor den geheimen Wissenschaften hüten Sie sich; der Teufel steckt dahinter in leibhafter Gestalt.

Yet even here, Herder appears to believe in the corporeal existence of the Evil One. However, it is just as likely that he was accommodating his language to the understanding of the young student of theology, but recently departed from the school of Lavater and Hafeli. This interpretation is confirmed by our knowledge that Herder soon afterwards abolished the formula of exorcism from the baptismal liturgy of Weimar, since he saw it as liable to encourage superstition.

d) The religious and mystical usage: sources and applications.

Herder early became acquainted with yet another cognate usage of the
"Kraft" idea. In August 1766, he made, among others, the following extract from Hume's "Natural History of Religion":

Wir sind auf einem Schauplatz, wo unbekannte Ursachen wirken, unbekannte Folgen wirken; nur beschäftigt sich die Einbildung, um diese unsichtbaren Kräfte zu entdecken; zu unphilosophisch, um den großen Mechanismus einzusehen, sucht man Alles nach sich zu bilden — [compare Herder's and Hume's warnings against personifying natural causes].

Herder thus became acquainted with a rational explanation of the origin of religions, and himself adopted it. He writes around 1780:

Wilde [sehen] überall Kräfte, Geist: Orientalen überall Gott

We have already seen that this knowledge did not deter Herder from personifying natural phenomena or their causes himself, in the same way as the "Wilde" he describes.

At an early date, thus, the "Kraft" idea acquires a religious significance in addition to its many other meanings. Herder writes at an early date:

Gott erfüllt den Raum durch seine Kraft —

This nuance of the religious application is almost certainly derived from Kant. Compare Kant's "Allgemeine Naturgeschichte" of 1755:

Die Gottheit ist in der Unendlichkeit des ganzen Weltraums allenthalben gleich gegenwärtig; — die ganze Schöpfung ist von ihren Kräften durchdrungen.

(Herder mentions this work of Kant as early as 1766.)

Herder, in his religious period, goes so far as to praise the mode of worship of primitive peoples which Hume had explained from natural causes:

Kräfte wurden angebetet und nicht Formen. —— Sie [i.e. Egyptians] beteten nur die Gottheit im Lebendigen an! [Herder sees such worship as closer to the "pure" original religion of man.]
In 1781, he again writes of God:

Wor Kraft in der Natur ist, ist Er.¹⁴⁰)

Enough has been written by various critics on the details of Herder's religious usage of the "Kraft" idea in his "Gott" of 1787, and of his attempts to link the divine "Kraft", indeed almost to identify it, with the "organische Kräfte" at work within the world. Schaefer's words are noteworthy: ¹⁴¹)

Dies ist ein Angelpunkt von Herders Theologie, die wesentliche Lösung seines Anliegens, die Unendlichkeit hineinsubringen in die Welt, ohne ihren unendlichen Charakter zu verletzen.

This, of course, shows not only how Herder uses the idea to reconcile God and nature, or God as the Uncreated and as Creator, but also confirms our initial thesis that Herder's main conceptual syntheses always contain elements of both Unity and Variety, Absolute and Relative. However, it is enough that we have traced this application of "Kraft" to Herder's Riga period and even before, noting how even in those years he used it to link the divine with the natural.

We must now ask what are the particular theological sources and status of the idea of "Kraft" as employed in Herder's theology. There can be no doubt, as McEachran¹⁴²) notes, that he saw the religious usage of the concept as akin to the Johannine doctrine of the divine logos. He related this in turn to the Old Testament idea of the divine breath as a life-giving force:¹⁴³)

Othem Gottes ist in uns, eine Sammlung unsichtbarer, mächtiger und so verschiedener, nur im Duft zusammengeordneter Lebens- kräfte --- ich bin Kraft!

We cannot, however, agree with Kühnemann's statement:¹⁴⁴)
This statement is too general, applying apparently to all applications of the idea by Herder, and fails to account for the ways in which Herder later used the idea in his "Gott" and other works. We have seen, moreover, that his earliest sources were not Johannine Christianity. This can only be seen as another attempt to make Herder appear more orthodox than he was.

Herder's religious applications of "Kraft", it will be seen, are closely related to the animistic doctrines mentioned earlier. These are, of course, traceable ultimately to the "Timaeus" of Plato, the medieval "anima mundi" etc. But within the Judaeo-Christian tradition, the idea first appears with regularity after the writings of Philo and other Alexandrian mystics who adapted the Platonic idea of a universal soul to their theological systems. Jammer writes in his history of the idea of force: 145)

Force, therefore, according to Philo, exists in three variations:
as the eternal property of God, identical with his essence; as incorporeal beings created by God prior to the creation of the world; and as wholly immanent in the world.

Philo's teachings in turn influence the Cabbalistic writers, 146) and Judah ben Samuel Halevi cites the Hebrew plural term "Elohim", found in the book of Genesis, as evidence of an earlier polytheistic religion. It is curious that Herder singles out the same term, giving a similar interpretation of it. He says of the "oriental" peoples: 147)

Sie sahen alles als lebend an und begabten also auch alles mit lebendigen Wesen; das sind die Elohim, Adonim, Schadim der Erbäer, die Iseds der Parsen, die Laken der Tibetener --- [etc.]

Strothmann, 148) however, draws attention to Aquinas' "Forma substantialis" as
a possible source of Herder's "Kraft" in its theological connotation. Clark derives this idea of Aquinas' in turn from Aristotle. (Incidentally, there is no evidence for Clark's idea that Harris' conception of God as "Energy", quoted by Clark, 150) might have influenced Herder. For Herder, so far as we know, read only Harris' "Three Treatises", in which no such theological application is found.) Jammer writes: 151) Aquinas' doctrine of celestial intelligences [derived also by Jammer from Aristotle] and his thesis that 'all multitude proceeds from unity' lead him to accept the principles of dynamic astrology. This corroborates Strothmann's and Clark's statements, and also shows how near unorthodoxy, by standards other than those of the later Middle Ages, Aquinas comes in this notion. But Strothmann, in singling out Aquinas as the likeliest source, can produce no evidence, since none exists that Herder had encountered this or other doctrines of Aquinas. Strothmann omits to mention equally possible sources such as the "Timaeus", the Alexandrians and the Cabbala (which Herder mentions at times), all age-long fountain-heads of heresy. We have already seen that Hume was a further source. Strothmann, like so many others, is simply at pains to show Herder as more orthodox than he was.

Another possible source presents itself in the work of the Cambridge Platonist Ralph Cudworth, whom Herder mentions in his Riga essay "Über die verschiedenen Religionen" 152) and, in an approving reference, in 1774. 153) Jammer describes the theology of Cudworth as follows: 154) Cudworth's conception of "Plastick Nature" is a variation of the Neo-Platonic concept of a world-soul, but with an important reservation: the universe is not conceived as activated by forces working from without, but by a forming principle from
within; but this principle, this "Plastick Nature" does not operate consciously, as the world-soul was supposed to do, and consequently cannot be identified with God's being; it serves rather as an unconscious intermediary, a medium, under the control of the highest intelligence which guides the cosmos.

The same writer also quotes R. Passmore's work on Cudworth:

--- his plastic natures are a sort of "third man" designed to bridge the gap between God and matter, mind and body.

And when we find the third statement: " --- Leibniz himself recognised that there were many points of contact between his own concepts and those of the Cambridge Platonists", the circle of our argument is complete. These statements about Cudworth might be an exact description of Herder's use of the "Kraft" idea in his "Gott", where, as we know, he praises Leibniz as his forerunner.

We need only add that, contrary to the belief of past critics, Herder was acquainted with the thought of Giordano Bruno at a relatively early stage in his career, although no reference to Bruno occurs outside Herder's manuscripts till 1803. Herder had encountered Bruno's ideas through Toland. We shall discuss Rouche's derivations of the "Kraft" idea later in connection with Herder's ideas on the "medium" within which "Kräfte" were supposed to operate; for Rouche fails to distinguish between "Kraft", "Medium" and "Aether".

We conclude from all this that Herder's use of "Kraft" as a common term between God and nature, spirit and matter, was rather mystical than religious in the normal sense, and that it was certainly far from orthodox theology. (We shall pass by the "pantheism" theme, since too many critics have already discussed it.) Koch is one of the few to support this view. All this
corroborates our original contention that Herder was not, as Rouché and others would have it, merely imposing theological dogmas upon the world of science. He was once again attempting a synthesis, mystical, or even aesthetic\textsuperscript{161}) in inspiration, between disparate elements of his experience. The synthesis, as we shall see, certainly involved distortions of the scientific position; but the distortions to the faith Herder officially represented were, even in his most religious period, just as considerable.

Finally, we shall briefly examine one further religious application of the idea of „Kraft“ by Herder, once more a double-sided conception. Herder writes (in the recently published 1769 manuscript already mentioned\textsuperscript{162}) as follows concerning the soul:

--- ihre vitale Kraft --- kann nicht mehr dem Allen entgegen- würken, was auf sie stürmt - ich sterbe.

Yet, on the same page, he also writes:

Mein Tod ist nur ein Vertreiben aus Raum und Zeit: Keine Schwäche meiner Kraft.

Thus it appears that he considers the soul to be a „Kraft“ possessed of two aspects, one of which is "vital", and the other immortal.

The fullest treatment of this further contradictory aspect of the „Kraft“ idea is that of R. Unger,\textsuperscript{163}) who publishes the first of two letters of Herder to Mendelssohn in 1769, in which Herder casts doubt upon Mendelssohn's arguments in favour of the soul's immortality. Unger notes\textsuperscript{164}) that Herder later uses (in his "Ideen") some of the same arguments in favour of immortality which he had challenged in Mendelssohn's „Phädon“, for example the analogy between the butterfly's development and the progress of the soul, which, as a „Kraft“, passes into a new „Organ".
Of the similar problem of the soul's origin, Herder writes that, at some time in the future, "wirds offenbar werden, daß die Seele sich einen Körper durchs Gefühl und zum Gefühl von außen bilden, oder sich führend in die Welt hineinbilde!" Yet much of his fourth "Kritisches Wäldchen", of the same period, and his later "Vom Erkennen und Empfinden", are devoted to demonstrating that it is only through sense experience that reason and the higher levels of the mind emerge, that is, that the specific individuality of the personal soul is created by experience through the body. Unger's words on the whole problem of the soul in Herder's works may fittingly conclude this survey. He calls it

--- das unabschlossene, nie zum völligen Ausgleich gekommene Ringen verschiedenartiger Motive in seiner Beantwortung der ihm lebenslang beschäftigenden Frage.

e) The aesthetic application:

The sentence quoted in our last section:

Wilde sehen überall Kräfte, Geist: Orientalen überall Gott

is continued by Herder as follows:

Daher die älteste Poesie, Poesie der Wilden ---

This juxtaposition of ideas shows how closely connected he considered the origins of religion and of poetry to be. Hence he readily transferred his description of the divinity as "Kraft" to his account of the nature of poetry. A.Gillies brings this point out well in his "Herder und Ossian":

Er untersuchte und betrachtete die Poesie nicht mehr so sehr [in his early plan for a "Geschichte der lyrischen Poesie"]; er lernte sie vielmehr als die lebendige Entfaltung der göttlichen Kraft der Natur genießen und erleben ---

Herder's attitude to poetry is well characterised by Witte:
Die meiste Eigentümlichkeit Herderschen Geistes bestand ja in seiner überraschend phantasievollen Anschauungsweise von Allem. Ueberdies ist die Phantasie ein schöpferisches und darum vorzugsweise dem Inhalte der Dinge zugewandtes Vermögen, während der Verstand mehr Anderes verarbeitet und überwiegend formal ist. Seine ästhetische und seine sonstige wissenchaftliche Kritik ist in der Hauptsache ebensosehr material wie Lessings formal beschaffen.

Since then the "Kraft" idea is the antithesis of a formal category, it is not surprising that Herder's abstract descriptions of poetry are based upon it. His view of genius was similar. He believed, as Gillies says:

--- daß das Genie der Ausdruck der inneren Kraft des Weltalls, der schöpferischen Tätigkeit der Gottheit war.

It is true, as Schütze suggests, that this application of "Kraft" embodies, as did Leibniz's individual monads, a principle of spontaneity and individuality. But numerous other applications have shown us how the idea, as Herder uses it, is equally capable of providing universal generalisations.

Herder adapted the familiar "Raum", "Zeit", "Kraft" triad to aesthetics (as well as to physics, metaphysics, and religion, as we have seen); he classifies visual art as appropriate to "Raum", producing "Werke", music to "Zeit", producing "Energie", and poetry to "Kraft", producing "Sinn". In another passage, poetry is associated with "Energie" in turn. But we need devote little attention to Herder's sources for this application; Clark's essay explains in detail how Harris' distinction of "Werk" and "Energie", in turn borrowed from Aristotle, influenced him. We shall merely add that Herder wrote asking Nikolai for a copy of Sulzer's essay "De l'énergie dans les oeuvres des Beaux-Arts". He had, however, known Harris' ideas for several years before he made this request, so that Harris is
undoubtedly the chief influence.

The poetic application of the "Kraft" idea is probably the most subjective of all its usages. After all, Herder saw poetry as a means of restoring living emotional content to an over-rationalised and effete world. We should bear this aspect in mind in connection with Herder's scientific application of the idea, for this subjective, emotional element jeopardised what little objective value the idea might have possessed when used in scientific contexts. The idea of "Kraft" may have proved an inspiration to the "Kraftgenie" who took his name from it; but it could only detract from the value of Herder's scientific thought.

f) The historical application:

The Dionysian, creative force at work in the poetic genius was likewise considered by Herder to be at work and to express itself in the historical process. He writes, in an earlier version of "Auch eine Philosophie":

Wir suchen und wägen Kräfte, nicht das Schattenbild ihrer Abstraktionen und Folgen, die sich vielleicht mit jedem Stral der Sonne ändern.

And in his "Plan zum Unterricht des jungen Herrn von Zeschau" of 1772, we find the following heading:

§ II Geschichte des menschlichen Geschlechts oder der Kräfte der Menschheit.

As Herder moves away from his more youthful, biological view of history as struggle, as "Gärung", or colourful, pullulating growth, he still retains the idea that "Kräfte" are the raw material, as it were, of history. But the historical "Kräfte" are now seen as diversified in kind:
he writes in 1782 in a fragment entitled "Philosophie der Geschichte." Side by side with the older sense of historical "Kräfte" as natural, uncontrolled growth, his later idea that their operation obeys mathematical, even mechanical laws, begins to appear, especially in the "Ideen", Pt. III.

Kühnemann neatly sums up this dual aspect:

Die Kräfte, welche ringen, bis sie ihr Gleichgewicht, ihr Maximum finden, erscheinen in doppeltem Sinn: bald sind sie die rohen Kräfte, die von Verstand und Vernunft überwunden werden, bald wieder sind sie Kulturkräfte, die sich im Gleichgewicht erhalten.

Thus, in the historical application too, the idea has acquired a double meaning.

6) The physical application:

We shall discuss Herder's views on the nature of physical force and energy in our chapter on physical science. For the present, we shall recall that Herder's manuscript notes, based upon lectures by Kant on mathematics, classified the applied mathematical disciplines according to "Raum", "Zeit" and "Kraft". His words are as follows:

Mathesis specialis  
) Raum: daher Geometrie und Trigonometrie  
) Zeit: daher Chronologie  
          Gnomonik  
) Kraft: a) 1. Bewegkraft Dynamik westen Körperm überhaupt z.E.  
          Mechanik [sic]  
          a) unserer Erde: Geographie
52.

b) der Himmelskörper: Astronomie

c) des Lichts

a. geradlinicht Optik
b. durchgeschlagen Dioptrik
c. zurückgeprallt: Catoptrik
d. der Luft Aerometrie

2. in flüssigen Körpren Hydrodynamik, oder Hydraulik

b] stillstehende Kraft:

1. in vesten Körpren: Statik
2. in flüssigen - Hydrostatik

We thus see that Herder had learnt at a very early date to base all the physical sciences upon "Kraft", as a common object of study. Kant is, of course, responsible for this classification.

There is evidence that Herder soon came to connect, or even to identify this physical application with the religious one. He writes in 1774: 181)

Gedenke Newtons! --- Du stehest auf der Höhe! strebest --- blos dem Strome der Gotteskraft nach, sie in allen Formen, Gestalten und Schöpfungen tief und treu zu fühlen, dem Schöpfer zu dienen und nicht dir [compare the earlier "Gott erfüllt den Raum durch seine Kraft"].

But in this respect at least, Herder was in no way deviating from the beliefs of many, if not of the majority, of contemporary scientists. We have observed how even Kant 182) could speak of the divine forces in space. Jammer writes: 183)

--- action at a distance was viewed by many theoreticians of the early 18th century as a disguise of occult quality and was criticised as incomprehensible. The only way to reconcile this new and immensely successful notion with traditional ideas was to supply it with a metaphysical-theological foundation and to
assimilate it into the Neo-Platonic body of doctrines. Force and gravitation were thus conceived as manifestations, par excellence, of divine omnipresence and omnipotence.

Herder further proceeded to use the pattern of gravitational attraction in the solar system as an analogy for the spiritual welfare of man, in his important and famous essay "Über die dem Menschen angeborene Lüge" of 1777.\(^{184}\) The idea of such central attraction of the spirit towards the deity is again an ancient mystical conception. In an earlier section, we observed how Herder also assimilated magnetism, electricity, etc., treating them as "Kräfte", into this complex framework of physico-metaphysical relations, completing a continuous series ascending from the very elements of matter to the highest divinity.

h) The biological application:

In 1766, Herder first made extracts from the work of the microscopist John Turberville Needham:\(^{185}\)

--- eine vegetativische\(^{186}\) Kraft sey der Grund aller Erzeugung.

Herder was thus early familiar with the use of the "Kraft" idea in current biological literature. Needham's use of the gravitational analogy in describing growth (which we shall discuss later with Herder's biological theories) doubtless encouraged Herder in his belief that all phenomena, including life, could be accounted for by "Kraft". Herder, as we have noticed, linked the biological idea of a life-force to the theological conception of the divine breath during his most religious period, completing another link in the great synthesis which the "Kraft" idea came to represent. For the present, we shall note that Herder's knowledge of the "Kraft" idea in
biology considerably antedates his knowledge of Haller and others, whose works Clark\textsuperscript{187} sees as his principal source for this application.

\textbf{i) The psychological application:}

This application, with the two previous ones, will be examined in detail in the appropriate section. We may note here, however, that Herder knew from his early period the traditional picture of the mind as composed of a series of "Kräfte" (faculties), which he soon, in truly characteristic fashion, reduced to one "Kraft" of which, he said, the various mental functions are merely different expressions. He writes in 1767:\textsuperscript{188}

\begin{quote}
Die Natur der menschlichen Seele verkennet überhaupt in ihren Wirkungen die Abtheilungen der Kräfte, wie die Philosophen sie in ihr abgetrennt.
\end{quote}

In following Leibniz's interpretation of the workings of soul and body as alike governed by "Kräfte" (whether by Leibniz's monads or the neurological "Kräfte" etc. of Haller, or by a more metaphysical "geistiges Band"), Herder laid the basis for his "physiological" psychology. At present, we need only point out that he early used the "Kraft" concept in psychological topics, and remark once more upon its dual quality as a mediator between disparates.

\textbf{j) Conclusion.}

Despite the loss of the notebook in which Herder had recorded his mature ideas on "Kraft",\textsuperscript{189} his works contain sufficient references to the idea to show us how vast and complex its associations are. Accordingly, its principal function is to unite different areas of his knowledge and thought. The gaps which it is used to bridge are at times so wide, that the synthesis can be called little more than verbal, a papering over of gulf's which
threaten to gape open again at the slightest probing. But this very character of the concept should make us wary of over-emphasising any one source or application of the idea, as so many critics have done.

It is a compromise then, but not a compromise in the sense of a neutral territory on which choice between extremes can be avoided; on the contrary, its function is to facilitate movement between extremes, either of which Herder is prepared to adopt when necessary. We shall later find that he was prepared to reduce physical and even biological "Kräfte" ultimately to purely material or corporeal units. Yet on the other hand, we have already seen how he could use the term to designate spirits or entirely incorporeal agencies. In this sense, the idea is not so much an alternative to the extremes of spiritualism and materialism, as a veil, a conveniently ambiguous term which allowed the many-sided, problematic mind of Herder to take up materialistic or spiritualistic (even purely mystical) positions at will, while avoiding the more obvious appearances of contradiction. We have already tried to show that these shifts in position need not imply conscious dissembling upon Herder's part, such as some critics have claimed to detect. Nearly all the conflicts which the concept covers over are present, as we have noticed, from an early date, since the outer limits of the idea, the materialistic and the mystical, both appear in the 1760's. All this should illustrate and confirm our initial presentation of Herder's intellectual personality. The "Kraft" idea comprised a system of links in Herder's mind, whose very essence was to strive after complete knowledge and self-development. All this also shows that it is impossible to treat Herder's science in isolation from the rest of his thought. For this idea, as used in Herder's scientific writings, carries with it a host of important associations from most of the other subjects in which he was interested.
Used in purely scientific contexts, therefore, the idea proves virtually valueless as an empirical description of the natural world, which is seen as wholly reducible to "Kraft". This initial study of the idea therefore supports our second major contention that ideas concerning the content, as distinct from the form, of the natural world, or scientific results attained in a non-scientific way, are of less importance than the methods by which the results were achieved. The "Kraft" idea has a methodological value as a means of synthesis. Jammer writes:

The history of physics shows clearly that the introduction of the concept of force led to a methodological unification of the conceptual scheme of science.

That is, the rôle of the concept in the history of science has been essentially the same as we believe it to have been in Herder's thought. Conversely, in both physics and in Herder's thought, it has been proved to have no explanatory power whatsoever.

We conclude with the observation that Kant's attack upon Herder's use of "Kräfte" in his "Ideen", Pt. I, was justified, but that it concerned only an extremely small part (notably Herder's "proof" of immortality) of a much larger complex of related ideas which merge almost imperceptibly into one another. When we encounter the idea in any one application in Herder's scientific thought, we shall recall that, in his own imagination at least, it carried many of these extraneous associations; this helps to explain why he was so ready to juxtapose ideas which, to the present-day reader, seem entirely unrelated. But this very factor contributed not a little to the immense popular appeal, in the late 18th century, of a work so rich and universal as Herder's "Ideen zur Philosophie der Geschichte der Menschheit".
CHAPTER II

Scientific Methods.

We shall now undertake a systematic and critical exposition of Herder's philosophy of science, with special attention to methods. Herder frequently recommends the use of one method while himself employing another; the resulting ambiguity, which we shall attempt to elucidate, is the chief difficulty we shall meet.

1. Subjectivity and objectivity: the relationship of subject and object in the study of the natural world.

   a) Experimentation, observation and the use of instrumental aids.

   It should already be obvious that Herder's belief in "Kraft" as the qualitative content of the natural world was bound to predispose him against the use of exact, quantitative techniques in his scientific studies. Yet in his "Gott", that great apotheosis of "Kraft", Herder writes of exact, quantitative procedures: 1)

   Sie sehen, Philolaus, den Vorzug solcher wissenschaftlichen Formeln. Was der gemeine Verstand in täglichen Erfahrungen dunkel, aber anschauend bemerkt, bringen sie ins Licht, führen es auf allgemeine Gesetze, ja wo möglich auf Zahl und Größe zurück; dadurch bekommt ihre Behauptung einen Werth der bestimmten Gewißheit, ja einer allgemeinen Anwendung, die man nachher gern bei jedem einzelnen Gegenstande verfolgt.

   Thus Herder, especially in later years, was prepared to recommend a quantitative procedure, the results of which (especially where "Kraft" is concerned) he himself failed to utilise.

   But the eighteenth century, as Cajori 2) observes, witnessed a general
decline in the use of exact experiment after the great era of mathematics and physics in the previous century was over. It was in many ways an age of speculation and hypothesis, out of which new sciences were finally to arise; Herder was very much a part of this movement, especially since he was rather a philosopher and theorist of science than a practical scientist.

However, he was always prepared to make use of the data of experiments recorded by others, but not so much in the physical and mathematical sciences, which, like Goethe (though less markedly than he), Herder never entirely understood and appreciated. But he eagerly read experimental reports in medicine and biology; we shall note how he made use of these later. For the present, we may remark upon his repeated references\(^3\) to the eye-operation which the surgeon Cheselden recorded, with notes on the patient's progress. Herder's own eye-operations, rather than scientific curiosity, may have stimulated this interest. Nevertheless, he built his theory of the tactile origins of perception largely upon such experimental reports.

Unlike Goethe, Herder entirely approved of the use of instrumental aids in scientific investigations. We have already commented upon his wish for "new organs" to detect undiscovered "Kräfte". He renews this wish in a late poem, praising all new instruments invented:\(^4\)

\[
\begin{align*}
ein\ neues\ Werkzeug\ ist  
& \quad \text{Dem\ Menschenvolk\ ein\ vielfachstärkeres\ Aug'}  
& \quad \text{Und\ Ohr\ und\ Hand;}\ ein\ neues\ Werkzeug\ schafft  
& \quad \text{Ihm\ neue\ Welten.}
\end{align*}
\]

He had himself used a microscope on at least one occasion in Goethe's company.\(^5\) However, like Goethe, he seems to have felt that the observer should never lose sight of the values inherent in unaided perception. Too close a scrutiny can turn our delight over a living whole into revulsion, and he
points out "wie das schöne Gesicht, das mit bloßen Augen angesehen uns reizend vorkam, näher und mit einem Fernglase [sic] betrachtet, mit allen seinen Schweislöchern und Höckern und Erhöhungen ein Gegenstand des Abscheus würde". This recalls Herder's precipitate abandonment of his early medical studies after he had been overcome by the spectacle of a dissection. But Herder in this matter never went so far as Goethe, against whom one remark vindicating instrumental aids is clearly directed. The embittered Herder says of the "Sensualist" and "Realist":

Unrecht aber hätten sie, wenn sie sich der Vergleichung, der Berichtigung und Verstärkung der Sinne widersetzten und z.B. ein Vergrößerungs- oder Fernglas verschmähten, weil es ihnen den Mond oder die Milbe nicht mehr, wie diese ihr unbewaffnetes Auge sah, zeigt.

More than once, he eulogises the Newton-Herschel reflector-telescope as a great example of a "new sense". Thus, he approves in theory of experiments and instruments, and uses their findings, but his emotional reactions could prove stronger than his scientific interest in personal practice.

On a more general level, Herder frequently recommends and employs the observer's approach as distinct from speculation. He writes:

Immer ist unsere Psychologie noch nicht weit über die Kindheit hinaus, wenn sie --- ihren Weg durch Schlüsse und Errathungen fortsetzt; ohne auf die Besonderheiten einzelner Subjekte mit der Genauigkeit zu merken, mit welcher der Naturforscher die Körper der Thiere zergliedert ---

He writes to his son August in the famous letter already mentioned: "Also kommt --- auf Deine eigne Beobachtungen und Erfahrungen alles an". He made careful observations upon various skulls in comparing the anatomy of
the apes with that of man. He again recommends careful observation and portrayal of the various ethnological types as the foundation for a new physical anthropology.\textsuperscript{12) It was his belief that the observations of individuals in the natural sciences ought to be shared, and that greater co-operation was necessary for scientific progress in the future.\textsuperscript{13)}

But finally, we should remember Herder's own admission:\textsuperscript{14)} "--- ich bin so flüchtig und ungeduldig bei Allem, was viele lange mechanische Uebung fodert". In this particular, he lacked Goethe's patience. Siegel\textsuperscript{15)} appropriately emphasises the greater development of Herder's powers of hearing, rather than of vision, in which Goethe excelled. He further remarks that hearing, for Herder, was a more immediate way of perceiving "Kraft", a conception virtually foreign to Goethe, as Clark\textsuperscript{16)} indicates. Goethe's remark to Falk in 1809 sums up this difference:\textsuperscript{17)}

\begin{quote}
\end{quote}

The many concrete observations which Herder mentions are usually culled from the works of other scientists, gathered together in notebooks in accordance with his characteristic method of compiling "Collectaneen" and excerpts.

\textbf{b) Subjective elements in Herder's observation of nature.}

G. Schwarz writes of Herder's attitude towards the visible landscape:\textsuperscript{18)}

\begin{quote}
\end{quote}
This can only be described as nonsense. We know that solitary walks and contemplation of landscapes were a necessary part of Herder's life at all its stages. His childhood dreams of a water-world\(^{19}\) in the lake at Mohrungen during his walks in a setting of broad fields, woods, sky and watery plains were, as we shall see, an important contribution towards his ideas upon the natural world, as was his voyage in 1769, with the powerful emotional turning away from abstract erudition towards nature (and the renewal of the old dreams of a water-world). Again in the forests round Nantes in 1769 Herder communed with nature,\(^{20}\) and no doubt only his indisposition while in Straßburg prevented him from renewing such experiences there. His letters to his betrothed from Bückeburg show a further development of his more subjective interest in the natural world, although they have less of the dream-like quality of the earlier contemplations of lake and sea. These landscape descriptions written in Bückeburg\(^{21}\) are among the most beautiful passages of lyrical prose ever written by Herder. We know that, on surveying the landscapes of autumn\(^{22}\) and spring,\(^{23}\) he was moved by the deepest emotions. During the Bückeburg period, he spent hours alone in his garden and on long rides through the wooded country round the town. The young Georg Müller testifies to his continued interest in visible nature at Weimar, when his daily walks in the "Webicht" were an essential part of his routine and inspiration.\(^{24}\) Suphan says of much of what Herder writes in his "Ideen" on nature:\(^{25}\)

\[\text{Nicht über Büchern und Papier sind sie [i.e. these utterances]}\]
\[\text{dem Denker einst aufgegangen, sondern vornehmlich im Leben und} \]
\[\text{innigen Verkehr mit der Natur und ihren Erscheinungen.}\]

Suphan goes on to link Herder's frequent personifications of plants, trees,
etc. with this interest, and observes that he often compares the figure of man to that of the tree; we shall later contend that this comparison contributed to the theory of one organic "type" behind all forms.26)

Thus, from his childhood until his stay with his son August, in the last year of his life, among the mountains at Schneeberg, an intense, subjective interest attached Herder to all forms of landscape and of observable nature. We have documented this preoccupation in some detail since it has too often been ignored, and since it forms the subjective counterpart to his declarations, discussed already, in favour of more objective scientific observation, and is of similar importance in determining the tone of his writings upon the natural world.

c) Objective methods in Herder's theory and practice.

Having discussed Herder's attitude to practical observation, we shall now examine his theoretical pronouncements upon the objective basis of scientific knowledge, and the extent to which he himself follows them.

Many critics have produced quotations supposedly indicating his unqualified support for the "empirical" approach to knowledge. Herder indeed does contend that logic must have an empirical foundation: 27)

Der Logiker und der Naturerklärer wird Eins: was er ursprünglich auch ist und in den Tairnhausens, Pascals, Wolfen, Kästners und Lamberts war.

Many of these utterances, however, arise out of his early, emotional and Rousseauistic reaction against pedantry and in favour of the senses, and are, as such, not based upon a reasoned examination of the nature of scientific knowledge. He exclaims: 28) "Man verliert seine Jugend, wenn man die Sinne nicht gebraucht". His new "physiological" psychology, given its final form
in 1778 but begun in the fourth "Kritisches Wäldchen" of 1769, is full of such statements,\textsuperscript{29} and indeed much of its value derives from just these sentiments. The more emotional outbursts of the "Journal meiner Reise" gradually give place to a less demonstrative but equally sincere respect for empirical data; upon these, Herder built much of his mature work. He realises that they must be the raw material of all true science. He writes:\textsuperscript{30}

> Wenn alles Geschwätz des Wahns und der Sophistik zerfressenes Holz seyn wird: so werden wahre Versuche und Beobachtungen der Natur dauren, und vielleicht in anderen Theorien sich bewahren.

Again and again, Herder opposes "Erfahrung" to "Metaphysik".\textsuperscript{31} He believes that the scientist must be completely impartial in choosing material for scientific study, and adds only the one reservation that the greatest probability of obtaining new information for science should govern the investigator's choice.\textsuperscript{32} The thoroughness of the investigation is deemed more important than the particular object chosen.\textsuperscript{33}

We have however already shown, in connection with Herder's use of analytical and synthetic methods, in what sense this " empiricism " is qualified, in his own practice, by metaphysical arguments. For in constructing his unitary picture of the universe, he found it necessary to introduce metaphysical hypotheses which could not admit of empirical verification. Unlike Newton, with his famous "Hypotheses non fingo", Herder could never be content to admit final ignorance of the ultimate nature of any observed phenomenon. Any explanation of apparently irreducible data seemed better than none at all; where Goethe stopped in face of an "Urphänomen", Herder
went on to name and even to define another "Kraft" producing it. Thus we have already disagreed with statements such as Clark's: "Herder was not an anticipator of Charles Darwin; he was rather a forerunner of Auguste Comte".\(^{34\text{a}}\) We now further reject Schütze's pronouncement: "He [i.e. Herder] comprehended --- what the scientists of his age were prone to ignore, that the principles of knowledge, being inductive, excluded speculations passing beyond the limits of the hypothetical into the region of the absolute, or dogma". Similarly, we cannot agree with the unqualified beliefs of Götz,\(^{35}\) who lists numerous declarations of Herder's which recommend empiricism, and concludes that Herder was an "empiricist".

Several critics have remarked upon such inconsistent features of Herder's thought. Haym\(^{36}\) notices how Herder uses extravagant analogies at times, while condemning their use by others elsewhere. We have just seen how he is equally inconsistent in rejecting all metaphysics in favour of "Erfahrung". Noll simply registers this paradox and believes that no explanation is necessary.\(^{37}\) Posadzy\(^{38}\) similarly, throughout his work, sees Herder as governed by moods in his adoption of more or less empirical methods. However, we have already attempted to demonstrate that this ambiguity is more than merely a curious fact or a whim of Herder's; it is a fundamental and necessary feature of his whole personality.

It remains for us to examine Herder's "empirical" approach, such as it is, in some detail, to find what precedents there may be for it, and to determine Herder's place in the history of scientific methods.

Although a predilection for the concrete is part of Herder's own nature, he leaves us in no doubt that he looked to a specific philosophical mentor in advocating formal inductive methods. Francis Bacon is named again and again.\(^{39}\) An early statement makes it clear just how Baconian Herder's
theory of empirical induction is:

Alle Gesetze der Attraktion sind nichts als bemerkte Eigenschaften, die wir unter einander ordnen, bis ein Hauptgrundsatz wird. --- Je mehr wir diese [Grundsätze] unter einander ordnen können, desto weniger und einfacher werden die Gesetze, desto näher kommen wir Einem Begriff, dem Hauptbegriff des Wesens.

This attitude is characteristic of what Dewey \(^1\) calls the "demand for assurance and order", typical of scientific thought before Berkeley and Hume. It is in fact Bacon's supremely confident belief that science can provide the ultimate answers concerning the laws of the universe and its nature. By Herder's time, however, the theory of empiricism, as in the writings of Hume and even of the early Kant, had become increasingly associated with scepticism; this association has lasted down to the present day. Herder's more naïve beliefs are those of an earlier age. Thus he was not an empiricist either by modern standards or by more rigorous ones of his own time. What is variously styled his "empirical", "inductive" or even "positivistic" method retains the naïvely optimistic character of its origins in the Renaissance, and, at a personal level, in Herder's own youthful period. Thus all of these words are inadequate for describing his interest in experience as opposed to metaphysics; for firstly, his "empiricism" lacks the sceptical, self-limiting quality found in all modern scientific empiricism, and is not even as thorough as that of Locke, whose rejection of innate ideas Herder considered too extreme;\(^2\) secondly his "inductive" method simply sets up an unquestioning "common-sense" explanation of how we can obtain certain knowledge of the external world instead of grappling with what has become known, since Berkeley and Hume, as the "problem of induction"; and thirdly, his "positivism", although occasionally putting forward
phenomenalistic views of reality (as we noticed in our study of "Kraft"),
just as often repudiates these, and freely intermingles absolute and
relativistic arguments.

A study of Herder's relationship to Bacon is long overdue; it should
reveal, among other things, that the methods of Herder hitherto described as
"empirical" or "inductive" can be so designated only in a Baconian sense,
since Herder largely shares with Bacon the polyhistor's belief that universal
explanation will eventually become possible, and since they lack that
thorough logical analysis of the limitations of scientific enquiry which we
associate with nearly all theorists of scientific method (with the notable
exception of Whewell) since Hume and Kant. This phase of Herder's
philosophy may therefore best be described by the more general term of
"naturalism", or, in more particular, psychological connotations as
"sensationalism" (or Clark's variant "sense-ism") within the tradition of
Locke and the psychologistic idea that: "nihil est in intellectu, quod non
fuerit in sensu". Herder's naturalism reveals itself most clearly in his
attacks upon Kant, where, however, his attempts to refute Kant's arguments
concerning the logical functions of the mind by describing the chronological
development of the mind through psychology betray a fundamental philosophical
misunderstanding. For the two approaches are not mutually exclusive, as
Herder supposed, but complementary. This is another instance of the naïve
"common-sense" belief, still as alive in the present time as in Herder's,
that causal explanation based upon experience somehow renders invalid or
unnecessary the logical examination firstly of the philosophical possibility
of knowledge by experience, and secondly, of the conclusions to which
experiential knowledge leads. Moreover, Herder's naturalism retains strong
tinges of Bacon's revolt against scholasticism. Indeed, Herder frequently refers to Kant's critical philosophy as "Scholastik". He had not yet realised that naturalistic explanation, the objective basis of all science, requires a logical framework within which to elucidate its own characteristic methodological problems. In this respect, the movement inaugurated by Hume, and carried to an extreme of idealism by Kant, has left its imprint upon all later philosophies of science.

But with or without logical legitimation and qualification, the naturalism of Herder as a constant appeal to concrete experience and observation is none the less real, and is an important part of his thought, serving as a great example and precedent in an age and country where a one-sided rationalism, in the Enlightenment and then in the Kantians, was rampant. Knebel's words on Lucretius aptly describe this aspect of Herder's philosophy:

Der ganze Zusammenhang seiner Philosophie, so wie er dasteht, zerfällt von selbst; aber der Geist davon, nämlich alle Erscheinungen auf natürliche Gründe zurückzuführen, muß ewig der Geist der wahren Philosophie bleiben.

d) **Subjective methods in Herder's theory and practice.**

Let us now first examine Herder's theoretical beliefs about the role of subjectivity in our thinking in general and in scientific thought in particular.

On the one hand, he makes such declarations as the following: "Die wahrhaftigen ersten Grundsätze des Denkens und Empfindens sind allgemein, weil die Ähnlichkeit der Organisation, Mittel und Sphäre allgemein ist." Just as often, however, he emphasises that there are subjective variations in what he above acknowledges as the universal basis of reason, "Vernunft, die aber,
so einformig das Wort klingt, doch bei verschiedenen Menschen so verschieden
wurkt, sich jedesmal so einzeln und sonderbar mit Empfindung mischt, auf das
und jenes und auf nichts anders baut, --- daβ niemand mit dem Magnet und
Ruder des andern sicher fahren kann".46) (We should observe that these two
utterances are almost contemporaneous.) These variations arise since the
reason is built out of the data of vision and imagination, which themselves vary in the individual subject.47) But Herder returns again and again to
the position adopted in our first quotation, affirming that certain principles
are common to all reasons:48) "Man nenne sie notiones communes, oder ideas
innatas, oder axiomata rationis, oder Zopyra, oder wie man wolle; sie sind
da nur eben, weil sie allgemein dasind, weil sie jedem, wenigstens dunkel,
vorschweben ---". In this latter statement, he seems to emphasise the
subjective basis of knowledge even to the point of affirming that the a priori
ideas he was later to attack in Kant's philosophy are real. Haym49) in fact
lists several a priori principles in Herder's philosophy. Thus we may
conclude that Herder uses subjectivistic arguments, which conflict in truly
Herderian fashion with opposing ones, in his considerations upon the nature
of knowledge.

We need only add that, as most critics since the time of Kant's famous
reviews of the "Ideen" acknowledge, the "subjective" element (this time in
the non-technical sense, meaning "betraying personal emotion") is again
strong in Herder's pronouncements upon the natural world, that is, in his own
practice. Gillies notes this aspect of Herder's work:50) "The stimulus of
science, as of so much in all German scientific investigation, lay not in
reason, but in feeling". All Kühnemann's51) works on Herder emphasise this
aspect of Herder's methods, often to the virtual exclusion of other, less
emotional elements, though Herder's emotion is often reflected only in his style, whereas the content of his exclamations may be perfectly objective and scientifically acceptable. Other remarks upon Herder's subjectivity are found in the works of Hoffart, Litt and many others. Meinecke sums all this up admirably in his statement: "so wurde er [i.e. Herder] zum Schöpfer einer neuen Methode der 'Einfühlung', - dies von ihm selbst geschaffene Wort". Herder himself admits this, writing: "Die Lampe meines Geistes brennt von gar zu nassem Feuer: sie hat immer Oel der Leidenschaft nöthig, und das ist so grob und wässrig".

Most important of all, however, is that Herder not only allowed subjective elements to infiltrate his own scientific thought, but actually believed that the scientist is necessarily influenced by subjective factors. Herder himself wishes, in his study of the "elements", "die Physik alles dessen, aus sich herausfinden zu können". In a frenzy of emotion, he writes in his "Johannes":

Nicht grüble und definire dir das Reich der Kräfte, in dem du würken sollt [sic], zu oder hinweg! sondern fühle! strebe! würke!

He later writes of two great scientists, "der empfindende Mensch fühlt sich in Alles, fühlt Alles aus sich heraus, und druckt darauf sein Bild, sein Gepräge. So ward Newton in seinem Weltgebäude wider Willen zum Dichter, wie Buffon in seiner Kosmogonie ---". And of Copernicus, he writes: "Zu den größten Entdeckungen also, die wir dafür halten, wirkte Einbildung, Malerei, Poesie herauf und hielt die Leiter!" However, all of these utterances date from before his mature period begins; he later tempered such unrestrained subjective inclinations and emotional "Einfühlung" by increased development of the other, more objective pole of his thought.
Until this century, few, if any, theorists of science would have conceded to Herder the point that subjectivity plays a major part in scientific activity. The image of the scientist as a strictly objective, almost sphinx-like observer long reigned supreme. It is of interest to find that Karl Popper, a present-day theorist, accounts for the "objectivity" of science in a novel way, of which Herder, with his belief in subjectivity in each individual, and his call for co-operation between scientists, would certainly have approved. Popper writes: 60) "--- neither the dryness or remoteness of a topic of natural science prevent partiality and self-interest from interfering with the individual scientist's beliefs. --- it is the public character of science which imposes a mental discipline upon the individual scientist, and which preserves the objectivity of science." In ages before scientific team-work was the rule, Herder's judgement on subjectivity, of course, contained even more truth than it does today.

e) The relationship between subject and object: the problem of perception.

Having discussed the separate roles of subjectivity and objectivity as Herder employs and conceives of them, we shall now examine his theories of how the subject and the object, perceiver and perceived, are interrelated, and of what their relative importance is.

We have seen how he bridged the dualism of mind and body by using the "Kraft" idea. The same dualism recurs on a more abstract level as that between subject and object, or of perceiving mind and perceived objects. Here, for the first time, we find Herder using the word "Analogie" to bridge a gap. This is the first of numerous senses in which we shall find him using this word; critics have tended to ignore these nuances, or to over-emphasise one or other at the expense of the rest. This rather surprising
use of the term "Analogie" in a psychological sense may have been suggested by Baumgarten's designation of the senses, the mediators of subject and object, as the "analogon rationis". (It is to Clark's^61 mention of this phrase that we are indebted for this point.)

The idea of an "Analogie" has two types of use; it can denote a parallel between the content of two distinct units, or between their respective forms. The "Kraft" idea, however, could only denote content, as we have seen. When the "Analogie" notion denotes such a parallel of content, it comes very close to the old "Kraft" conception, as we might expect; used in this way, it is, in fact, often merely a rephrasing of the "Kraft" idea. In the case under discussion, the subject and object are seen as "analogous" because their content is similar; the content of the perceiving mind and of the perceived world are both, needless to say, "Kräfte". We may therefore expect in advance that such a use of the idea of "Analogie" might share all the weaknesses of the "Kraft" conception. We shall now test this conclusion inductively.

Herder begins his "Vom Erkennen und Empfinden" by solving the problem of perception, the problem of how it can be possible for the perceiving subject to have knowledge of an object, of something external to itself, by the idea of an "Analogie" between the "Kraft" of the subject and the other "Kräfte" in the world, the object. The problem is thus solved virtually before it is even stated as a problem: 62)

Je mehr wir indes das große Schauspiel würkender Kräfte in der Natur sinnend anschauen, desto weniger können wir umhin, überall Ähnlichkeit mit uns zu fühlen, alles mit unserer Empfindung zu beleben.

This is, of course, basically the same argument which we earlier encountered
as Herder's belief in personified "Kräfte", and is, as such, a subjectivistic belief. Irmscher, in his commentary on the manuscript of Herder he recently published, emphasises this important aspect of Herder's method of "Einfühlung", noting how it emerges at an early date. He writes: 63) "Die große Welt wird doch nach dem Modell der kleinen konstruiert, der Analogie- schluf herrscht vor." This approach, Irmscher points out, became the source of Herder's feeling for plastic art and of his "physiognomical" understanding. Haym 64) further compares it to Schelling's later "Identitätslehre", a philosophical conception which Herder never stated explicitly nor employed in such a subjectivistic way as the Romantics were to do.

A second, alternative solution which attempts to explain this parallelism appears later in the same work of Herder's. God, as the emanator of both aspects of "Kraft", in perceiver and perceived, appears as their higher common denominator. 65) Sommerhalder records earlier hints of this usage in Bückeburg. 66) Strothmann, always at pains to emphasise the religious background, singles out this usage, 67) making out of it a comparison between Herder and St. Bonaventura (the same who persecuted Roger Bacon).

A third, this time objectivistic and psychological explanation of the supposed "Analogie" is implied by Herder when he writes, in the same work: "Alle unser Denken ist aus und durch Empfindung entstanden". 67a) For, since our "Empfindung" is derived from our sense-experience, as the whole of Herder's "physiological" psychology with its theory of "Reiz" asserts, our subjectivity must in this case be conditioned, or even determined, by our objective experience. This solution recalls how Leibniz eventually allowed "petites perceptions" to enter the supposedly "windowless" monad from without.

Of the three positions we have discussed, only the second, religious one
merits the title of "Analogie", although Herder often uses the word to denote the first position as well. The first and third solutions, subjectivistic and sensationalistic respectively, are not true analogical relations, but direct cause and effect explanations. For in the first, the subject gives rise to the object it comprehends by projection, and in the third, the subject is built up by the objective reality which confronts it. The second position, however, involves a basic equality between the parallel subject and object. Herder comes back to this solution, given a new, secularised turn, in his "Metakritik":

Diese Analogie unserer selbst können wir nicht anders als auf alles außer uns anwenden, weil wir durch und mit uns selbst sehen, hören, verstehen, handeln. Wir tragen sie aber nicht in die Objekte über [Herder here avoids subjectivism]: dann wenn in diesen nichts Verständliches, Hör- und Sichtbares wäre, so existierte an ihnen keine Kategorie, d.i. kein Sinn und kein Verstand.

Thus subject and object are "pre-adapted" by some unspecified external agent, a deus ex machina as in Leibniz's theory of pre-established harmony; only Herder no longer wishes to name any transcendental factor. Such indirect linking of subject and object sets them in a true relation of "analogy".

But Herder suggests alternative links apart from transcendental ones; such naturalistic links are the idea of an "Äther", as our medium of perception, much emphasised by Rouche, who notes the precedent in Shaftesbury's work. Secondly, Herder suggests light as the "Organ der Gottheit", by which we perceive. This is, of course, related to the Greek idea, appropriated by Goethe in turn, of an "inner and outer light". Herder too writes: "Wäre in diesem Körper kein Licht, kein Schall: so
hätten wir auf aller weiten Welt von nichts, was Schall und Licht ist, Empfindung" (1778). This "inner light" is something "dem Licht Analoges". Thirdly, he suggests that the "ätherischer oder elektrischer Strom"\(^73\) in our nervous system is the same as that in many phenomena of external nature; and at other times, he names an "animalische"\(^74\) or "organische Wärme",\(^75\) or a "Lebenswärme",\(^76\) or yet again "dieser himmlische Feuerstrom"\(^77\) as the common denominator between ourselves as perceivers and the external world. (Compare the more overtly mystic "geistiges Band" referred to earlier.) All these "physiological" or quasi-physical explanations of the mechanism of perception in terms of common content were premature in Herder's age, and completely unscientific. In most of these cases, it is really an identity, not an analogy of content which is implied.

Another "analogy" between perceiver and perceived appears in Herder's application of the archaic microcosm-macrocosm notion, again encountered in his "Vom Erkennen und Empfinden"\(^78\) of 1778. Rouché\(^79\) emphasises this idea (because it adds weight to his argument that Herder's thought is unscientific), and lists five possible sources. We might add to Rouché's discussion the remark that, while the two concepts were often, especially in antiquity, seen as analogical in their form (e.g. Seneca's analogy of the bones of man, and mountains as the bones of the earth, the Pythagorean belief in the controlling importance of number both in the reason of man and in that of the universe, etc.), Herder, in the context under discussion, stresses the common content of the two:\(^80\)

Ich fürchte mich also gar nicht vor dem alten Ausdruck, daß der Mensch eine kleine Welt sei, daß unser Körper Ausszug alles Körperreichs, wie unsre Seele ein Reich aller geistigen Kräfte, die zu uns gelangen, seyn müsse.
However, formal analogies, characteristic of the more mature Herder, later appear in place of the earlier animistic or vitalistic ones; such are the idea that subject (mind) and object (world) are governed by the same laws or patterns (we shall discuss this later), and the idea that the form of man is representative of a universal organic "type".

Another more subjectivistic solution to the subject-object problem is encountered in Herder's theory of the "Bild". ("Wir sehen nicht, sondern wir erschaffen uns Bilder.") Paradoxically, this is one of Herder's psychological solutions to the problem which has most claim to being scientific, since it largely anticipates the modern "Gestalt" theory. Schütze has written an article on this theory, without however noticing this remarkable parallel. Herder actually writes of the "Bild"-creating soul:

Sie ruft aus dem Chaos der Dinge, die sie umgeben, eine Gestalt [sic] hervor, an die sie sich mit Aufmerksamkeit heftet und so schafft [sic] sie durch innere Macht aus dem Vielen ein Eins das ihr allein zugehört.

This theory implies a disorderly nature upon which the mind imposes an a priori order. Yet Herder later writes, attacking a priori ideas in Kant:

"Vernunft als Gegenstand betrachtet. Als solcher ist sie die reinausgesprochene Regel, die ich in mir gleichstimmig der Natur wahrnehme". Here he appears to suggest that the order is equally present in both subject and object. This of course reflects his mature belief in parallel formal laws in mind and in nature. Our interpretation is confirmed by Herder's statement: "Die Vernunft, sehe ich, gehört zum Gegenstande, wie der Gegenstand zur Vernunft; nach einem Gesetz, zu einander geordnet." But, two years later, we find him returning to his old sensationalistic idea that the mind, and reason itself, are developed only through the subject's
experience of the objective world: "--- an ihr [i.e. der Natur] hat sich der menschliche Verstand, ja die Vernunft selbst, zur Regel gebildet." 85a)

Of all these attempts to solve the problem of perception, none are logically or metaphysically acceptable, since Herder does not really see the dualism of subject and object as a profound problem of logic and metaphysics. Only once does he appear to doubt whether the problem can be finally solved, and on this occasion, he simply quotes the more sceptical Hamann: 86) "Unser eigen Daseyn und die Existenz aller Dinge ausser uns muß geglaubt und kann auf keine Weise ausgemacht werden." Tested, however, purely as psychological explanations of perception without regard to the logical or metaphysical difficulties, two of Herder's theories, the "Bild" conception and the sensationalistic explanation, satisfy many of the demands of modern scientific psychology, which, however, develops these theories much more fully.

But to return to our main topic, is there any means of establishing whether "der größte, vielleicht nie ganz zu schlichtender Kampf zwischen Object und Subject", 87) as Goethe calls it, is solved in any sense which Herder himself would regard as final? That is, what is for Herder the fundamental relationship, what is the fundamental status, of subject and object?

Herder's conclusions on the closely related but more general question of what relationship should subsist between individualism and self-negation, between "Lieber und Selbstheit", as he calls it (cf. Goethe's "Systole und Diastole", Pope's "self-love and social", etc.), may give us the clue to such an answer.

In this other problem, we once more find Herder alternately adopting both extremes; that of individualism appears especially in the earlier
period, with the "Genie" or "Ausnahme" doctrine. 88) He later writes "Der tiefste Grund unsres Daseyns ist individuell". 89) But the opposite extreme of almost mystical self-surrender also appears from time to time, as when Herder writes: 90) "Namenlos sterben ist süßer als man denkt --- desto mehr hat unser Geist seine Hülle verlassen: er floß zurück ins Meer der Gottheit unter den Menschen, ins Reich fortwirkender lebendiger Kräfte". Again, he states: 91) "Das Ich erstirbt, damit das Ganze sei." Schütze and others emphasise the former extreme, while Kühnemann tends to emphasise the latter. ("Bei Herder wurzelt alles in dem feinsten Mitgefühl für fremdes Leben ---") 92) Herder's statement that the deepest form of perception as of feeling is love tends to reinforce this, as Wilhelmsmeyer 93) indicates. But in the great majority of cases, especially in his years of maturity, Herder chooses the central position, presenting both tendencies as equally present in man: 94) "Alle Triebe eines lebendigen Wesens lassen sich auf die Erhaltung sein selbst und auf eine Teilnahme oder Mitteilung an andre zurückführen". This truly classical position is also Knebel's ideal: 95)

Freilich gehört Individualität zu jeder Aeusserung, aber die größte Individualität neigt sich wieder an meisten zum Allgemeinen herab.

From our study of the problem of perception in Herder's works, reinforced by our study of the cognate problem of the individual and society, we conclude that Herder's most fundamental answer to the problem lies in the central position between subjectivism and sensationalism. The mind and the objective world are poles of equal status, and out of their dialectical interaction, perception and the development of the mind arise. Once again, it is basically the "Kraft" conception which enables Herder to adopt a
central position, still allowing him to move to either of two extremes at will. Between these two extremes, as we have seen, Herder fluctuates all his life, even attempting, as in his "Vom Erkennen und Empfinden", to adopt conflicting positions simultaneously. Too many critics assume that Herder's thought is for the most part logically integrated; its very essence is its many-sidedness.

Thus, not only in his own practice, as we earlier noticed, but also in his theory of perception, Herder assigns equally important functions to subjectivity and objectivity. Neither aspect should be emphasised to the exclusion of the other, as has so often happened. It is important that we should bear this in mind in our analysis of his scientific thought.

2. Anthropomorphism, "anthropocentrism", and the "type" theory.

The first of the three main positions Herder adopts in his theory of perception, the belief that man comprehends external reality by projecting his own characteristics into it, by personifying natural agencies, leads us now to examine the charges of anthropomorphic thinking about nature which various critics have levelled against him. For example, Kühnemann, always inclined to emphasise the more subjective and emotional aspects of Herder's personality, speaks of "die Erkenntnis der Natur in ihrem inneren Leben als eines Abbildes der Menschheit" (96) in Herder's works, and later says: "Als Entwicklungsarten des Ideals der eignen Seele fühlt Herder jene Lebenswesen der Tiere und Völker" (97). Haym, (98) another Kantian, likewise emphasises the subjectivistic elements in the works of Herder, who in fact possesses them to a vastly lesser degree than such "Naturphilosophen" as Schelling and Oken, with their almost grotesque anthropomorphism. Hoffart speaks of
Herder's "universellen Anthropomorphismus";\textsuperscript{99}) May\textsuperscript{100}) is the first to compare Herder's anthropomorphic beliefs to Robinet's "homme anatomise" theory of the organic kingdoms, and notes Oken as a further parallel. Rouche\textsuperscript{101}) takes up these comparisons in more detail, adding others. (We may note here that Robinet's work appeared in 1761 and the following years.)

We have so far observed how Herder's anthropomorphic beliefs all arose out of his "Kraft" conception. We have already rejected such theories, derived from the supposed "Analogie" between man and nature, as unscientific. But his theory of a "type" common to all organic, and even inorganic forms, and compared by critics with Robinet's and Oken's theories, is no longer derived purely from speculations concerning the content of natural entities, but primarily from consideration of their forms. We therefore ask whether the idea is anthropomorphic in the same sense as Robinet's search in non-human nature for piecemeal shapes comparable to parts of the human organism, and whether, if it is anthropomorphic, it belongs to the same class as Herder's unacceptable beliefs in personified "Kräfte".

The whole comparison with Robinet derives from a single sentence in Herder's "Ideen":\textsuperscript{102})

\begin{quote}
Man könnte, wenn man die ihm [i.e. dem Menschen] nahen Thierarten mit ihm vergleicht, beinahe kühn werden zu sagen: sie seyn gebrochene und durch katoptrische Spiegel auseinander geworfene Stralen seines Bildes.
\end{quote}

Herder further refers, in an earlier version\textsuperscript{103}) of this passage, to the archaic microcoshm idea in the same connection. But of all the critics, only Thienemann\textsuperscript{104}) quotes the immediately following lines in which Herder makes important qualifications, and even this critic fails to draw conclusions about Herder's sources for the idea. (We shall discuss these sources later.)
Herder's words are as follows:105)


He proceeds to appeal in detail to comparative anatomy, as he does on several other similar occasions.106) All this shows how Herder, departing from the poetic image of refraction, and suggesting the archaic microcosm theory, goes on to reject outright the beliefs of such thinkers as Robinet, for such ideas are clearly referred to here. Another earlier version of this passage begins with the same image of refraction, which once more is qualified, this time by a statement rejecting the complacent pride which usually characterises thoroughly anthropomorphic thinkers:107)

Man würde mich übel verstehen, wenn man mich glauben ließe, daß nicht jedes Thier so gut für sich und die Erde gemacht sei als der Mensch.

Herder's "type" idea is thus a generalised and formal or structural category, quite different both from Robinet's theory and from Herder's own anthropomorphic conception of "Kraft" as the universal content behind all natural forms.

Other statements of the mature Herder qualify even his unambiguously anthropomorphic conception of "Kräfte", for example when he says that the
"Kräfte" in other organisms are by no means always analogous to those found in man: 108)

Es wäre ein sehr unwahres Lob, das man dem Menschen machte, wenn man jede Kraft der belebten Natur in ihm dem größten Grade nach finden wollte —. Tausend Geschicklichkeiten und Künste der Thierschöpfung sind um ihn, die er nie erreicht, ja die er gar nicht begreift.

Such utterances show, moreover, not that Herder searches for elements of man in other organisms, as extreme anthropomorphic thinkers had done, but the very opposite — they show Herder searching for elements of other, lower phases of existence in the human constitution. The following scientifically unexceptionable words confirm this: 109)

Je organisirter ein Geschöpf ist, desto mehr ist sein Bau zusammengesetzt aus den niedrigen Reichen. --- Kalk und Erde, Salze und Säuren, Oel und Wasser, Kräfte der Vegetation, der Reize, der Empfindungen sind in ihm organisch vereint und in einander verwebet.

That is, the lower levels of material and organisation are represented in man as well as the higher ones peculiar to him.

All this leads us to conclude that Herder's views on the Scale of Being should be styled "anthropocentric" rather than "anthropomorphic". Life on earth culminates in and centres upon man, as any biologist will acknowledge. The materialist Einsiedel as well as the ecclesiastic Herder wrote: 110)

"Der Mensch, dessen Masch[ine] am vollkommensten, [sic] vereinigt alles, was durch die drei vorigen Reiche möglich wird, in bildenden Kräften". In this respect, Herder's "anthropocentrism" is scientific. (We shall discuss its teleological implications later.) But the Leibnizian and neo-Platonic
conviction, common in Herder's day, that the ladder of nature may be extended above and beyond man, the "Mittelgeschöpf", is, of course, no longer scientific. It is part of the mystical superstructure, ultimately derived from the "Timaeus" of Plato, which crowned the humanism of the Renaissance, and, more especially, of the eighteenth century, envisaging man, rather than God, as the centre of the universe. Once more, we cannot believe, as Rouche does, that Herder is merely imposing theology upon science.

Another class of anthropomorphic ideas criticised as Herder uses them are those attacked by Georg Forster, who writes of Herder:

Er lässt mir z.B. die Natur zu sehr auf menschliche Art allegorisieren in ihren Werken.

Disregarding the personifications we mentioned earlier, we do indeed encounter others, such as in Herder's habit of apostrophising nature as a mother, or his application of terms borrowed from human activities to those of plants. But most of these are rather figures of speech than indications of a serious belief in the existence of non-human personal entities. Such ideas were very common, especially in works on natural history, in Herder's age, as for example in the works of Linneaus, one of whose biographers writes: "His phraseology, and even his titles, are figurative; but his figures are generally highly expressive. With him, the various means by which nature ensures the reproduction of plants are their nuptials; the changes in position of their parts at night are their sleep; the periods of the year at which they flower form the calendar of Flora". To this class belongs also Herder's (and Goethe's) common metaphor of male and female principles in nature as the source of creative development. Popular natural histories are full of such usages, even at the present day. They are,
however, best avoided, since it is not always possible to draw a line between mere metaphor and impermissible hypostatizing of natural agencies.

Thus, while anthropomorphic arguments certainly appear in Herder's works, the criticisms levelled against him on this account are too unqualified, and at times completely unjust. For his anthropomorphism, derived from the animistic "Kraft" principle, is balanced in his mature writings by more objective tendencies, which culminate in his complete affirmation of comparative anatomy. Herder never treats animals as quasi-human intelligences in the way that many earlier theorists had done. He repudiates such ideas, preferring the middle way between personification and materialistic mechanism in a broadly vitalistic theory. For "weder der bloße Mechanismus, den Buffon; noch die entwickelte mathematisch-politische Vernunft, die andre ihnen angedichtet haben" is acceptable to him in accounting for animal activities. We shall discuss the particular weaknesses of Herder's and of all vitalism later.

Appendix: The origins and scope of the "type" theory, and its relation to anthropomorphism.

When Herder's name appears in histories of biology, it is usually cited in connection with the theory of organic "types". Some writers consider it as Herder's own idea, others as Goethe's, and others, as we have noticed, as borrowed from Robinet or earlier writers. It is important that this confusion should be ended, and that the status of this theory in relation to science should be assessed. We shall now attempt these tasks, contending that Herder's own ideas played an important part in his formulation of the theory; at the same time, we shall be able to define the rôle of anthropomorphism in his thought with greater exactitude.
Suphan notes that Herder had discovered the idea of a type for each animal species or possibly, because of an error in a translation from the French, for all animal species, in the works of Buffon. After analysing Herder's notes, he contends that Herder elaborated and generalised Buffon's idea to such an extent that his own formulation may be considered independent. We agree with Suphan's statement, and shall now attempt to assess the scope of Herder's personal contribution.

Herder's note from Buffon's "Histoire Naturelle" runs as follows: "v. allen Geschöpfen ein Urbild. Vollkommenheit zerstreut. Buffon Vierfüßige Thiere Th. 1, 62-65." Even this passage, by itself, shows how Herder is amalgamating Buffon's conception of an animal type with familiar ideas of his own on perfection and its distribution. A remark of 1769 illustrates these views: "--- beweist also nicht selbst dieser Proteus von Geschmack, --- mit den Ursachen seiner Verwandlung, daß die Schönheit nur Eins sey, so wie die Vollkommenheit, so wie die Wahrheit." Perfection, like the animal type, manifests itself in unity and variety at once. Berger correctly notes how, in this respect, Herder's "type" idea corresponds to the familiar old aesthetic formula.

The universal type, as conceived by Herder, differs in a further particular from that of all earlier writers. For it is not only a generalised form; it is also a system of "Kräfte."

O daß dieser Eine Typus d.i. die inneren Grundgesetze dieser Einen, wirkenden Kraft, durch die sich die schaffende sowohl als die nährende und Gedeihen machende Gottheit offenbaret, in der Reihe der Dinge --- bis zum Menschen hinauf bemerkt würde.

Herder again writes:

Nicht verschiedene Keime (ein leeres und der Menschenbildung widersprechendes Wort) aber verschiedene Kräfte hat sie
[i.e. die Natur] in verschiedener Proportion ausgebildet, so viel deren in ihrem Typus lagen ---

Bruntsch\(^{122}\) alone, quoting another similar passage, realises that "Kräfte" play a part in the idea. The "type" idea is in this sense a transition stage in Herder's progress towards more formal categories; out of a configuration of "Kräfte", the form, or natural law, arises. As Herder began to seek more formal ideas, he reached conceptions of greater scientific value.

In this case, his characteristic method of synthesising disparates (form and content, unity and variety, etc.) led him to a notion far more general than those of Buffon and others, since Herder's type is at times extended to comprehend crystals, plants, animals and man. This concept was general enough to allow great latitude in detailed applications such as Goethe gave it, yet particular enough to provide a stimulus to investigation. In fact, some of Herder's more particular formulations, as we shall see, anticipate those of Goethe. Thus, while we can agree with Kohlbrugge,\(^{123}\) whose words are echoed by Rouché,\(^{124}\) that Herder was a child of his age and of the Leibnizian tradition in formulating such a summary concept covering the whole visible Chain of Being, we believe that his particular version of the idea constituted an important stage in his own development, and was, at the same time, general enough and full enough of nuances, unlike previous formulations (such as Buffon's), to provide a manifold stimulus to other thinkers.

But apart from the contributions of Buffon and of Herder himself, we earlier noticed how Herder appears to refer to the "homme anatomisé" theory of Robinet, which treats man himself as the basic model or "type" in nature. Although Herder rejected such ideas as "Spiele der Einbildung", is it not
possible that they, rather than the ideas of Buffon, were a major stimulus to Herder's theory? Lovejoy,\(^{125}\) like May and Rouché, considers Robinet as Herder's chief source, but he gives no details, and falsely believes that Herder's was purely an animal, not a universal type. But his discussion is valuable, since it analyses Robinet's use of the "type" theory in detail, concluding that it really contains three alternative formulations. The first is the general conception of a type common to all living forms (and even, in one sentence, to stones as well); Lovejoy considers that this is a generalised version of Diderot's animal type. The second formulation envisages the type as an "elongated tube or hollow cylinder, naturally active", which is seen as a basic unit similar to the later concept of the cell. The third formulation is the notorious "homme anatomisé", the belief that the shapes of dismembered parts of the human form are to be found in plants and all natural forms.

Now Herder does indeed briefly mention Robinet in 1776.\(^{126}\) This, together with the later reference to "Spiele der Einbildung", indicates that Herder knew something of Robinet's work. How then are we to reconcile this with Suphan's statement:\(^{127}\) "Man darf die Selbständigkeit der Conception unbedenklich für ihn [i.e. Herder] in Anspruch nehmen"? This question can never be answered finally, but there are some indications which may lead us to a tentative conclusion, at the same time affording us further insight into Herder's anthropomorphic ideas.

We observed how Herder, in one passage, began with a statement at first sight reminiscent of the "homme anatomisé" idea (in his image of refraction), then mentioned, in an earlier version, the archaic microcosm idea, and finally defined the animal type in terms of comparative anatomy, and repudiated the "homme anatomisé" theory outright. Thus he arrived at a
scientific formulation from unscientific, indeed from anthropomorphic premises. This one passage, we believe, recapitulates consecutively the development undergone by Herder's ideas over a period of years as he progressed towards his final formulation of the "type" theory, although the anthropomorphic beginnings of this wider development were rather different from those mentioned in the opening sentence of the passage in question.

Now we have seen that Robinet on one occasion extends his "type" so as to include "stones"; but Herder, in his earliest independent application \(^{128}\) of the idea (1783), at once refers the inorganic manifestation of the "type" to crystallisation in particular. In his "Älteste Urkunde" (1774-76), Herder depicted the mystical "hieroglyph" upon which man's earliest knowledge was allegedly based not only as a divine revelation and symbol, but also as a formalised representation of the human figure, which he in turn identified with the microcosm conception. \(^{129}\) Gillies, in his admirable article on the "hieroglyph", brings out this point clearly: \(^{130}\)

He [i.e. Herder] was anxious, in his search for the origins of things, to find a sign that was not symbolical merely, but actually naturalistic --- He thought he had found it in the hexagon, which he said was formed after the human figure.

The figure is, in fact, completely formal:

Now Herder's reference to crystallisation cited the snowflake as its example of inorganic form. He returns to this idea as late as in 1802: \(^{131}\)

Bildungsgesetze der schaffenden Natur sind allenthalben dieselben; die Blume des Winters, die Schneeflocke, enthüllt dir das Geheimniß werdender Welten.
His „Urkunde“ figure at once shows us how he could include the snowflake and the human figure in one category. A remark in the „Urkunde“ itself adds weight to our comparison of the "hieroglyph" and "type" conceptions. Herder writes: 132) „Jeder kennet die Figur [i.e. the "hieroglyph"] als Typus der Schöpfung". And, as for the hexagonal form, the article "Snow" in the Encyclopaedia Britannica (13th edition) states of snowflakes: "The crystals, which vary greatly in form, belong to the hexagonal system." And finally, the "hieroglyph" denoted not only the human form, as 133) „Einheit im Mannichfaltigen, Mannichfaltiges in Einem!”, but also „Götter- und Naturlehre in sieben Kräften", 134) „die Urkräfte der Welt!“ 135) Out of this configuration of „Kräfte", the law-governed state of man's earliest knowledge and society arose. This is exactly parallel to the later "type" idea which was both a general, abstract form, and a configuration of „Kräfte". It is therefore probable that, in his original formulation of an ideal universal type including man and the snowflake, Herder had the old hexagon of the „Urkunde“ at the back of his mind.

We may add a further source for the "type" conception in Herder's own earlier thought when we consider his comparisons between the forms of birds and fish, first recorded 136) in his "Journal" of 1769, and derived from his childhood dreams of a water-world. The suggestion in Genesis 1, 20 that birds and fish had a common origin in water may well have helped to produce Herder's comparison, just as it had once given rise to the same parallelism in the writings of Basilius the Great. 137) Herder, in fact, refers to this Biblical source in his „Ideen": 138)

Fein und wahr stellt dieser Naturweise [i.e. Moses] die Geschöpfe der Luft und des Wassers in Eine Classe und die vergleichende

Secondly, we should recall our earlier mention of how Herder compared the outer form of man to that of the tree during his walks around Weimar. These two precedents, together with the "hieroglyph" conception, foreshadow important features of Herder's later "type" formula, which postulated a common form behind all organised entities.

In what then does Robinet's influence consist? Firstly, we know that Herder rejected his "homme anatomisé" theory. Secondly, Herder's "type" gives no place to Robinet's quasi-cell, the "elongated tube or hollow cylinder". And finally, his own version of the theory of a universal type can be explained entirely through the interaction of Buffon's theory of animal types and the more general, even mystical beliefs in unity of natural forms held by Herder himself in earlier years.

Herder's subsequent applications of the theory in his "Ideen" suggest not only the original universal and ideal type, but also a concrete, anatomical, animal type like Buffon's, and even a sort of vegetable type, as in the following statements: "ein Zweig vom Baume stellet den ganzen Baum dar", and "Das letzte Blatt seiner ersterbenden Kraft ist noch ein Bild des ganzen Baumes". (These references antedate Goethe's declaration in Italy that he had conceived the idea of an "Urpflanze" or vegetable type which he described, in his "Metamorphose der Pflanze", as an idealised leaf.) Rasch notes that Herder used the term "Urpflanze" in Bückeburg; he had indeed first compared the leaf to the whole tree at this time. And we have further seen how, in his "hieroglyph", the refraction image, and the microcosm idea, Herder had used the generalised figure of the complete human
organism (not the piecemeal "homme anatomisé") as a broadly anthropomorphic basis from which he passed on to a formulation of the "type" in terms of comparative anatomy.

None of these applications requires reference to Robinet to explain them. Herder's one explicit reference to Robinet groups him along with Maupertuis, whose views were repugnant to Herder at the time (1776). Therefore we may conclude that, although he knew of Robinet's work, Herder was not influenced by it in his own statement of the "type" theory. His repudiation of the "homme anatomisé" is more likely to be aimed at Bonnet (whose theoretical works on science appeared in the years 1762-1770), who held a similar belief, and with whose works Herder was better acquainted, than with Robinet's. Singer cites Bonnet, in translation, as follows:¹⁴⁵)

> All beings have been conceived and formed on one single plan, of which they are the endlessly graded variants. This prototype is man, whose stages of development are so many steps towards the highest form of being.

Rouché¹⁴⁶) also mentions Bonnet's theory as another precedent to Herder's. But Bonnet's idea is anthropomorphic in the kind of literal sense repudiated by Herder, and which can have had no more influence upon him than Robinet's theories. Alternatively, Herder may have been attacking that host of writers who, up to the nineteenth century, took the idea of man as a "microcosm" too literally, searching, like Abraham von Franckenberg¹⁴⁷) in 1688, for parts of the human form concealed throughout nature. Herder had almost certainly encountered this basically medieval doctrine, once very widespread, of "resemblances".¹⁴⁸) Jakob Böhme¹⁴⁹) too had seen man as a "Hieroglyph" [sic] of the universe long before Herder used the word, but again had given the idea a much cruder and more literal application.
As for Goethe, Hansen\textsuperscript{150}\) claims that he formulated the idea of an animal type before Herder did, whereas Erhard\textsuperscript{151}\) claims priority for Herder. But even if Goethe had reached the idea before Herder, we have no guarantee that he mentioned it to him before Herder found it himself in his study of Buffon in 1783. We have also seen how Herder expressed other nuances of the idea in Bückeburg. This question of priority in the theory of an animal type cannot, however, be settled finally.

All this has shown that anthropomorphic arguments did play a large part in Herder's progress towards the stage when he applied his "type" theory scientifically, but that they were very different from, and much more abstract than those of Robinet, Bonnet, etc. For Herder's original conception of an ideal universal type differs from earlier versions, since it is more formalised and it admits, potentially, of more diverse applications; these qualities preclude, by their very abstraction, any distortions such as are implicit in Robinet's search for models of human organs in lower forms, for "essais de la nature qui apprend à faire l'homme".\textsuperscript{152}\) Herder, as we have seen, takes the opposite course: lower forms are seen as variants upon an abstract pattern, or upon an anatomical pattern,\textsuperscript{153}\) man's share in the lower kingdoms is limited to his lower natural functions, and whole organisms are compared only to other whole ones, or the same part to the same part.\textsuperscript{154}\) Once more, we see how unscientific premises can become the basis of scientifically acceptable theories. The idea, through Goethe's more detailed applications of it to anatomy, and the publicity given to it by Herder, influenced Kielmeyer\textsuperscript{155}\) and thus also his pupil Cuvier, who gave it greater precision, eventually distinguishing four animal types. The theory of types behind all organised and even inorganic forms was to lead René Hauy,\textsuperscript{156}\) the founder of modern crystallography, to search for
crystallographic types and, in 1822, to discover some of the fundamental laws of crystallisation. But Rouché writes:

--- l'anatomie comparée, avec la distinction de R. Owen entre "analogie" et "homologie", viendra ruiner la notion équivoque de "ressemblance" sur laquelle reposait l'unité de plan de composition [i.e. Herder's type theory, which Rouché describes by Geoffroy St.-Hilaire's term].

"Ruiner" is, however, a strong word to describe the superseding of one scientific hypothesis by another. The earlier phases made it possible for Richard Owen, himself a great admirer of German "Naturphilosophie", to reach his more exact distinction. As A.D. White more charitably puts it:

Mistaken observations lead men astray, mistaken theories suggest true theories.

3. The analogical method.

We have seen how Herder's concept of "Analogie" was used, in typical style, to bridge the traditional dualism between subject and object, thereby violating the requirements of both logic and science. This usage led, we subsequently observed, to some of Herder's most unjustifiable anthropomorphic arguments. We shall now, however, examine Herder's use of analogies in more detail.

In his review of Herder's "Ideen", Pt. I, Kant, referring in particular to Herder's attempts to prove that there is an afterlife by comparisons with natural metamorphoses, classed Herder's use of analogies among the indefensible methods which he was out to expose. Haym follows this lead, and speaks of "die Zwittermethode der Analogieschlüsse". Kühnemann amplifies Kant's remark, saying: "Welch ein Ansatz zu gefährlichster

Now, as Rouche 164) concedes, Kant himself had used and misused analogies in his "Allgemeine Naturgeschichte und Theorie des Himmels" of 1755. Kant had, in fact, entitled the final chapter: 165) "Dritter Thcil, welcher einen Versuch einer auf die Analogien der Natur gegründeten Vergleichung zwischen den Einwohnern verschiedener Planeten in sich enthält." Kant even proceeded to conclude from these premises that we may enjoy an afterlife upon some of the more distant or "more perfect" planets, 166) thereby using the very argument he later condemned in his pupil Herder. But at the time he reviewed Herder's "Ideen", Kant had recently made a final break with his earlier views, entering his "critical" period. He aimed at extirpating from philosophy the methodological abuses which he and many others had formerly countenanced. He must have seized at once upon Herder's extreme use of analogies as typical of all that he had now set his face against. But this gave to neo-Kantian critics the unfortunate impression that all Herder's analogical arguments are equally reprehensible, so that Kühnemann and others reject them en bloc.

But Herder used analogies in many ways, three of which we have already noticed; these are the "Analogie" of subject and object, leading to anthropomorphism; the wider version of this usage, upon which we touched in passing and to which we shall later return, whereby the mind of man, seen collectively, and the processes of nature are supposed to be governed by analogical laws; and the analogy between the progress of the human soul and
various natural metamorphoses, which in turn is used as a "proof" of an afterlife. These usages are largely unacceptable to philosophy and science alike, but Kühnemann and his followers do not distinguish them from one another nor from a fourth usage, which we shall now discuss.

We should first of all note that older philosophies gave no recognition to analogical arguments as a distinct and legitimate method in philosophy or science. As a modern theorist writes: 167)

In classical and medieval logic --- there is a certain amount of analysis of types of analogy, but practically no attempt at justification of the validity of analogical arguments, although such arguments are frequently used.

Both Kant and Herder not only made use of analogies, however; they each attempted to analyse the analogical method theoretically. Kant, in his "Kritik der reinen Vernunft", having first observed that mathematical progressions can be extended, to include further exact quantities, by analogy with preceding terms, writes: 168)

In der Philosophie aber ist die Analogie nicht die Gleichheit zweener quantitativen, sondern qualitativen Verhältnisse, wo ich aus drei gegebenen Gliedern nur das Verhältnis zu einem vierten, nicht aber das vierte Glied selbst erkennen und a priori geben kann, wohl aber eine Regel habe, es in der Erfahrung zu suchen, und ein Merkmal, es in derselben aufzufinden.

Herder replies to Kant in his "Metakritik" that even mathematical "analogies" are not always exact, and that any formal relationships can be discovered by analogical reasoning in the same way as in mathematics, only with less precision; in other words, the difference is one of degree rather than of kind: 169)
It is especially noteworthy that Herder here refers to formal and mathematical analogies, that is to something quite different from the purely qualitative analogies in terms of content, for example "Kraft", which he had earlier misused. The later Herder prefers more formal, to wit more verifiable and measurable ones. Besides, in the same passage, he goes on to note that analogies are possible between objects, whereas Kant had specified, outside mathematics, only "qualitative Verhältnisse" in philosophy. Herder thus extends his theoretical justification of the method to forms and relationships between objects in the natural world, to the world studied by science.

Kant however, in the sentence we quoted, clearly sees analogical arguments as a means of prediction, of determining the existence of unknowns which can subsequently be verified by planned observations. This means that he too recognises a certain scientific use of analogies. But he qualifies this by the statement that such discoveries can be complete and exact only in mathematics, and must be supplemented in other cases by a posteriori investigations whereby some unknown "Glied" in a quasi-mathematical series is found. Herder in addition recognises a looser use of the method: 170)

Wie unsere ganze Psychologie aus Bildwörtern besteht, so war meistens Ein neues Bild, Eine Analogie, Ein auffallendes Gleichnis, das die größten und kühnsten Theorien gebohren.

In this (earlier) statement, the analogy is seen as a means not of determining unknown members of a series, but of creating new hypotheses. That is, analogies are not seen themselves as keys to exact prediction; they supply
new theories which, to judge by the examples Herder gives to illustrate the above passage (those of Newton's gravitational theory and Buffon's cosmogony) may themselves predict whole series of facts later tested by experience. This interpretation is confirmed by another statement of Herder's in 1787:

In allen Wissenschaften sind die größten Erfindungen nur durch Analogieen gemacht worden: man dachte sich mehrere ähnliche Fälle und machte Versuche und führte sie auf allgemeine Begriffe, zuletzt auf ein Hauptprincipium zurück; und wenn dies auf jeden der gegebenen analogischen Fälle paßte: so war die Wissenschaft erfunden. 170a)

Rouché agrees that Newton did use an analogical method:171) "qui consistait à percevoir des analogies (Herder, grand admirateur de Newton, abuse du mot et du procédé) et à rapporter beaucoup d'effets à peu de causes", and cites Leibniz and Lambert as other earlier advocates of such a method. But, used in Rouché's sense, "analogical method" can surely be made to describe all and any cases of scientific generalisation, which compares several events or states and pronounces them to be effects of one or of a few causes. For example, we may add to Rouché's parallels the instance of Boscovich, whom Herder also admired. A modern student of Boscovich writes:172)

--- two very general principles should be recognised in his philosophical thought on nature, which were the constant supports on which he leaned in his journey into the "new world". They are simplicity and analogy in nature. This is indeed a reasonable desideratum for any profound study of nature, and is in conformity with the basic tendency of science at any stage of its journey into new fields.

Likewise, Buffon writes in a chapter excerpted by Herder that the scientist should collect his data, then:173) "--- il faut ensuite les lier ensemble par les analogies --- et les présenter dans l'ordre le plus naturel. Cet
ordre peut se prendre de deux façons, la première est de remonter des effets particuliers à des effets plus généraux, et l'autre de descendre du général au particulier." Pallas¹⁷⁴) and many other scientists of Herder's age followed similar procedures, as do all scientists who attempt some new generalisation.

But let us discuss Herder's more original suggestion that analogies may lead to new theories or hypotheses, not simply to empirical generalisations. As the physicist N.R. Campbell writes:¹⁷⁵) "... analogies are not 'aids' to the establishment of theories; they are an utterly essential part of theories, without which theories would be completely valueless and unworthy of the name." Mary B. Hesse,¹⁷⁶) in her work upon scientific analogies, elaborates upon this wider usage, distinguishing three elements in an analogy which is used to establish a new theory. Two objects or sets of observations are compared, and a positive analogy between similar features is drawn. Other features are dissimilar: they are the negative part of an analogy. The third element is neutral, since further unknown similarities or dissimilarities may exist, but are as yet unobserved. For example,¹⁷⁷) the wave analogy, derived from observations of sound effects (ultimately of water movements) may be applied to light; after negative aspects are eliminated, echoes are compared to reflections, loudness to brightness, pitch to colour, and then air, the medium of sound (or water, the medium of water-waves), being a neutral aspect, is compared to a hypothetical "medium" of light, so that the wave and ether theories of light arise. (We shall later see how Herder drew similar analogies in practice in dealing with this same problem of light.)

Rouché¹⁷⁸) notes that Herder's "type" theory is based upon analogical
argument, and writes in a similar connection: 179)

Herder use et abuse des analogies. Leur recherche est chez lui un instrument de synthèse et aussi de découverte, qui lui permet de passer du connu à l'inconnu ---

This sentence constitutes the only recognition which Herder's analogical method, as a means of discovery, has so far been accorded by critics, and, as we have seen, Rouché rejects even Herder's "type" as unscientific and unoriginal, and proceeds in the latter part of the above sentence to group it along with Herder's analogical "proofs" of the afterlife. However, Hesse emphasises that science made significant progress by employing such analogical procedures in anatomy, citing Aristotle,180) Goethe, Cuvier and Geoffroy with their comparative techniques, and observing how they culminated in the "type" theory (with no mention of Herder, however). The "type" is seen as a noteworthy contribution to science: 181)

The use of analogical argument --- does not presuppose that the actual causal relation is known. The ideal type might be regarded simply as a formal scheme derived from some of the observed species and then found to be applicable to others. This would already rescue it from the charge of being ad hoc.

In conclusion, we can now distinguish the following distinct senses in which Herder applies the analogical method in practice to science:

(1) Firstly, like Leibniz, Lambert, Newton, Buffon and many others, he applies it to the natural world, which is seen as basically simple and law-governed, for the purpose of comparing and generalising a plurality of effects, and subsuming these under comprehensive causal laws. This is the more traditional application of the method in science. We shall discuss the validity of Herder's "laws" later, observing how he was prone to overstep the
limits of verifiable fact in his generalisations.

(ii) It is recommended and used by Herder as a vehicle by which new facts may be discovered. This constitutes a wider application of Kant's more restricted, "mathematical" theory of analogies to objects in the natural world, and as such is original and departs from traditional usages. Herder writes: 182)

Da singt der Luftvogel und dazu sein Kopf; der Fisch, was tut er? was hat er für neue Wassersinne, die wir Luft- und Erden- geschöpfe nicht fühlen? Sind sie nicht analogisch zu entdecken?

Herder accordingly greeted Monro's "Structure and Physiology of Fishes, explained and compared with those of Man and other Animals" (1785) with delight some fifteen years later. 183) Herder's conjectures on analogical "Wassersinne" in fish have been borne out in more recent times, with the discovery of the lateral line system, sensitive to all disturbances in water, in fish. Monro knew nothing of this mechanism, merely listing "nerves, running lengthwise on the sides of the body, to which no spheroidal bodies are attached." 184) Herder should have been keenly interested by Monro's chapter on "Experiments on Hearing in Water"; 185) but Monro discussed only the transmission of sounds to the human ear within water, and only in the last few years have those sounds produced by fish, whose existence Herder suspected, been detected by microphones. Herder's praise of Monro's work is only one of many examples showing how he was always interested in the latest advances of science in his age. No claim should be entertained that he achieved inspired insights into the science of later ages; subsequent discoveries have merely vindicated his analogical method as he used it in such cases as this.

(iii) The analogical method is recommended and used by Herder as a means
for selecting new theories and hypotheses. Such is his "type" conception, considered as a general hypothesis apart from individual comparisons in animal anatomy. Its predictive quality emerged when Goethe discovered the intermaxillary bone in man by analogy with other animals. Hence Goethe could write on the 17th November 1784, to Knebel: 186)

Hier schicke ich dir endlich die Abhandlung aus dem Knochen-
reiche ---. Ich habe mich enthalten, das Resultat, worauf
schon Herder in seinen Ideen deutet, schon jetzt merken zu
lassen, daß man nämlich den Unterschied des Menschen vom Thier
in nichts einzelnen finden könne.

Goethe undoubtedly refers to Herder's "type" theory here, for it stated that the basic pattern in human and animal anatomy is identical, whereas Herder's particular remark about the intermaxillary bone in his "Ideen" shows that he accepted the prevailing belief that the bone is absent in man, its presence in apes being "der letzte Abschnitt vom Menschenantlitz". 187) This would seem to hint that the theory of an animal type came to Goethe from Herder. Goethe's following words show, furthermore, that he thought explicitly of the analogical method in connection with his discovery. He says of the event: 188)

Denn hier ist es, wo uns der Genius der Analogie, als Schutz-
engel, zur Seite stehen möge, damit wir eine an vielen
Beispielen erprobte Wahrheit nicht in einem einzigen,
zweifelhaften Fall verkennen, sondern auch da dem Gesetz
gebührende Ehre erweisen, wo es sich uns in der Erscheinung
entziehen möchte.

In this last application of the analogical method, Herder departs both from traditional usage and from Kant's assertion that analogies are valid only as a means of exact, mathematical prediction in science. However, as Hesse puts it: 189) "the inconclusive nature of the procedure is not fatal here,
because we are not looking for incorrigible inductive methods, but only for methods of selecting hypotheses." Another present-day theorist writes of such uses of models and analogies in biology: 190) "The best one can hope for, in most cases, is that the model will reveal unexpected properties which are paralleled by similar features of the living mechanism not previously noticed." Once more, as in Herder's theory and practice, the predictive value is emphasised. (We shall discuss the misuse of analogical prediction in our section on teleology.)

Finally, we may once more recall the present trend which denies that the scientist does and must work in accordance with strictly logical and objective methods in formulating theories and hypotheses. Karl Popper writes: 191)

The question "How did you first find your theory?" relates, as it were, to an entirely private matter, as opposed to the question, "How did you test your theory?" which is alone scientifically relevant.

We have established that critics, in denouncing Herder's misuse of analogies, have, wittingly or otherwise, either ignored or summarily rejected his more scientific uses of the method, which were truly progressive and comparable with modern theories of scientific methodology. This tendency of the critics dates from Kant's condemnation of some of Herder's analogies, and the subsequent notorious misuse of the method, to the point of outrageous and grotesque anthropomorphism, by Schelling and others. But once again, we find that there are two sides to one of Herder's major ideas, and that an impartial study of his work must consider them both.
4. Comparative and classificatory methods.

a) The comparative method.

We have seen how Herder had applied his ideal, universal "type", arrived at by analogy, to animals in particular (following Buffon), and made this a justification for the comparative method, and for comparative anatomy in particular. Like the analogical method, this method appealed to Herder’s nature, which strove to interrelate and unify the diverse data it encountered. (We shall show later how this leads to the assumption that all of nature forms a harmonious whole, or even an organism, and to the universal application of "holistic" methods.) However, he says of his "type";

"Es erhellet also von selbst, daß da diese Hauptform nach Geschlechtern, Arten, Bestimmungen, Elementen immer variirt werden mußte, Ein Exemplar das andre erkläre ---. Wer sie studiren will, muß Eins im Andern erklären." On other occasions too, he applies the "type" theory directly to comparative anatomy.

But comparisons between organisms must not only include all aspects of internal and external anatomical structure; these must also be related to function and environment:


Herder's aims in these matters are shared especially by Goethe, who sends for Herder's writings on the natural kingdoms for consultation as late as 1789, around 1793 or 1794, he sends Herder his first sketch for "Ueber
Herder was, of course, the first to be notified of his discovery of the intermaxillary bone in 1784.

The breadth of Herder's comparative method becomes clearest when he asserts, in the "Ideen", that Camper's comparisons of cranio-logical angles are not sufficient in themselves; they must be supplemented by comparisons, between animals and men, which consider physiology, dimensions and proportions of organs, inner structure, anatomy, muscles and also climate. Such aims are in the best tradition of physical anthropology. Grundmann, the best writer on Herder's ethnographical opinions, applauds in Herder: "--- das feine Verständnis und methodische Geschick für derartige, wissenschaftliche Fragen." All this tells against Rouhé's belief: "L'anatomie chez lui [i.e. Herder] n'est qu'une physiognomie étendue à l'ensemble du corps, une psychologie des formes", and "--- la dimension et l'emplacement des organes révèlent l'intention de Dieu." This belief arises since Herder's comparisons are often coupled to the Leibnizian and ultimately Platonic conception of the Chain of Being, which, for Herder, is both a chain of forms and of "Kräfte" behind these. But firstly, the Chain conception was not an inductive concept created by a spirit of "piété rationaliste" in the eighteenth century, as Rouhé believes. On the contrary, it was the product of Greek mysticism in Plato's "Timaeus", it carried the completely heterodox implication that the Chain was an inevitable emanation from the deity, and it was a purely a priori system, formulated before attempts at inductive classification, which eventually burst the whole system asunder, could begin. All this is admirably demonstrated in Lovejoy's classic study of the Chain of Being. Secondly, Rouhé's belief that Herder was concerned, like Bonnet, with giving "physiognomic" interpretations of the "Kräfte" behind the forms rather than of the natural forms themselves, needs
great qualification. For the "Kräfte" argument is used mainly in Part I of the "Ideen" as a "proof" of immortality, and is thus emphasised for the most part in connection with the ideal half of the Chain, the soul-like entelechies which ascend into other-worldly hierarchies; but Herder's "type" theory, from which his affirmation of the comparative method derives, applies only to the natural and visible parts of the Chain. Our opening quotations should have shown, moreover, that Herder's interest in comparative anatomy is genuine, wide, and quite distinct from his belief in "Kräfte". In 1799 in fact, he goes so far as to reject Leibniz's and Bonnet's ideas on the "Chain" as a priori, emphasising that only an empirical approach to natural forms can provide a sound basis for comparisons:

\[\text{Vor aller Erfahrung weiß die Vernunft von Gattungen, Arten und Geschlechtern gleich wenig, und kann sich über Gleichartigkeit, Varietät und Affinität keine Gesetze geben. Wird vollends aus der scholastischen Regel des continui specierum oder formarum logiarum'} [quoted from Kant's first Critique] des mathematischen Leibniz Gesetzes der Continuität hergeführset und des Leibniz mit Bonnets Stufenleiter topisiret: was kann man bei diesen Traumreden thun, als sich gähnend und gähnend verwundern.

Thus both an ideal series, which we shall later examine, and a natural series of forms, studied by the comparative method, are present in Herder's ideas. Herder treats the two with basically different methods, metaphysical and teleological on the one hand, and empirical and comparative on the other. He may have convinced himself, and some of his readers, that the two are in no wise mutually contradictory (for he wished to add conviction and "Anschauung" to his theories of "Kräfte", thence of the afterlife), but we should not confuse the two, or subordinate one to the other. For the
formal, comparative and scientific approach to natural entities is of equal
importance to the metaphysical edifice of „Kräfte“ in the great synthesis
of Herder's „Ideen“. He was by no means the founder of comparative
anatomy, but he was a leading advocate of the method in an age when it was
beginning to bear fruit. After tentative beginnings in the work of
Aristotle, Belon and others, this method was, in Herder's times, just
awakening as an independent discipline in the hands of such men as Buffon,
Daubenton, Vicq d'Asyr, Blumenbach, Camper, Hunter, Monro, Pallas and Tyson,
works of most of whom Herder had encountered. In this respect, he
partook of the most advanced aspirations of biology in his age, and was ahead
of many others in his insistence that function and environment are as
important as structure in our comparisons between organisms. A modern
theorist of biology, maintaining that structure and function are inseparable,
confirms the value of Herder's dynamic approach: 204)

The antithesis between structure and function, morphology and
physiology, is based upon a static conception of the organism.
--- Actually, this separation --- does not apply to the living
organism. What are called structures are slow processes of
long duration, functions are quick processes of short duration.

Finally, Rouché writes, with reference to the later theory of evolution,
of "l'abîme qui sépare celui-ci de l'unité de plan de composition"205) [i.e.
the "type" theory]. But the recognition of a broad similarity in structure
between species was undeniably a prerequisite for modern evolutionary theory.
Kant, in his famous review, in fact saw that the "type" theory could be used
as an argument for evolution, a possibility which he at once rejected. 206)
This is not for a moment to suggest that Herder intended such an inference to
be drawn. But Kant's remark demonstrates that the theory of "type", with
its concomitant comparative method, was a stimulating and essential step towards the theory of evolution by descent. It was likewise essential to Owen's later and more exact distinction between "analogy" and "homology", as well as to what Lovejoy calls "the temporalisation of the Chain of Being". Thienemann justly says of earlier workers:207)

--- um Homologien und Analogien scharf unterscheiden zu können, mußte die vergleichende Anatomie erst ein bedeutendes Tatsachens- material schaffen und verarbeiten. Damals [i.e. in the 18th century] aber war die vergleichende Anatomie noch nicht zur selbstdändigen Wissenschaft geworden.

The "abime" which separated the earlier from the later theories was not so wide after all.

b) **The "pathological" method.**

Herder extended his application of comparative methods to include pathological cases. As early as 1768, he recommended such studies, seeing them as likely to cast light, in psychology, upon the normal as well as the abnormal.208) His best known utterance of this kind occurs in 1778, in the striking words "--- der Vorsteher eines Toll- und Siechhauses gabe die frappantesten Beiträge zur Geschichte der Genies aller Zeiten und Länder."209) In this statement, as in the parallel one in the 1775 version of the same work which recommends the study of "Blendwerke, Visionen, Krankheiten, Träume", Herder probably has in mind such men as Swedenborg, whose strange genius had interested Herder since the time of his review of Kant's "Träume eines Geistersehers" in Riga. Herder connected unusual creativity with extreme powers of imagination, which often expresses itself in intuitions, dreams and forebodings. Such gifts are shared by the prolific but
undisciplined fantasy of children and primitive peoples, which Herder in turn connects with their undeveloped, larger-than-life perception: "Welches sind die ersten Gestalten, die sich der Seele eines Kindes eindrucken [sic], von dem die Rede ist? Riesenfiguren, übertürmliche Ungeheuer." By their extreme quality, reappearing in the creative genius, such insights are not far removed from the transports of insanity, which is therefore a deserving subject for the psychologists' attention. In the "Ideen", Herder again mentions "--- Krankheiten und Unnaturen ---, die allemal lehrender sind als die mittelmäßige Gemeinheit." Whether such natures are or are not capable of foreknowing future events, doctors should study the dreams and delusions of their patients: "Sie werden darin wie in einem Traumbuch wenn nicht die Zukunft so die verhüllte Gegenwart und Vergangenheit des Leidenden lesen." Herder here connects psychological delusions with the patient's past, rather than the future, just as modern psychoanalysis, of course, would do.

But Herder did not merely recommend such methods in theory; he employed the data of pathological cases in his own analysis of perception. Thence arose his keen interest in the report of the surgeon Cheselden on the progress of a patient whose sight had been restored by operation, and in the similar instance of the congenitally blind subject examined by Diderot. Although Herder was here closely following Berkeley's studies of similar cases (in fact, Berkeley had cited the Cheselden case himself), he had always recommended such a procedure and generalised it into a methodological doctrine applicable to psychology as a whole.

Among Herder's extracts from his reading in the early 1780's are notes from works on pathology such as Gaub's "Institutiones pathologiae medicinalis" and (as yet only in manuscript), Sydenham's "De morbis
epidemis" and Meier's "Abhandlung von der Kopfwasersucht". We may therefore assume that he appreciated the importance of pathology outside psychological studies, as the following general statement of 1770 suggests:

Was wollen wir also aus dem unnaturlichsten Falle von der Natur schließen? Gestehen wir aber ein, daß er ein unnaturlicher Fall sei - wohl! so bestätigt er die Natur!

In fact, his earliest utterance upon the pathological method extends it to biology as well as psychology. Thus although, in the following quotation, Goethe is referring (in 1807) to the vagaries of perception in particular, just as Herder had done over thirty years previously, Herder would have endorsed his words even in a universal sense:

Die krankhaften Phänomene deuten gleichfalls auf organische und physische Gesetze.

c) Classification.

Let us now examine in greater detail Rouche's contention that Herder's natural history and classification of natural forms are based upon Lavater's "physiognomical" approach, not on objective factors:

L'histoire naturelle pour Herder, c'est tout simplement la physiognomie étendue à l'ensemble du corps et à la totalité des êtres vivants.

This belief was not originated by Rouche, but is derived from Hayr and Koch. Koch, for example, writes:

Nicht also aus biologischen Einsichten eröffnet sich Herder zunächst der Blick ins Wesen des Organischen, was am deutlichsten vielleicht im ersten Entwurf der 'Plastik' zutage tritt, sondern aus metaphysischen Zusammenhängen, aus der Philosophie des Symbolischen, die jedes Ding als Ausdruck eines hinter seiner Erscheinung steckenden und treibenden Gehaltes, den Körper als
This criticism has much truth in it, especially when applied to Herder's writings before 1783, around which year his mature period really begins. For example, he writes, reviewing Lavater's "Physiognomische Fragmente" in 1776:


It is in a similar sense that we should in turn interpret Herder's early statement that Linneus' exact taxonomy must be supplemented by Buffon's "natural" system, which does more justice to the demands of individuality and uniqueness, values which were especially important to the young Herder. A similar pronouncement in the 1776 review of Lavater's work confirms our interpretation:

So bald eine lebendige Sache Wissenschaft, Sciens, geschlossenes Kompendium mit Klausuren [sic] und Paragraphen wird: so ist sie todt: sie wächst nicht weiter, was sie als lebendiges Studium immer thäte. Das sagt nicht Lavater, sondern Bako!

Another rhapsodic passage of similar purport occurs as late as 1782 in Herder's "Geist der ebräischen Poesie".

Thus Herder did employ a "physiognomical" criterion to animals, although less often than to man, before his mature period; he was, in fact, more emotionally interested in their expressiveness, their "character", than objectively concerned with their untrammelled natural history. Even in his
"Ideen", as May observes, the idea of animal expressiveness is not absent, since Herder sees animals 227) "als Ausdruck ihres besonderen Elementes". But here, it is no longer a "personal character", but an environmental factor which achieves expression. For the mystical and Platonic doctrine of the body expressing the soul becomes increasingly secularised. (Rouché, however, does not consider this a mystical doctrine, but as a laicised version of the Christian doctrines of incarnation and creation in science. 228)

While we earlier studied Herder's subjective and empathetic approach to the natural world, we also observed, in his use of analogical and comparative methods, a more formal and objective element which increasingly complements the former in his mature years. He came to realise that he could not classify organisms simply by characterising the "Kräfte" they embodied in terms of physiognomy; his breach with Lavater around 1780 shows in which direction his whole attitude was moving. He subsequently states, in fact, that physiognomy must concern itself rather with anatomical proportion in the tradition of Dürer, with the "Studium des natürlichen Consensus der Formen im menschlichen Körper", 229) and no longer mentions animals and formless "inner character"; he also says that the archaic "Lehre der Complexionen und Temperamente" is of no assistance in a study of man's natural functions. 230) On the other hand, attempts to specify the nature of the nebulous "Kräfte" exactly enough to satisfy scientific demands led Herder, as we shall see, to seek a materialistic, even chemical basis by which they could be defined in concrete terms. He finally rejected physiognomy completely: 231) "Daß unsere Temperaments- und physiognomische Eintheilungen zu Nichts sichern führen, muß jedermann klar einsehen".

"Kräfte", seen as vitalistic, soul-like principles in animals, cannot readily be demarcated into distinct groups; Herder indeed uses them as we
have repeatedly observed, rather to overcome than to create distinctions, which are essential for any graded classification. He in fact appeals, in connection with the universal life-force which he uses to unify all organic entities, to Leibniz's principle of continuity: 232)

Ueberhaupt ist in der Natur nichts geschieden, alles fließt durch unmerkliche Übergänge auf= und ineinander; und gewiß, was Leben ist in der Schöpfung, ist in allen Gestalten, Formen und Kanälen nur Ein Geist, Eine Flamme.

But in his actual classification, which must finally rest rather upon form than intangible varieties of content, Herder emphasises the opposite aspect, that of distinction, and insists 233) "--- daß indem man eine Leiter der Dinge sucht, man die wirklichen Sproßen und Zwischenräume [nicht] verkenne, ohne die keine Leiter statt findet." For like all Herder's principal scientific conceptions, the "Chain" or "ladder" is, as we earlier remarked, used in two senses; as a series of "Kräfte" with all their non-scientific overtones, and as a series of distinct natural forms, which should be compared and classified objectively. Neither aspect should be ignored, or subordinated to the other.

Nonetheless, he never overcame his antipathy to Linneus' system; in a renewed affirmation of his "type" hypothesis in 1785, 234) Herder, protesting against Linneus, once more emphasises those factors which make organisms similar, rather than different: 235) "Ey! wie verlieren sich die Classen aller Geschöpfe in einander!" It becomes clear just how many-sided Herder's "Kraft" idea is when we recall that he used it, as in his theory of a unitary, universal life-force, to overcome distinctions such as those laid down by Linneus, yet on the other hand, in his early "physiognomic" approach, made it the criterion of uniqueness and individuality in personal "character".

However, his antipathy to Linneus' classification prevented him from acquiring
any real interest in systematic botany. In like fashion, he preferred accurate travelogues to systems of racial characteristics such as Kant and others advocated. This does not mean that he desired physiognomical accounts in the style of Lavater. Grundmann,\textsuperscript{236} as we observed, demonstrates the contrary. Indeed,Lovejoy\textsuperscript{237} points out that the breakdown of too rigid systems of classification at the end of the eighteenth century was a prerequisite for later evolutionary theories; in this sense, Herder's views were progressive.

Nevertheless, his more unitary theories, such as that of "type", were general enough to allow distinctions between individual forms, as well as a search for similarities, to be made. What then, we may ask, was Herder's own classification, the "natural" system he sought after like Buffon? Firstly, as we observed, he attempted to make the "Kraft" system the basis of a classification by two expedients; the first (in his "Ideen") was the tacit step of reducing "Kräfte" to material or chemical agencies; this makes of them something different from "Kräfte". (We shall discuss this later.) The second, earlier attempt was inspired by Haller's effort to give vitalism an exact basis, which encouraged Herder in this ultimately futile quest. As is well known, Herder adopted (in modified form) Haller's categories of "elasticity, irritability and sensibility\textsuperscript{238} in his detailed description of the physiological "Kräfte" in which life manifests itself. It could be argued that they are suspiciously like the triad of vegetative, animal and rational souls upon which Aristotle based his classification.\textsuperscript{239} This is not to deny that Haller built up a sound body of knowledge about nervous reactions around them; but it was this knowledge, and the exact physiological senses which the terms have since acquired, which constituted their value.
However, they tell us nothing in themselves, especially when equated to "Kraft", that great solvent of distinctions, with all its non-scientific associations. And Herder annulled such value as they ever had by maintaining that the three "Kräfte" were fundamentally one.

Rouché, however, adds that Herder supplemented this "classification" by listing certain characteristics of the heart and blood of various animals. In fact, he attempts to classify animals by comparing their respiration, nutrition, and reproductive modes, describing the distribution and relative predominance of these functions in different organisms, as well as by making detailed comparisons of the numbers of their heart-chambers (still an important part of animal classification), of the nature and temperature of their blood, and of the type and relative complexity of their lungs. It is of paramount importance that we should remember that all this more realistic classification is found in the "Ideen", a further sign that Herder gradually moved away from classification in terms of "Kraft" or "physiognomical" criteria; this earlier phase had reached its peak in his "Vom Erkennen und Empfinden" six years before. Herder has not abandoned his vitalistic principles; but he now relates them to a biologically more acceptable classification in terms of physiology, by observing that lower animals possess greater powers of regeneration and greater independence of separate organs than higher ones do; the higher the organism, the greater is the decrease of regenerative ability and independence of separate organs, and vice versa. This phenomenon is now known as "progressive integration" from lower to higher forms, and is well attested in biology. We shall see later how Goethe registers a similar belief some years later, in 1795, and again after Herder's death.

Herder also notes that organisms of more advanced structure display
greater specialisation in their various separate functions; this truism acquires new interest when he attempts to explain why lower forms, such as insects, often perform apparently complex activities. He observes that the single individual caterpillar or bee, for example, is in itself, by its lack of versatility, incapable of performing all the functions which the economy of its species requires; as Hansen notices, Herder then cites the phenomenon now known as "alternation of generations" to describe how the caterpillar overcomes its lack of versatility, while he notices that division of labour is found among bees, each group performing distinct functions. Thus the complexity of functions in such lower species really arises out of a combination of simpler functions, and the progression from simple to complex in the scale of natural forms remains unbroken: 245)

Was sie [i.e. nature] in Einem Modell nicht ausführen konnte, legte sie in drei Modellen, die alle zusammen gehören, gebrochen aus einander.

Herder notices elsewhere that the caterpillar achieves its complex cycle by differentiation in time, the bee its complex economy by differentiation in space 246) - i.e. "nacheinander" and "nebeneinander". High degrees of specialisation encountered in lower forms such as spiders and ants are not explained by "innate instincts" or new proliferations of "Kraft", the usual asylum ignorantiae, although even the radical Reimarus had to resort to "Grundkräfte" and undiluted teleology here. 247) For Herder, in 1770, explains them solely in terms of environment; the more limited the creature's environment, the more specialised it can become within this restricted area: 248)

--- die Empfindsamkeit, Fähigkeiten und Kunsttriebe der Thiere nehmen an Stärke und Intensität zu im umgekehrten Verhältnisse der Größe und Mannichfaltigkeit ihres Wirkungskreises.
Herder does not, however, take the further step of relating this observed link between organism and environment to evolutionary adaptation. Besides, as Reimarus' son pointed out in his preface to a later edition of his father's work on this topic, Herder's formula does not always hold. For example, the sloth, though its sphere of action is highly restricted, possesses no highly specialised constructive abilities. Nonetheless, this method of classification is truly empirical, and in no way "physiognomic".

When we come to examine Herder's distinctions between man and the animals, we shall see how he further employed formal and structural classification in discussing differences in cerebral structure, and in extending Camper's theory of craniological angles to include animal forms. And finally, we shall later examine his most satisfactory distinction between natural orders in terms of "levels of organisation", on each of which different laws operate.

All this shows that Herder's attempts at animal classification were by no means completely "physiognomic" as Rouche maintains. He increasingly experienced the need to supplement Haller's categories, which even in themselves are something a little more than "physiognomic", by distinctions based on observable differences in both structure and function of organisms, in accordance with his mature admiration of comparative anatomy, and his own recommendations that it should never lose sight of physiology.

5. Causality and teleology.

From this point onwards, our chapter will be increasingly occupied with Herder's views concerning collective groups and interactions within dynamic processes, no longer with static comparisons.
a) **Causality and determinism.**

We earlier noticed how Herder equated the causal principle to "Kraft", deriving this conception in turn from our knowledge of ourselves as agents; he also knew that this could lead to personifications of non-human causal agencies, and attempted to defend himself against this charge by repeating the Humean commonplace:  

> "Keinen Zusammenhang zwischen Ursache und Wirkung verstehen wir also, da wir weder das, was wirkt, noch was gewirkt wird, im Innern einsehen und vom Seyn eines Dinges durchaus keinen Begriff haben."

Thus, on the one hand, Herder upheld the view, dear to Marxism, that our ideas of causality are derived from our knowledge of ourselves as causal agents; secondly, he tried to show, by quoting Hume at various junctures, that we may not attribute any external reality to the causal principle; and thirdly, by his whole theory of "Kräfte", he went on to do what he himself warned others against, and himself personified external causes freely. At times he tried to qualify this:  

> "Also ist auch bei allen Wirkungen ausser uns alles nur Traum, nur Vermuthung und Name; indessen ein wahrer Traum, sobald wir oft und beständig einerlei Wirkungen mit einerlei Ursachen verknüpft sehen."

These words show how Herder wanted to have it both ways: he wanted to agree with Hume, yet to affirm the logical and external reality of causality. For he never seriously doubted the substantial reality of many of the "Kräfte" which, in science, he considered as so real that he at times even reduced them to material and chemical agents.

It has been maintained, by Ernst Mach and others, that the whole idea of causality is anthropocentric and unscientific. This was why, as Jammer notes, so many positivists attacked the idea of force or "Kraft", seeing it as closely related to the idea of cause. All this is perfectly justified when the idea of cause is given an intrinsic, independent reality, and claims
to explain effects fully in itself. But, like "Kraft" in physics, it may be used "relationally", that is mathematically, as Boscovich used the idea of force, or "operationally" (functionally), as Berkeley uses the idea of cause, for neither of these thinkers introduces any non-logical or non-scientific overtones. S. Toulmin sums this up well:

It is not essential that the search for causes should be anthropocentric; but that it should be diagnostic, i.e. focused on the antecedents in some specific situation of some particular event, is essential.

For in the latter case, in a scientific rather than a logical context, the idea of cause becomes merely an abstract term for describing prior conditions in a physical event. Attacks upon causality which object even to these uses are extreme and scarcely justifiable.

As we have seen, Herder often uses the idea of cause in a truly anthropocentric or personified sense, in a way which cannot be condoned by any logical philosophy of science today. In practice, however, he believed that scientific enquiry consists in a search for natural causes, that is for prior conditions which must be enumerated if a description of natural events is to be complete, and thereby (apart from his "Kraft" theories) applied the causal principle in the normal scientific way.

Did Herder then believe in a strict causal determinism throughout nature? This question will be answered fully when we later examine the various expedients he adopted to avoid giving a deterministic account of the universe in a purely mechanistic sense. For the moment, we should recall that Herder refuses to except man from the causal laws which govern the rest of nature, and does not ascribe to him any freedom of will in the broader sense. His definition of freedom thus anticipates those of the great deterministic
systems of the nineteenth century: 255)

Da ists wahrlich der erste Keim zur Freiheit, fühlen, daß man nicht frei sei, und an welchen Banden man hafte? Die stärksten freisten Menschen fühlen dies am tiefsten.

Herder similarly writes in 1799: 256) "Selbstbestimmung nach Gesetzen der Natur, nicht außerhalb solcher Gesetze, ist die höchste Freiheit." These latter words show that Herder does believe that man is capable of spontaneous action; he is not merely the passive recipient of external influences. We shall later see how Herder's conceptions of dynamism, vitalism and organism in turn oppose to the mechanistic view of causality similar spontaneous principles in nature, parallel to man's limited freedom; these spontaneous principles may indeed be causally acted upon, yet they retain an inner resilience, a degree of latitude within a framework of causal laws which indeed arise out of their interaction. But, as in the case of man, the latitude is of much less significance than the determinants, as Gillies concisely puts it: 257)

Herder takes free will for granted but hardly convinces us of its ability to function amid all the external and inherited factors to which he proceeds to ascribe a decisive formative effect.

For Herder emphasised environmental determinism much more than most of his contemporaries; in this, he is, of course, truly progressive. G.A. Wells 258) gives a good statement of this position, but, in ignoring the rôle of "Kräfte" in Herder's theory of spontaneity, he gives the impression that Herder's ideas are even more modern than they in fact are.

For Herder, thus, causal determinism precludes any indeterminacy or
"uncaused events"; even his "spontaneity" is not completely spontaneous, since it consists rather in a mode of individual reaction to some external circumstance. This is what Herder means when he rejects fortuity or "Zufall", as he often does, for he sees no event as wholly arbitrary. But he does accept fortuitous causation in another sense: the order in which a causal sequence devolves may be fortuitous, being a result of the interaction of several independent causes:259)

Wirkt jede Kraft in ihrer Natur, so wirkt sie frei, und wenn sie durch andre eben so freiwirkende Kräfte eingeschränkt, d.i. in Wirkungen begrenzt wird, so entspringen daraus höhere Gleichungen, die man Gesetze der Natur nennt.

Apart from the "Kraft" principle, which allows Herder to appeal back to purpose, or to the divinity, whenever he wishes, this view of causal laws in nature is not far from that of Lucretius, containing as it does a marked element of fortuity. We shall return to it later.

b) Mechanism and teleology.

We have seen how Herder reached a more modern conception of natural law, saying that it arises out of a configuration of various independent natural agencies. Yet he wavered between this view and another much less scientific one which considered that each separate "Kraft" embodies a natural law, or even a purpose, in itself. He says in a funeral sermon in 1772:260)

"--- wo göttliche Kraft ist, ist ja göttliche Absicht - so sicher und gewiß, als der Zug jenes Vogels". This was certainly the easiest way of solving the problem of fortuity in natural events, by postulating an individual teleological purpose in each event for which a "Kraft" was supposedly responsible. This purely teleological usage should not be confused with Herder's religious application of the "Kraft" principle as in his "Gott"; for these divine
"Kräfte", although emanating from the deity, are yet constrained to follow "laws" of necessity wherein purpose, as well as purely natural causality, is manifest. The latter is that "immanent teleology" we shall touch upon later, and does not involve distinct purposes in individual "Kräfte". On one occasion, the more teleological usage of "Kraft" is applied directly to scientific data, in the "Ideen". Herder maintains, with reference to embryology:


This interpretation of animal genesis conflicts with all earlier and later mentions of an animal "type", which, elsewhere, is always seen as the result not of one purposive "Kraft", but of a configuration of mutually limiting "Kräfte". This exceptional instance should be seen as one of several separate attempts to counteract mechanistic theories of organisms; in this case, Herder goes to the opposite extreme of pure teleology. It is strange that the numerous critics of his teleology have not lighted upon this relatively extreme case. Many critics have indeed seen Herder's use of "Kraft" as teleological; but this criticism applies without qualification only to such exceptional usages as that cited above; in this case, however, Herder is manifestly writing under the influence of Harvey's embryological theories.262) For as a rule, he does not describe each "Kraft" as purposive; purpose emerges in natural laws, which are produced by the conflict of separate "Kräfte". We can, however, argue that all vitalism is teleological,
as many modern theorists of science are prepared to do. But critics of
Herder's teleology have made their accusations on a more specific level,
which requires to be qualified. The accusations would, however, be justified
if directed against Herder's "proof" of an afterlife by means of soul-like
"Kräfte".

But in so far as purposive "Kräfte" are seen as self-sufficient in their
purposiveness, Herder's teleological arguments can be said to favour
hylozoism, the pantheistic variant of teleology, rather than the teleology
of traditional orthodoxy.

Rouché²⁶³) compares Herder's belief in universal order to Kant's use of
divine "eingepflanzte Kräfte" in his "Allgemeine Naturgeschichte". This
comparison is justified only in such instances as those mentioned above, for,
as we have said, purpose is not usually immanent in "Kräfte" themselves, for
Herder, but in the laws which arise out of them. Kant, however, used the
"Kräfte" of attraction and repulsion themselves as the direct purposive
agents of the divine will.

Thus, although Herder is never a mechanist in the sense of recommending
mechanical theories of organisms, where in fact he resorts to teleology as
one of several ways of avoiding mechanism, he combines the idea of "Kraft",
whose applications range from pure teleology to pure materialism, with the
mechanical theory of natural law, which says that laws are produced by a
conflict of mutually limiting forces. As so often in our study of Herder's
philosophy of science, we find that straightforward "either-or" questions do
not lead to answers which do justice to his ambivalent position.

c) Anthropocentric teleology.

We earlier remarked that the teleological implications of Herder's
attitude to anthropocentric ideas would be considered later. We shall
examine them now.

The anthropocentric variety of teleology is well characterised and parodied in Goethe's epigram, "Der Teleolog": 264)

Welche Verehrung verdient der Weltenschépfer, der gnädig,
Als er den Korkbaum erschuf, gleich auch die Stopf erfund.

On some occasions, notably in his theological works, we find Herder supporting similar, if less exaggerated views. He says, for example, in a sermon of 1768: 265) "--- für mich glänzt jene Sonne, und mir legt sich der große Elephant zu Füßen: für mich schmückt sich die Erde mit Blumen und Früchten."

Many critics have listed isolated remarks of this kind in the "Ideen", garnered by Herder from the natural histories and theodicies of the day. 266)

We have seen how the idea of a type, based, especially in its earlier formulations, upon man, implied the anthropocentric doctrine that man is the centre and goal of creation. But more often, Herder adopts the more relativistic view that each organism is as necessary a part of the whole Chain as any other. For example, he apostrophises Nature as follows: 267)


Many of the "anthropocentric" teleological remarks made in Herder's age reduce themselves simply to didactic formulations of facts from economic geography, which enumerates natural products according to their utility. For example, Herder's early unpublished manuscript dialogue on the nature of water contains such questions as: 268) "Schadet oder nutzt d[as] Seesalz?" or "Gibt d[ie] Fluth a[uch] Nuts[en]? Ja! d[ie] Schiffe können durch- s[egeln] üb[er] Ort[e], worüb[er] s[ie] sonst nie gek[ommen] wären." These questions carry no teleological overtones, yet they could easily, by the
addition of a theological premise, be rephrased in such a way. Thus it is not so much in the individual statement about the use of natural amenities that we should look for anthropocentric teleology, but only where such statements are explicitly backed up by the doctrine that natural products were created exclusively for man's benefit. No such general doctrine is found in Herder's works. Even Buffon, although an opponent of teleology, lists among the details which the natural historian ought to consider in describing animals "toutes les utilités ou les commodités que nous pouvons en tirer". 269) Thus most critics, even Kohlbrugge, 270) who finds nothing of scientific value in Herder's works, admit that a doctrine of anthropocentric teleology has no real place in them.

da) Teleology in general.

The problem of teleology in Herder's philosophy has been discussed or mentioned by nearly all critics of his philosophy of nature, and even of his thought in general; some critics give detailed references to relevant passages in the "Ideen". 271) Yet since no survey of Herder's philosophy of science would be complete without some mention of this problem, we shall note in general how his attitude to teleology developed throughout his life, name some of the influences which helped to shape his views, and discuss some of the implications of teleology in science (also in the light of modern theories), avoiding repetition, where possible, of points already raised by others.

(i) The development of Herder's views concerning teleology.

A. The first significant development in Herder's attitude to teleology, if we disregard his conventional treatment of the question in sermons and the like, occurs in 1769, a year in which mechanistic and even materialistic views appear to an unparalleled degree in his writings, especially those not
designed for publication. (Critics may wish to link this to his stay in France, or to his precipitate departure from Riga.) He writes, in the manuscript recently published by Irmscher:

> Es ist also Krieg und Friede unter allen Wesen. Sonne mit Sonne: Planet mit Planet: Körper mit Körper: Mensch mit Mensch:— den Saft den diese Pflanze nicht anzieht, eine andre: --- im Universum ist Alles Anziehung und Zurückstoßung und also Gewaltsamkeit.

No mitigating teleology or theodicy appears here, as it does in Kant's "Allgemeine Naturgeschichte", from which Herder derives the theory of universal attraction and repulsion. It is Herder's first enunciation of the doctrine, derived from Lucretius (whom Herder had carefully studied), and shared by Hobbes, Holbach and later mechanistic materialists, of a universal "struggle for existence". It is worth remarking that, in this same sketch, Herder repeats Hume's theory that the origin of religion is man's fear of nature, and portrays his planetary gods as inaccessible to personal entreaties or complaints, as themselves enmeshed in the universal, mechanical laws of struggle, just like the remote and impotent gods of Lucretius.

B. In his "Auch eine Philosophie", Herder's well known reply to optimistic teleologists of history is that a purpose does indeed lie behind historical development, but that the providence within which it operates is inscrutable to our limited vision. By considering each age as "Mittel und Zweck zugleich", he combines this qualified teleology with the historical relativism which brought this work its deserved fame. He indeed names special purposes in historical events at times; for example, he accepts the Biblical figures on the lifespan of the patriarchs, and says that their longevity was necessary to enable early man to consolidate his slow
acquisitions in knowledge. But, on the other hand, he goes on to say: "Man bildet nichts aus, als wozu Zeit, Klima, Bedürfnis, Welt, Schicksal Anlaß gibt." C. In his "Altestes Urkunde", Herder returns to more religious theories, and elaborates the idea that a manifold and decisive intervention of God took place at the beginning of history. This new interest in first causes rather overshadows his interest in final causes; man, he asserts, acquires at the beginning of history all the abilities which he requires in order to fulfill the course of his later historical development by natural means, without further divine aid (apart from the coming of Christ).

D. The next major advance in Herder's attitude to teleology begins with the writing of the "Ideen". This work combines elements from all of his earlier positions (with the exception of the belief that providence is inscrutable). The main use of teleology in history, and to some degree in science, is to demonstrate that man is developing increasingly towards the goal of "Humanität". Some interpretations of individual natural phenomena in terms of purpose appear, and have been well documented by the critics earlier referred to. But the mainstream of Herder's teleological thought in his early mature period is "immanent teleology", the combination of final and efficient causes, as Rouché notes. Herder well knew that it is possible to phrase one and the same statement in teleological and in naturalistic terms. For example, he says that "Humanität" is the goal of man's nature, but elsewhere he writes: "Wenn man auch von den Endursachen der Schöpfung ganz abstrahiret: so lag es schon im Stoff der Natur selbst, daß sie aus Vielem ein Eins machen und durch das kreisende Rad der Schöpfung Zahlloses zerstören mußte, damit sie ein Minderes aber Edleres
belebte." For the very reason that Herder preferred statements which allowed both types of interpretation, his teleological statements are rarely extreme. The workings of purposeful nature or providence are never miraculous; Herder says of early geological upheavals: 281) "--- so änderte die Vorsehung den Plan ihrer Haushaltung mit unserm Geschlecht durch natürliche Ursachen unsres Wohnhauses."

Hints of the earlier, more radical view of development by conflict repeatedly appear alongside more teleological passages. Many of these utterances, in their almost aphoristic formulation, are strongly reminiscent of Tobler's "Naturfragment": 282)

Immer und überall sehen wir, daß die Natur zerstören muß, indem sie wieder aufbaut, daß sie trennen muß, indem sie neu vereinigt.

Such passages occur throughout Herder's works, and provide, as they did with Goethe, a strong antidote to teleology; by the Weimar years, they have become coloured by Shaftesbury's emotional pantheism, which, though unscientific in itself, was certainly opposed to traditional teleology. This blend of Lucretian development by conflict and the nature worship of Shaftesbury appears in the most surprising contexts, as in Herder's words on nature at the confirmation of Caroline Luise of Weimar in 1802: 283)

(i) Jedes Einzelne dient dem Allgemeinen und muß ihm, auch unbewußt und wider Willen, dienen.
(ii) Jedes Einzelne lebt in seinesgleichen fort; die Natur erhält die Geschlechter.
(iii) Jedes Einzelne Daseyn ist darauf berechnet; der Tod ist Mittel der Natur zu ihrer ewigen Jugend.

These are strange words indeed for a Lutheran confirmation.

However, the dominant tone of the "Ideen", Parts I and II, arises from
Herder's attempts to interpret the same phenomena both teleologically and naturalistically. One instance which has caused confusion among critics is his application of Leibniz's principle of plenitude to the natural world, his statements that "all must become which can become" and that "creation must be enjoyed in all its parts". These have been interpreted teleologically by several critics, or (naturalistically) related to environmental determinism by others; by modern readers, they can easily be related to the theory of evolution by adaptive radiation, and it is such interpretations which gave rise to the mistaken "Vorgänger Darwins" theory with its ensuing protracted controversy. Herder, in fact, states the idea in both teleological and naturalistic forms, as the two following quotations respectively show:

Die ganze Schöpfung sollte durchgenoßen, durchgefühlrt, durch- arbeitet [sic] werden; auf jedem Punkt also mußten Geschöpfe seyn, sie zu geniessen, Organe, sie zu empfinden, Kräfte, sie dieser Stelle gemäß zu beleben.

and (this time applied to history):

Was ist das Hauptgesetz, das wir bei allen großen Erscheinungen der Geschichte bemerkten? — daß allenthalben auf unserer Erde werde, was auf ihr werden kann, Theils nach Lage und Bedürfnis des Orts, Theils nach Umständen und Gelegenheiten der Zeit, Theils nach dem angebohrnen oder sich erzeugenden Charakter der Völker.

Both passages, and other similar ones, are really only different phrasings of one and the same idea.

We have seen how Herder occasionally uses "Kräfte" teleologically. In most usages in the "Ideen", however, they allow of more or less naturalistic interpretation as well, and are more often symptoms of an aversion to extreme
mechanistic materialism, which, although logically more consistent, was scientifically premature in Herder's day, since it involved the wholesale application of mechanics to complicated biological organisms. Herder's other teleological pronouncements do not introduce unverifiable entities or falsifications of observations (with the notable exception of the theory of planetary habitation, well-nigh generally accepted in that age). Usually, his teleology is a methodological weakness, not a distortion of empirical facts.

Furthermore, the teleological rephrasing of authentic observations is sometimes more apparent than real, somewhat in the manner of Linnaeus' "metaphorical" anthropomorphism earlier discussed. Lamprecht realises this:


Lambert, with whose works Herder was long acquainted, even set this idea up as a doctrine:

Dieses Verhältnis [i.e. teleology] aber verwandelt höchstens nur das ist, so die physische Sprache gebraucht, in ein muß seyn, weil die göttlichen Vollkommenheiten das fordern, was die Erfahrung lehrt, das es sey.

That is, teleology provides an additional a priori justification for a causally stated principle. As we have seen, such double-edged usages and arguments were particularly dear to Herder.

In the „Ideen“, the theory of divine intervention found in the „Älteste
Urkunde" is renewed; but once more, it appears only in history, not in non-human natural phenomena (we shall oppose critics who maintain that Herder believes in divine and miraculous intervention in natural processes as individual points arise); secondly, the intervention again takes place only at the origins of human history, after which natural development prevails; and thirdly, this theory is one of first, not of final causes. In his theory of the origins of the natural world, Herder, in making statements which preclude any belief in evolution by descent, may be presumed, by a process of elimination, to have supported a creationist view of the origin of species; curiously enough, he never states this belief explicitly or categorically (hence the "Vorgänger Darwins" fallacy and controversy). But, as with the origin of man, this theory is one of first, not of final causes; Rouche fails to note this important distinction.

Rouche says of the God he believes is behind Herder's teleology:

"... le Dieu de Herder est ici un Dieu personnel ... C'est même le Dieu de l'orthodoxie." But teleology founded upon the supposed order and wisdom of natural laws was by no means committed to orthodoxy in Herder's age; the freethinkers Maupertuis and Reimarus expatiated freely upon the wisdom manifest in natural laws. Teleology of this kind was connected rather with deism in the tradition of Descartes than with orthodoxy, as is attested by the many attacks launched by the orthodox upon Newton, who even suggested that the orbits of the planets may be corrected periodically by direct divine intervention. An affinity to Cartesian deism is clearly manifest in Herder's treatment of origins - divine creation followed by unaided natural development - and of teleology as exhibited in the wisdom of natural law; but his continual attacks upon Cartesian mechanism and the
machine analogy obscure this parallel. In its other important use as a justification of progress towards "Humanitāt", it bears witness to the humanistic belief that man, left entirely to his own natural resources, has a great destiny before him.

E. It is well known that Herder, in Part III of his "Ideen", explicitly and categorically rejected final causes in history. These are his first theoretical pronouncements upon teleology, for his earlier practice had no well-defined theory behind it. Rouché says of the change: "C'est à partir de 1787 seulement que sous l'influence de Spinoza Herder interdira au Dieu de la Bible d'intervenir dans l'histoire humaine". But, as we have seen (and Meinecke says the same), Herder never at any time suggested that God intervened in history, except at the time of man's origin and first acquisitions, and (in his Bückeburg theology) at Christ's birth. All the instances of "intervention" named by Rouché are really initiations, origins. And secondly, Herder's criticism in 1787 was directed against final causes, not first causes. Having disposed of the delicate problem of origins in Part II of his "Ideen", Herder was now free to reject all further use of the supernatural, that is of divine intervention in history as a process guided by a purposeful agent. Moreover, as we shall note in our detailed review of Herder's knowledge of science, he appeals to divine action in history, but such action is never mentioned in his scientific discussions. After he had used, in nature, the compromise of equating final and efficient causes, then, in history, of relegating divine action to origins and using natural causes to describe subsequent developments, Herder was free to naturalise his conception of providence even further, and he finally concluded that the essential doctrines concerning man's progress can be demonstrated from nature
and history alone. In this respect, his development is parallel to that of Lessing and of Reimarus, and culminates in many of the beliefs associated with modern liberal theology.

Although Herder had decidedly rejected teleology in 1787, we find him writing, in an early manuscript for Part IV of the "Ideen" in January 1788, that the idea of one God and father is essential to knowledge (in connection with the coming of Christ). This shows that Herder was still seeking to combine two conflicting positions, and to introduce the divine into history at the Incarnation, the only place, apart from the very beginnings of man's history, where he had introduced it before. Knebel's objections led him to suppress the passage in question. From then onwards, he consistently rejects interventionism and teleology in theory, although he occasionally reverts to single teleological arguments in points of detail or in official ecclesiastical works such as his Lutheran catechism. On principle, he opposes Kant's attacks on the traditional proofs of the existence of God, as he opposes all Kant's doctrines, by reaffirming the teleological proof from universal order. This contradiction to Herder's own earlier pronouncements can be fully explained, since we know that he was gravely concerned at the harmful effects of Kantian tendencies (often imperfectly understood by the students) among the young theologians who came to him from Jena; this was, in fact, one of his cardinal motives for writing the "Metakritik". For elsewhere, he believes, in his later years, that natural laws in science, and a self-regulating providence in history, are sufficient objects of wonder in themselves: "Alle die, die Religionsbekenntnisse ins Spiel bringen, sind Feinde der Wissenschaft aus Vorurteilen des Pöbels. --- Kein Religionsdogma muß dem Forschungsgeist der Wissenschaft sein Ziel setzen wollen ---"
(ii) Influences on Herder's attitude to teleology.

We have seen how Rouche makes Spinoza responsible for Herder's rejection of teleology in 1787. Rouche himself admits: 302)

Il recommandait déjà la lecture de Spinoza dans les "Lettres concernant l'étude de la théologie" ---; et sa lettre du 6 février 1784 à Jacobi atteste qu'il l'avait à nouveau étudié depuis l'été 1783. Mais l'effet ne s'en est fait sentir qu'à partir de 1787.

No explanation for this puzzling delayed action is offered.

Let us discuss the possible influences. Rouche suggests and rejects Robinet's influence: 303) we agree with this, since we have already shown that Robinet's influence on Herder was probably minimal. Herder however writes in his preparatory notes for the "Ideen": 304)


In the passage referred to, Buffon attacks the search for final causes behind animal organs, noting that the aim of science 305) "--- est de connaître le comment des choses, la manière dont la nature agit; et que nous substituons à cet objet réel une idée vaine, en cherchant à deviner le pourquoi des faits, la fin qu'elle se propose en agissant." Lucretius had, in fact, said almost the same thing long before. 306)

There are, however, three occasions on which Herder goes against these warnings, when he says that apes were denied speech so that language might not be debased by them, 307) when he says "Wo ein Organ weniger befriedigt werden konnte, reizte sie [i.e. nature] es auch minder", 308) and when he observes that the reproductive organs are situated lower down on the higher mammals "als ob sie [i.e. nature] ihrer zu schämen anfinge." 309) Now Buffon...
saw the best corrective to final causes in comparative methods and description, as opposed to explanation. 310) Similarly, Geoffroy rejected Cuvier's teleological approach, advising, as Whewell puts it 311) "--- that our attention is to be turned, not to the fitness of the organisation for any end of life or action, but to its resemblance to other organisations by which it is gradually derived [not by evolution, however] from the original type." (Geoffroy called his "type" the "unity of plan" or "unity of composition", and the associated method the "Theory of Analogues", claiming that they were his own creation; 312) we know this to be false, of course.) Thus, it transpires that the biological criticisms of teleology at the end of the eighteenth century derive from the rise of the comparative method. In Herder's thought too, it provides an antidote to teleology, as when he emphasises comparative structure in opposition to Reimarus' teleological "Kräfte". 313) Once again, we find him adopting one half of a recommendation, but also attempting to cling to earlier beliefs, and either to reconcile the two, or to ignore their mutual contradiction. Probably his knowledge of Leibniz's claim that he had "harmonised" final and efficient causes reinforced him in this belief, as Hoffart 314) and Rouché 315) suggest.

Thus the influence of Buffon, coupled with Herder's natural bent for comparative methods, along with the relativism of his early theories of nature in 1769 and of history in 1774, were the first steps which led to his final rejection of teleology. Rouché says that philosophic, not scientific influences led him to this decision. Yet Herder had long been familiar with Bacon's works, in which teleology is rejected on philosophical grounds, 316) and, as Rouché admits, an unaccountable interval of at least four years falls between his study of Spinoza and his rejection of teleology.

There were other influences at work. Einsiedel, 317) in opposing
teleology from a scientist's point of view, must have helped to keep alive the Lucretian aspects of Herder's earlier beliefs. However, Suphan stresses Knebel's influence upon Herder's teleology.\textsuperscript{318} He quotes Knebel's letter of 22nd January 1788 attacking his use of teleology in history. But, as we have seen, Herder had already abjured teleology in 1787, in Part III of his "Ideen", and his renewed appeal to the deity here was exceptional. Thus Knebel's influence, at this stage, can only have served to prevent a recrudescence of arguments for a benevolent providence, which Herder wished to use at this point to counterbalance his denunciation of medieval Christianity.

But Suphan names another critic of Herder's manuscripts - Goethe. Red lines against certain manuscript passages of the "Ideen" are attributed to Goethe, on the grounds that Goethe mentions such marking as his usual critical procedure, which Suphan holds to be peculiar to him.\textsuperscript{319} But Suphan's argument loses its weight when we read, in a letter of Knebel's to Herder: "Verzeihen Sie, daß ich hier und da einige kleine rothe Striche angezeichnet habe."\textsuperscript{320} Besides, although Suphan believes that Knebel's criticism of Herder's manuscripts begins only after Goethe departed for Italy, Haym cites a letter of Herder's showing that he sent Knebel the manuscript of Book VI of the "Ideen" in 1784.\textsuperscript{321}

However, the objections indicated in red are also considered by Suphan\textsuperscript{322} as evidence that Goethe was arraigning Herder's lack of "Anschauung". But several of the passages marked betray another, and more tangible fault. For example, one passage runs:\textsuperscript{323}

\[--- \text{die Welttheile hangen auch so enge zusammen, als sie der Convenienz nach zusammehangen konnten.}\]

Another passage on origins is also marked. It ran:\textsuperscript{324} "Hier sollte sich
also (so war der Riß des Schöpfers!) das Gebürg senken, damit auch das Meer seinen Ruheplatz finde." Yet another runs: \(^{325}\) "--- es sei genug von der allgemeinen Struktur unserer Erde zum Wohnplatz des Menschengeschlechts geredet." The critic's objections to these passages are obviously directed against their teleological content. The passages were accordingly expunged by Herder from his work. There can be no final certainty whether the critic was Goethe or Knebel, but Suphan's belief that it was Goethe is probably correct, not because of Suphan's own questionable arguments, but because we might have expected Knebel, in his attack upon teleology in his letter of 1788, to have referred to any criticisms of the same kind he had made on an earlier occasion.

From all this we conclude that, although the influences of Herder's 1769 phase and his subsequent historical relativism, along with his association with Einsiedel from the late 1770's, and his study of Buffon in the early 1780's, were strong enough to make his use of teleology fairly moderate from the start of his "Ideen", the detailed objections of Goethe, perhaps seconded by Knebel, led him towards his final step of rejecting teleology explicitly in 1787, or rather in 1786, when he set to work on Part III, before he again came under Spinoza's direct influence in 1787, while writing his "Gott". Purely philosophical objections, as raised by Bacon and Spinoza, probably had less effect, since they would otherwise have made themselves felt at an earlier date.

(iii) **Teleology and the philosophy of science.**

We have seen that Herder did not share in some of the abuses of teleology which were common in his day, as he did not employ crude anthropocentric teleology or interventionist theories of natural processes. Other abuses
which vitiated scientific observation are embodied in the predictive use of teleology. Lambert, although he elsewhere exercises moderation in teleology, is guilty of this when he argues that all celestial bodies, even comets, must be inhabited, since they must have been created for some purpose. The astronomer Bode repeats this argument, saying of the planets: Wenn sie unterdessen bei dem allen keine Bewohner hätten, was sollte wol [sic] ihr Endzweck und ihre Bestimmung seyn ---?" This is at the same time a misuse of the analogical method, since the evidence for the analogy is totally insufficient. Kant similarly argues in his "Allgemeine Naturgeschichte" that space must be infinite, since God's creative works, being eternal, require infinite space within which to manifest themselves. Even in his critical period, Kant argues that teleology is necessary to enable us to explain how the races of man originated (this shows how the problem of origins led directly to the idea of first causes, and often to teleology, even in a philosopher who applied thorough logical analysis to unquestioned orthodox beliefs); purposive preadaptation by God or providential nature must be presupposed, he believes. Herder knew all these works, including Kant's racial theories as put forward, in similar words, in his earlier essays on human races. But while he shared the belief in planetary habitation, which indeed lingered on well into the nineteenth century in the work of Herschel and others, he did not make any other predictive applications of teleology like Kant's theories of infinite space and racial origins, confining himself to empirical arguments on these questions.

The most significant philosophical analysis of teleology in Herder's age was, of course, that in Kant's third Critique, which accepted teleology, with qualifications, as a "regulative" principle governing biological investigation. Kant's qualifications of teleology were therefore logical; Herder's
qualifications (such as avoidance of interventionism and crude anthropocentric teleology, use of "immanent" teleology and its application in vitalism, avoidance of teleological prediction, use of comparative methods, relativism and the idea of development by conflict) are all empirical concessions to observation, but they are logically weaker than Kant's since they lack a consistent logical exposition. Herder is also less consistent than Kant in his practical uses of teleology, although even in 1788, Kant appeals to a purposive creative intelligence when he explains racial origins. Even in his third Critique, he still supports this theory of preadapted, inherited "germs", reminiscent of Bonnet's "Präformation" hypothesis, although he now qualifies it by saying that the existence of a creative intelligence cannot be demonstrated by a purely functional teleology.

Qualified applications of teleology as a "regulative", "functional" or "heuristic" principle still appear frequently in biological literature. Nagel and Braithwaite accept this as an unavoidable feature of biology, with the reservation, however, that linguistic statements in terms of purpose are not "proofs" of the existence of purposive agencies. All this means is that most thinkers wish to reject it in theory, but find it difficult to do so in practice. The anthropological argument that man, as a tool-maker, irrevocably becomes a thinker in terms of purpose, helps to explain the origin of teleology and its deep-rootedness, if not its logical difficulties. Herder himself knew this relatively modern explanation, and writes:

Was sind alle Werkzeuge, die je die Kunst oder Wissenschaft erfunden, als substituierte Zeichen zu Bezeichnung eines gefaßten Merkmals oder zu Erreichung einer vernünftigen Absicht?
As always, he had a clearer vision of empirical determinants than of logical demands; therein lay the root of his feud with Kant. But, as Kant first stated, the aim of science must remain causal description, and it cannot accept that teleology is knowledge in itself. Science, with the downfall of vitalism, is immeasurably nearer this goal than it was in Herder's age.

In conclusion, we may say that Herder's use of teleology was cautious, and counterbalanced by non-teleological methods. His attempts to synthesise the two are wavering and always changing, and are logically less satisfactory than Kant's. The only biologists of his age to abandon teleology completely in practice were the mechanistic materialists, most of whom were French. Herder felt that the machine analogy in biology was inadequate; it was indeed premature and over-simplified. His use of teleology was in part a reaction against such tendencies, especially when he introduced his "Kraft" conception in his vitalistic theories of life. He resorts to divine first causes in the problem of origins, but neither this nor any of his teleological utterances warrant the criticism that he was merely imposing orthodox theology upon science. His final abjuration of teleology was not a sudden volte-face, inspired by Spinoza, in favour of rationalistic, liberal theology, as Rouché believes. The ateleological tendency had been present since 1769 at least, and Herder's step merely represents the more exclusive emphasis of one pole of a dualism which he never fundamentally reconciled. For his various reconciliations of the two opposing elements, in the "Ideen" and before, never provided a true and relatively permanent synthesis after the manner of Leibniz, who "harmonised" final and efficient causes. The non-teleological tendency is juxtaposed to teleology in the "Ideen", and the two methods alternate, each retaining its basic identity, in uneasy coexistence. As always, two perfectly distinct sides are present in Herder's intellectual
personality, and out of their conflict ever-changing relations and mutual modifications result, but they are never completely reconciled.

6. Holism and organismism.

There is, however, another system of ideas, not unconnected with teleology, which was familiar to Herder and used by him, and which still survives in many present-day theories of scientific methods. This is the conviction that the significant units of the world investigated by science are wholes, which are not simply reducible to the sum of their separate parts, nor, in extremer versions of this belief, to the parts along with the relations which obtain between them.

This notion first appeared in more explicit form in modern scientific thought with the "Gestalt" theories in psychology, and with Smuts' "holism", and the works of such men as J.S. Haldane and Lloyd Morgan, in biology. In connection with this early biological "holism", Joseph Needham rightly speaks of "the neo-vitalistic idea of the organism as a whole". The teleological implications of such extreme holism become clearest when nature, or the universe at large, is declared to be one unified, harmonic whole, which therefore has a general, cosmic purpose (Lloyd Morgan, etc.). A.J. Ayer's criticism of monism applies to this type of holism too:

--- the assertion that Reality is One, which it is characteristic of a monist to make and a pluralist to controvert, is nonsensical, since no empirical situation could have any bearing on its truth.

In fact, the idea of a whole, used in this way, shows traces of the archaic concept of "substance" (widely used in philosophy before Locke and revived in new forms from time to time) as something which possesses attributes, yet is
itself somehow prior to and distinct from all of these. These "holistic" beliefs, at least when propounded as scientific truths, are in many ways a legacy from the vitalism upon which holism sought to improve, and are no longer accepted as scientific by most theorists of science.

Holism of this kind was soon superseded by "organicism" in biology; this retains a belief in wholes as the most significant natural units, but it believes these wholes can be reduced to their parts together with the formal relations existing between these; organicism repudiates all vitalistic theories, and accepts teleology only as "a short expression for all phenomena upon which the maintenance of an observed state or process depends." It examines all natural wholes by the analogy of the organism, seeing them as dynamic systems.

It is remarkable how many of these various nuances within the holistic and organicistic systems are already present in Herder's works. We shall examine these parallels in detail, since no critics have yet dealt with this aspect of Herder's thought as a distinct element of his methodological equipment. Perhaps it has escaped notice since interest in the problem is of fairly recent origin, the word "holism" itself having been coined by Smuts in 1926.

Litt, however, notes how Kant uses the general and the particular as abstract concepts, and observes in passing that Herder more often employs another pair instead:

\[\text{Der Relation zwischen Allgemeinem und Besonderem schiebt sich wie selbstverständlich eine andre unter: die Relation zwischen dem Ganzen und dem Teil.}\]

How then does Herder conceive of the part, in this general sense, in its
Every part is a whole in itself, reflecting the nature of the universal whole. This idea, of course, goes back to Leibniz’s monads and to the microcosm conception, and as such is an instance of extreme holism, believing not only in wholes, but in a universal whole and in a close parallelism between each and all and the ultimate whole; parts are wholes within wholes in endless series, as in a Chinese puzzle. This notion even appears in Anaxagoras’ theory of "homoiomeria", later mentioned by Lucretius and discussed by Goethe in his scientific writings. The "homoiomeria" were "universal particles", each of which contained something of every element in the universe. Such conceptions are closely bound up with the notion of "Totalität" whose development from Herder to Romanticism Wilhelmsmayer traces so well. It goes back, in fact, to the ideas of Bruno and Plotinus.

This type of holism is too far-reaching and general to be of use to scientific thought. A thinker with such views soon realises that he cannot, even intuitively, grasp the whole of existence unless through mystical contemplation, and thus seeks for the universal whole symbolised in more concise form in smaller, observable entities. Agnes Arber aptly says of Goethe’s solution to the problem:

Faced with the manifoldness of phenomena, he tried to reconcile it with his basic idea of the unity of things, by striving to discern the Whole in the tiniest individual thing. Any subject, however small and limited, with which he concerned himself, became the microcosm of something universal.
This is equally true of Herder, especially of his individual "Kräfte" and their relationship with the universal "Urkraft". For nature is present, at least potentially, as a complete whole in every part of her works. Herder writes of nature: 342)

Sie bestimmte Punkte des Raums und des Daseyns, wo Welten sich bilden sollten und in jedem dieser Punkte ist sie mit ihrer unzertrennlichen Fülle von Macht, Weisheit und Güte so ganz, als ob keine andre Punkte der Bildung, keine andre Weltatomen wären.

This recalls the: "Sie verbirgt sich in tausend Namen und Termen, und ist immer dieselbe" of Tobler's "Naturfragment". 343) Herder too sees nature as one vast whole: "Alles ist in der Natur gebunden", 344) he says.

This theory of universal wholes is of course a basic element in Herder's "monism", and should show the critic that this "monism" is of unmistakably mystical origin. Kant limited himself to saying that the unity of nature is a subjective postulate, whereas Herder disagreed, and said it could be derived from our objective experience. 345) As we have seen above, A.J. Ayer shows that any dogmatic monism, whether mystical or materialistic in origin, has no place in any true philosophy of science, since its teachings cannot in principle be verified.

However, the belief in wholes has a more scientific and biological foundation. As the philosopher Whitehead remarks: 346)

The relation of part to whole has the special reciprocity associated with the notion of organism, in which the part is for the whole; but this relation reigns throughout nature, and does not start with the special case of higher organisms.

Critics need not therefore puzzle over Herder's predilection for the idea of the organic even before he had studied organisms in any detail, or search for
particular sources of his belief.\textsuperscript{347}) For the substitution of the more mystical, intuitive relation of whole and part for the more rationalistic relation of general and particular soon leads, a priori, to the idea of organism, which considers all parts as related to each other as well as to an integral whole. Dachauer correctly observes that Herder's "organic" approach is intuitive, and a necessary part of his nature.\textsuperscript{348})

Herder's thought, in fact, displays much that is characteristic of this "organicism" which Whitehead describes, as well as the more general and less scientific "holism". Many critics have remarked in general upon the "organic" quality of Herder's thought as opposed to the more mechanistic views of the Enlightenment. For example, Rasch\textsuperscript{349}) writes:

Herder erblickte übel Ganzheiten und das einzelne als Glied eines Organismus, während der Rationalismus die Welt aus begrifflich trennbaren Teilstücken zusammensetzte und das einzelne als Rad im Uhrwerk auffäste.

That is, Herder went beyond the archaic, Leibnizian parallel between the content of part and that of whole as different manifestations of one universal cosmos, and set up the formal parallel between organic wholes and their parts. But the monistic, totalistic part of this belief, whereby the universe is conceived of as one great organism, is again mystical and non-scientific. This was the aspect of Herder's belief in the organic which, as Sauter\textsuperscript{350}) observes, the Romantics inherited. Dachauer\textsuperscript{351}) should be consulted for a survey, a model of its kind, of the development of Herder's "organic" attitude in his early, especially historical works; he traces their emergence in Herder's style and use of language.

But apart from this vague belief in an "organic" nature, Herder applied the notion of organic wholes to particular areas of the natural world in a
way close to that followed by modern organicism. We shall consider such applications in turn.

a) The principle of "Kompensation".

Herder sees each organism as a whole which is reducible to its parts together with the relations obtaining between them. In its more general formulations, however, this belief still shows traces of the Leibnizian belief that the part in some way reflects the complete whole, especially where the human organism is concerned; for example, Herder writes of the finest Greek statues: 352)

Der Genius eines einzeln-lebendigen Wesens lebt in jeder dieser Gestalten, die er wie eine Hülle nur durchhaucht und sich im kleinsten Maas der Stellung und Bewegung, ähnlich dem Ganzen, charakterisiret.

This passage shows a half-way stage between the original mystic conception of universal wholes and the more modern conception of organic wholes. Closer to the latter conception by far is the idea of "Kompensation", later developed by Goethe, 353) whereby the organism appears as an organic whole, whose growth proceeds by a kind of "budgeting" of available resources. Geoffroy St.-Hilaire later stated this principle in his "loi de balancement". 354) Before any of these writers lived, Aristotle had something close to this idea, but only in particular concrete cases. He writes 355) "--- some birds have the feet weak; in which case the defect is compensated by the superior action of the wings, as in swallows." However, this idea, grafted on to the "type" theory, led to comparisons between the deployment of available resources within the same structural plan in different animal species, as in Goethe's and Geoffroy's comparative anatomy, and certain instances in Herder's
works. Siegel\textsuperscript{356}) notes several examples of the idea in Herder's writings, from the language essay of 1770 onwards. Herder writes in this essay:\textsuperscript{357}) "Je schärfer die Sinne der Thiere, und je wunderbarer ihre Kunstwerke sind, desto kleiner ist ihr Kreis ---". Siegel, however, relates the idea only to Herder's "optimistic theodicy", ignoring its scientific implications.

Herder notes as early as 1766:\textsuperscript{358}) "Je weichlicher das Thier, um so härter das Behältnis." This early statement disproves Rouche's suggestion that this idea, which Rouche calls by its Darwinian name of "correlation des parties",\textsuperscript{359}) originated from Bonnet's "Palingénésie philosophique", since the latter work was published only in 1769. Herder does combine the idea with the "type" conception at one point, thereby arriving at a formulation almost identical with Goethe's later "Kompensation" theory:\textsuperscript{360})

Wer sie [i.e. animal forms] studiren will, muß Eins im Andern studiren; wo dieser Theil verhüllt und vernachlässiget erscheinet, weiset er auf ein andres Geschöpf, wo ihn die Natur ausgebildet und offen darlegte.

As Siegel remarks, the word "Kompensation" itself occurs in a similar context in the "Ideen".\textsuperscript{361}) We may add, for the sake of completeness, that it reappears in a similar utterance in 1797.\textsuperscript{362}) Other statements of the same kind, sometimes with explicit reference to comparative anatomy, occur in various works of Herder's.\textsuperscript{363})

He applies the same principle in discussing negroid characteristics as an example of racial variation:\textsuperscript{364})

Trat der Mund hervor: so ward eben dadurch die Nase stumpf und klein: die Stirn wich zurück und das Gesicht bekam von fern die Ähnlichkeit der Conformation zum Affenschädel.
He generalises this principle in a later statement:

--- so zeigt die vergleichende Anatomie gnugsam, daß die Verartung die ganze Gestalt angegriffen und sich keiner dieser festen Theile ändern könnte, ohne daß das Ganze verändert würde.

Götz, followed by Rouché, rightly compares the latter statement to Darwin's "law of correlation of growth", which states that alterations to parts of organisms usually affect other parts as well. (Herder, of course, does not have the general evolutionary background of Darwin, although he certainly knew that races had evolved in some way.) This was the modern equivalent of the older "Kompensation" idea and is a purely structural category, whereas the older version is founded on the belief that a constant available content out of which organic forms are built is allotted to each organism.

So far, we have noted how Herder applies a principle, still recognised by at least one modern organicist, whereby a fixed relationship between available resources and size or proportion of organs is used, as a formal criterion, to guide comparative anatomical investigations. But when we ask what Herder means by the resources available to each organism, we find a less satisfactory answer. He sees each organism as possessing a certain quantity of "Kraft". The constancy of this quantity determines the fixed "budget" of resources available to the organism in its growth. Siegel generalises this theory:

Das Kompensationsprinzip, das man etwa mit unserem modernen Energieprinzip vergleichen könnte, weist, kurz und unbildlich gesprochen, auf einen konstanten endlichen Kraftvorrat der Welt hin.

Siegel is quite unjustified in comparing this, without qualification, to the
modern principle of conservation of energy, as Clark does on another occasion. Herder could have had two sources for his belief: one is the basically mystical and a priori belief that wholes, being complete in themselves, must be made up of a constant quantity of parts (even if, as in the organism, they require progressive replenishment), so that any change can only mean that the constant available resources are redistributed, as in the change from European to negroid physiognomy (what is added to one part must be taken from another, and vice versa); the second source might be the more empirical principle, utilised by man from the earliest times, that if, as in plants, we deprive one part of nutrition, a corresponding increase in the size of other parts should result. No theory comparable with the conservation theory of modern physics plays any part in either. Earlier conservation theories of a universal kind sprang, as we shall see later, from a priori arguments concerning wholes.

Similarly, Herder's belief that changes brought about in organisms by environmental influences can be either superficial and uninherited, or radical and inherited, derives from his vitalistic variety of holism. The inherited change must affect the "Kraft" upon which the whole is built; for this "Kraft" stands for a purposive or teleological quality, common to all vitalism, which determines the genetic characteristics of the organism. This is unscientific holism, for a purposive "Kraft" is more than a mere quantity; it is a quality as well, and cannot be reduced to the parts of an organism together with their reciprocal relations.

We noticed in our examination of teleology how Herder only partially accepted Buffon's objections to final causes. In the same passage, which Herder had referred to in his notes, Buffon further argues against what would now be called "holistic teleology". He says of the pig: 370) "--- il a
évidemment des parties inutiles, ou plutôt des parties dont il ne peut faire usage ---. La nature est donc bien éloignée de s'assujettir à des causes finales dans la composition des êtres; pourquoi n'y mettrait-elle pas quelquefois des parties surabondantes, puisqu'elle manque si souvent d'y mettre des parties essentielles?" If Herder and Goethe had fully accepted the message of this remarkably modern passage, namely that organic "wholes" do not necessarily exist as intuition says they should, their "Kompensation" theory would never have appeared. However, its scientific aspects as well as its non-scientific ones would have been lost to posterity together.

Thus, Herder's theory of whole organisms is, on the one hand, an advance into modern organicistic theory and, on the other, a perpetuation of the older holistic theory which derives from vitalistic premises and includes teleological elements. This vitalism and its associated teleology are, however, mild in comparison with interventionist or anthropocentric teleology, and frequently appear in the holistic theories of the 1920's which preceded the higher development of organicism in the works of Woodger, Needham, Bertalanffy and others. Furthermore, as Bruntsch remarks, Herder's theory of organic change by environmental influences was a great advance on the "piecemeal" theories of change current in his age, especially among mechanistic thinkers.

We see once more how new and fruitful theories can arise out of a peculiar blend of empirical, formal principles and a priori or intuitive ones. Experience often has a disconcerting way of confirming a priori ideas; this is perhaps because many "a priori" beliefs really have a small but significant empirical ingredient in their origin. But then if we elevate this frequent correspondence to axiomatic status, the divergence between the two modes of knowledge sooner or later exposes us to error.
True parallels between a priori and empirico-scientific concepts are possible where the former are reducible to the latter in a way which allows them to be verified quantitatively. This explains why Herder's holistic conception of the organism appears relatively modern. Here, for once, the "Kraft" behind the organism, the "available resources", admits of quantitative analysis in principle at least and, in this century, in practice. For available resources or energy consumed in organic growth is the very factor around which much recent quantitative, even mathematical biology has grown. The empirical ingredient, whether consciously or unconsciously introduced, was in this case strong enough to lead Herder beyond his usual limitations.

b) Ecology.

The community of all organisms which share a common environment was treated by Herder as a holistic unit. He treated it in a truly organicistic way which admits direct comparison with modern biology. For he considers the ecological community as existing in a steady state of dynamic equilibrium,371) "--- wo Eins das andre Uberwaltigt und nur durch das Gleichgewicht Friede wird in der Schopfung." The "budget" theory of nature as a whole, nature as a "lebendige Haushaltung",372) is again behind this conception; but in this case, it can be reduced to quantitative terms, in the shape of available resources and food supply, and of population statistics of various species, and (with the reservation that such statistics were not available to Herder) it can be compared to the modern notion of biocoenosis, defined by one authority as "a population system, maintaining itself in dynamic equilibrium".373)

Herder further concedes that the equilibrium may alter with the passage of time:374)
Es kümmert mich also nicht: ob große Thiergattungen untergegangen sind? Ging der Mammut unter: so gingen auch Riesen unter; es war ein anderes Verhältniß zwischen den Geschlechtern. Wie es jetzt ist, sehen wir das offenbare Gleichgewicht.

Herder here combines an enlightened approach to palæontology with the quaint, but then widely accredited belief in earlier races of giants, whose bones (actually those of extinct saurians) Scheuchzer and others claimed to have found in fossil form.

But the present equilibrium may be disturbed and altered by man, and untold repercussions upon the ecological whole may result: "— die ganze lebendige Schöpfung ist im Zusammenhänge und dieser will nur mit Vorsicht geändert werden." 375) For, as Herder notes on another occasion: "Selten hat man eine Gewächs- oder Thierart dieses oder jenes Erdstrichs ausgerottet, ohne nicht bald die offenbarsten Nachtheile für die Bewohnbarkeit des Ganzen zu erfahren." 376) He deplores such unthinking disturbances of the natural community in America, observing how disastrous repercussions may be felt even upon the climate, as actually happened through indiscriminate felling of trees. 377) As a modern organicist says of the ecological whole: "If one group of organisms were eliminated, it would have to attain a new state of equilibrium or collapse." 378) Meinecke rightly notes how insights of this kind led to modern studies of symbiosis among different organisms. 379) For Herder here integrates the bald accounts of travellers into a far-reaching organismic theory, which is only now coming to the fore with the urgent demand for nature conservancy and controlled exploitation of the environment.

At this level, Herder's holistic theory was again truly fruitful. Taken any further, to theories of universal nature as a whole, it reverts to its archaic and mystical origins, whereas, tempered by observation, as in the present case, it could become truly scientific.
c) "Gestalt" theories in psychology.

The next application of holistic principles we shall examine is a psychological one. The functions of the mind, for Herder, are all reducible to "Kräfte", as we noted earlier. Such a complex of "Kräfte" is also seen as a whole, as in the ancient "microcosm" theory. Thus the basis of Herder's psychology is also holistic.

In psychology too, modern thinkers have applied holistic arguments, achieving their greatest success in the "Gestalt" theories of perception, whereby no percept is considered to be reducible simply to the sum of the external stimuli producing it, but a formative activity on the part of the perceiver completes, shapes, or confers structure and wholeness upon them. It is curious that, of all the many works written on Herder's psychology, only that of Lehwalder attempts to compare Herder's ideas and modern "Gestalt" theory. He writes: 380)

Die moderne Psychologie als Gestalt-, Strukturpsychologie u. s. w., kurz, alle Spielarten von Ganzheitspsychologie wenden sich gegen das atomistische Modell der Seele, weil diesem keine unmittelbare Selbst erfahrung entspricht.

This is a fair comparison between modern ideas and Herder's picture of the mind as a unified whole.

But what of Herder's theory of perception in particular? Although, in his essay "Über Bild, Dichtung und Fabel", 381) Herder attaches central importance to the process by which, he alleges, the perceiving mind spontaneously creates integrated images out of the intrinsically disorderly data of perception, not even Schütze, 382) whose article on this essay acclaims it as one of Herder's most characteristic and significant utterances, makes the obvious comparison with modern "Gestalt" theories, although these had
appeared as early as 1890 in the work of Ehrenfels, and again in 1912 with Wertheimer's improved version.

Once more, however, the same reservations we made in studying the "Kompensation" theory apply; Herder's intuitive sense for wholes, becoming more formal and organic in his mature years, appears strikingly modern; nonetheless, it derives ultimately from vitalistic, even a priori premises, whereas modern organicistic theories place much greater emphasis upon experimental data. The "Gestalt" theory, for example, has been backed up by a vast volume of experiment. But the common element in the two theories is organicistic holism, which was just beginning to enter modern theories of science at the time when the "Gestalt" theory arose. Once again, Herder's theory is more modern than most of his other ideas since it can be verified by experiment, for "Bild" is a formal, not a qualitative conception.

d) **The human society as a historical unit.**

The next level of whole which Herder treats in similar fashion is (disregarding his scattered utterances upon the family group) the individual human society, considered as a dynamic historical unit. Societies for Herder, as for Herbert Spencer,\(^3\) are closely analogous to organisms.\(^4\) However, this point has been discussed so frequently that no further mention is called for here. We shall return to it in our later evaluation of Herder's "laws" of social change.

e) **Mankind as a corporate personality.**

Herder early observes "--- wie nach aller Wahrscheinlichkeit das menschliche Geschlecht ein Progresives Ganze [sic] von Einem Ursprunge in Einer grossen Haushaltung ausmacht."\(^5\) The word "Haushaltung" at once
betrays the holistic implications of this dictum. This naturally leads to ideas such as the "ages of mankind", and the basic ideas of Lessing's "Erziehung des Menschengeschlechts". Critics should be wary of dismissing such notions of Herder's as borrowed from other thinkers, as Regli's work does with Herder and Iselin. They are the natural outcome of his own holistic beliefs.

It is interesting that Herder, with his theory of the increasing mechanisation of society and the increasing interdependence of its parts or members (in his "Auch eine Philosophie") states a principle exactly parallel to his biological theory, earlier discussed, that nervous functions are more interdependent in higher organisms and that they are more autonomous in lower ones. This latter, biological theory is in turn parallel to the modern organicistic theory of "increasing mechanisation" in higher organisms. All this demonstrates how a basic uniformity prevails throughout holistic thought processes at all times and in all contexts.

However, Herder is uncomfortably conscious that his theory of a corporate human personality in history is similar to the "universal soul" theories of Averroes and others. Indeed, as we initially established, even Herder's theories of history rest upon a postulate of historical "Kräfte". As in all holistic thought, a vitalistic, or even animistic basis is never far to seek. And since, in this case, our exact data on historical developments are so sparse, it is manifestly impossible to reduce this holistic idea to a quantitative, scientific basis. Holistic theories always risk casting their nets too wide, as happens on this ultimate level.

f) Philosophical implications.

We have seen that holistic ideas tend to be associated with vitalism,
and thence with teleology, from which, however, the later modern theory of
organicism in the main dissociates itself. Herder's thought displays
almost every nuance of these twentieth century developments on a general
level, so that, as usual, he fluctuates between two extremes. The basically
a priori conception of a Chain of Being, beloved of Herder's age, also had
holistic associations. Paradoxically, these led in turn to a repudiation
of teleology and to the theory of ecological equilibria, since every part of
the Chain was seen as equally important within the whole: 390)

Denn Thiere sind der Erde so unentbehrlich als Menschen, und
kein Glied ihrer Kette kann zerrißen werden, ohne daß nicht
zugleich das Ganze leidet.

But a strong reaction against all forms of holistic argument set in in
the 1930's, exposing many elements of these ideas as valueless to science.
This led to the formulation of more fruitful "organicistic" theories in
biology. The reaction arose partly because physicists were becoming
increasingly sceptical on whether any objective kind of orderliness exists
in the universe. 391) But it was also precipitated, on a higher level, by
the revulsion of certain thinkers against the sinister sides of the great
holistic systems of social and political planning which became clearer in
those years. Karl Popper, one of the greatest contemporary theorists of
scientific methods, roundly denounces many aspects of holism, and admits its
value only in highly particular functions which can be investigated by
science: 392)

--- a sentence such as "Organisms are wholes" reduces itself to
the triviality that, in an organism, we can discern some order.
Besides, a so-called "heap", as a rule, has a "Gestalt" aspect
too, just as much as the often cited example of the electrical
field. (Consider the regular manner in which pressure increases within a heap of stones.)

Herder is quite exceptional in his age as a thoroughly holistic thinker; but another telling remark of Popper's reminds us of the ancient origins of such ideas, behind their scientific applications: 393)

The doctrine that we may obtain a kind of concrete knowledge of "reality itself" is well known as part of what can be technically described as mysticism; and so is the clamour for "wholes".

7. The study of origins and the "genetic method".

Much confusion has prevailed in the discussion of Herder's so-called "genetic method"; the term has been used ambiguously. We shall therefore attempt to distinguish between the different ways in which Herder is interested in the problem of origins, disregarding in the main the particular problem of first causes, which we have already examined along with teleology.

Herder was keenly interested in origins and first things, both in history and in the natural world, from an early date: 394)

Eines von den angenehmsten Feldern, auf welche sich die menschliche Neugierde sehr gerne verirrt, ist dies: den Ursprung dessen, was da ist, zu erkennen.

Another well-known utterance, 395) which we need not quote here, reveals, as Herder considers his own nature and childhood in notes added to the "Journal", how deep-rooted and subjective this interest in origins was.

The original reason why Herder believed that the study of origins is valuable is that he considered, in the investigation of any developmental process, that all subsequent developments can be traced back to, and explained
Dachauer observes that this procedure tries "die Stufe der Vollkommenheit schon in der keimhaften Umhüllung ihres ersten Ursprungs zu erkennen", rather than to study a development step by step. In fact, it is another instance of a more extreme and static kind of holistic thinking in Herder's works, dating here from a time before he had learnt to look upon an entire dynamic process as an organic whole. Instead, he sees all developments as already present in an initial state, a static whole, complete in its parts; the developments are compressed into an origin, which he probably felt at this time to be a more concise and manageable unit than the complex devolution of a causal process in time. This sort of "original whole" recalls the Leibnizian conception of the monad, all of whose eventual developments are considered to be potentially present from the start (the "statue within the marble"). We may compare it, with qualification, to Herder's later, highly telescoped account of the first causes behind man's early acquisitions. On the other hand, we may recall how he later rejected Kant's teleological theory that racial evolution is caused by preformed "Keime", present in all men from the beginning, and called forth in racial evolution under climatic and other external influences. Similarly, Herder soon vehemently opposed the theory of "Praformation" in embryology. All this shows that his early belief that origins alone are enough to explain a complete process was soon considerably modified by his later studies of detailed causal developments in nature and history. He then learnt to treat
each complete temporal process as a dynamic whole in itself.

As for the sources of Herder's "genetic method", we should note, apart from his own subjective and holistic interest in the problem, the influence of Leibniz's monadology, and Rouché's discovery that Herder probably derived the word "genetisch" from the writings of Reimarus.\

Let us examine some of the other less scientific, subjective implications of Herder's preoccupation with origins. It contained for him a pronouncedly aesthetic element. He would have agreed with Goethe's remark (quoted by Suphan): "Wenn man von Urandängen spricht, so sollte man urandänglich reden d.h. dichterisch." Herder well knew that the earliest historical documents are themselves generally poetical, and remarks upon "--- die dichterischen Fiktionen, in welche sich alle Weisheit und Kunst bei ihrer Geburt, wie in Windeln einkleiden." He regarded such documents, including all ancient myths, and the early chapters of the Old Testament, as evidence not only on early history, but even, at times, on early natural (e.g. geological) changes. He is equally interested in all such "dichterischen oder philosophischen Hypothesen von dem Ursprung der uns bekannten Dinge."

So far as the Bible is concerned, we are here reminded of Herder's interest in divine first causes, which reaches its climax in the "älteste Urkunde" of the Bücksburg phase. In fact, he describes the opening of St. John's gospel, itself dealing with ultimate origins, as "die Stelle der Bibel, die mir mit jenem Anfange, der Schöpfungsgeschichte, am höchsten und tiefsten dünkt."

But, by the time the "Ideen" were composed, naturalistic explanation of origins was increasingly competing with his preoccupation with divine first causes. We shall discuss his interest in naturalistic cosmogonies later.
However, although Herder, as we have seen, resorted to unmediated divine first causes in grappling with the problem of the origin of human history, we should observe that he attempts to combine natural and divine agencies in explaining the origin of the natural universe. In this way, he declares "--- gefiel es dem Schöpfer dieser Welten, die Materie sich bilden zu lassen nach den ihnen anerschaffen inneren Kräften." This attempt to reconcile two varieties of causation, by means of "Kräfte", once more recalls Kant's "Allgemeine Naturgeschichte", of course. Moreover, it is in Herder's case rather another instance of his familiar "synthetic" approach than of any distinct "genetic method".

This naturalistic treatment of origins leads us to consider the second major sense in which critics speak of Herder's "genetic method". Rouché writes in this connection:

La méthode "génétique" de Herder est donc ce qu'on appellera une centaine d'années plus tard la "théorie du milieu", laquelle combine la "méthode historique" avec l'explication par le sol et l'hérité.

This is perhaps what Siegel means, although he gives no explanation, when he says that Herder prefers to build up an idea "genetically" rather than to analyse it philosophically. But critics have neglected to distinguish this view that origins are determined by environmental factors operating in a dynamic process (for example, in Herder's theory of racial origins) from what Herder himself had earlier called "genetic" explanation. We have seen that the latter involved the conception of origins as static wholes, within which all later developments are already in some way present, as in Leibniz's monads (no environmental factors being mentioned). This latter, earlier sense is unscientific, of course, whereas the later usage is truly scientific.
However, the danger of Herder's "genetic method" as a theory of environmental determinism, especially when he applied it to empirical psychology, was, as we have observed on several occasions, that it encouraged him to substitute chronological and causal for logical explanation. For the two are not mutually exclusive, as Herder appears to have believed, to his philosophical undoing in his attacks upon Kant. Moreover, as used by critics, in its more scientific sense, as a circumlocution for the theory of environmental determinism, the term "genetic method" has nothing to mark it out as a particular scientific method, distinct from the usual statements of cause and effect, origin and development, found in every area of science. It is not the method, but the emphasis on climatic and other types of external cause in biology and anthropology, which gives Herder some claim to being an innovator. (We shall discuss precedents such as that of Winckelmann later.) And, when the "genetic method" reverts to a hankering after knowledge of ultimate origins, it usually becomes, as in Herder's case, either poetical, mystical or speculative, or all of these together, a search for first causes, which lie outside the province of science.

At this point, we may recall Goethe's habitual aversion to studying first and last things: (407)


(Goethe here says he can understand how this system arose, although we know from other of his utterances that he personally found it untenable.) We have seen how Herder at first adopted the very expedient which Goethe names, the idea of "emboitement", although he later disavowed it in embryology, the
subject in which the theory originally arose. Knebel appears to have shared Goethe's belief, for he gives his words, in almost the same form, in one of his essays. 408)

As Karl Popper writes: 409)

Questions of origin are "how and why" questions. They are unimportant theoretically and usually have only a specific historical interest.

Should they, however, be non-specific, they inevitably lead to a speculative search after first causes. Science can investigate the origin only of specific objects or happenings, and it necessarily supposes that a causal sequence of indeterminate length, which can be traced backwards (as available data, and interest, decide), stretches backwards behind each event. The ultimate origins of such sequences cannot be investigated by science, as Goethe's words imply. Even questions of remote historical origins, concerning which we can, of necessity, obtain but the scantiest of information, can rarely be answered completely by empirical and scientific investigation. For example, the problem of the origin of language, so dear to Herder, is specifically excluded by the Société de Linguistique de Paris from the topics to be studied by its members: 410)

La Société n'admet aucune communication concernant --- l'origine du langage.

Such questions are left to speculation, which alone can provide (tentative) answers. Herder's merit in studying the origin of language was not that he approached the problem by means of any particular "genetic method", but simply that he ruled out non-naturalistic causal explanation, in his essay of 1770, as a matter of principle.
Too much has been said in the past about Herder's "genetic method", which has been only partially understood, and much overrated. We conclude that when the "viel berufene genetische Erklärungsart"\(^\text{411}\) sets itself up as a distinct method, it has no place in science, and when it can be reduced to the theory of environmental determinism, or to the conventional search for specific natural causes, it should be recognised quite simply as such, and given some such title.

8. The idea of development, and cyclic theories of change.

a) The idea of development.

Let us briefly examine the logic, origins and scientific implications of Herder's so-called "Entwicklungsgedanke", about which so very much has been written, especially by the earlier critics.

In our discussion of Herder's holistic ideas, we observed how he rarely regarded natural wholes as static, but, from the start, almost always as dynamic. This arose out of the usual holistic choice of the organism as the abstract model for all wholes, since all organisms are, by definition, dynamic units. It was further encouraged by Herder's constant use of the intrinsically dynamic concept of "Kraft". Thus, all natural wholes, as a rule, are considered by Herder as developing. For example, we have seen that in the "Kompensation" theory, he treated the individual organism as developing; on other occasions, he says that the individual human being never ceases to develop (hence the need for unceasing "Bildung"), that the ecological community of species is a dynamic (yet balanced) unit, that the society or nation is a developing quasi-organism, and that mankind, seen as a corporate personality, is involved in a process of becoming. These are the
principal naturalistic applications of Herder's idea of development (although metaphysical examples, such as the development of soul-like "Kräfte" by "Palingenesis", etc., also appear).

But by the phrase "Entwicklungsgedanken" or "Idee der Entwicklung", critics usually mean Herder's historical relativism, his belief in a natural, causal development of individual units in the historical process (as opposed to his alternative theories of absolute historical purpose or the "Fortschritt" of the theorists of perfectibility). As such, it is now usually called "Historismus", as Meinecke calls it, or "historicism", or the "historical method". The word "Entwicklung" in such cases is, in fact, misleading, and they are only of secondary interest for the student of Herder's theories of development in the natural or scientific world.

However, let us first pause to consider what earlier precedents for the idea of development, in general, were known to Herder. In the case of relativistic historical development, Haym and Kühnemann, followed by Blumenthal and most others, consider that Leibniz provides the philosophical source of the theory, to which Herder, it is maintained, gave a naturalistic application. Bruntsch, who alone attempts a detailed analysis of Herder's idea of "Entwicklung" as applied to the natural world, names the developmental cosmogony of Kant's "Allgemeine Naturgeschichte" as Herder's chief source. We need only add that, in the most general sense of the idea, Herder's use of the organism-model together with the idea of dynamic "Kräfte", whose sources we have earlier investigated, is quite enough to explain how his belief in development originated.

Before we leave the historical use of the so-called "Entwicklungsgedanken", we should reflect upon Friedrich Schlegel's criticism of Herder's relativistic "developmental method" in history, as Stadelmann quotes it. Schlegel
Modern critiques of "historism", "historicism" or the "historical method" strike very similar notes, for Schlegel penetrates to the very essence of the method in this dictum. Herder, in fact, is one of the first of "the school of thinkers who believed that in describing a development historically one has causally explained it",\(^{417}\) in so far as his "Entwicklungsgedanke" in history is concerned. This method, many modern critics contend, has been much overrated. It is our contention that this same "method", in Herder's historical writings, has likewise received far too much attention from critics. Correspondingly less attention has been paid to his use of the idea of development in physical and biological contexts (apart from the "Vorgänger Darwins" fallacy).

But, like the "genetic method", it boils down simply to the tracing of causal sequences. If we must make any distinction between the two, we may say that the "developmental method" studies all stages of a process, while the "genetic method" examines either the earliest stages, or those few environmental factors, acting upon one or more living units, which are supposed to determine their future development. Both study causal sequences, and any causal sequence presupposes the "idea of development", simply because causes, by definition, precede effects at some point in time.

Yet although the idea thus scarcely merits the title of a distinct method, it undoubtedly led to great advances in many sciences from the time of Herder onwards. In the hands of Kant, the way for whose achievements had been prepared for by Descartes and Thomas Wright, it led to the notion of stellar evolution. (Herder inclined towards this idea increasingly in later years.) In Herder's hands it led to an increased emphasis on function as
opposed to structure in the study of living organisms, to the idea of progressive environmental determination of organisms, to the belief that ecology involves dynamic processes rather than unchanging states, and to the naturalistic phase of Herder's "developmental" psychology. It eventually led, although not in Herder's works, to the theory of evolution by descent.

In fact, the idea of development is fundamental to that whole movement which transcended the older descriptive sciences and went on to establish the functional, causal, developmental sciences of modern biology and psychology. Yet it is seldom realised that the "Entwicklungsgedanke" had long before been firmly established by the science of mechanics: the whole subject of dynamics, by definition, presupposes it. Herder's age witnessed its extension to astronomy and biology, and, in part, to psychology. However, the term "Entwicklungsgedanke", like the term "genetic method", is often used confusingly, and denotes simply that temporal sequences are enumerated, and antecedent events are presumed to be causes of later ones. Today, we see it declining from the status it held in the later nineteenth century and after as the supreme vehicle of historiography; in the sciences, if we disregard such descriptive disciplines as statics, morphology and taxonomy, it is now universally taken for granted.

b) Cyclic theories of change.

The holistic conception of organism, as we have seen, necessarily leads to the idea of development. In turn, the development of an organism, or any process to which the organism analogy is applied, must follow a cycle of growth. This can be represented by a graph whose curve rises to a vertex, then falls away again symmetrically, until a new curve begins when a new
organism is produced. Now Herder applied the holistic organism analogy to the dynamic systems of ecology, society, and mankind (conceived of as a corporate personality). Thus we should expect him also to apply the analogy of the growth cycle to these, as well as to the individual organism, where it is, of course, no longer an analogy. In fact, he does discuss the growth cycle of the organism from birth to reproduction and death, the cycles within each human being's psychological development (in his "Tithon und Aurora" and elsewhere), the cycles of disturbed and recovered equilibrium in ecology, the similar cycles of "Maxima", and their various earlier equivalents, in the evolution of societies, and the "Lebensalter" cycles of mankind as a corporate whole which develops through one, or perhaps two great cycles (in his "Auch eine Philosophie"). He also applies the cyclic theory to "ages of taste", the phases of Greek literature, the growth of language, and the development of knowledge in general, ultimately arriving at a general cyclic theory of history.

But he had generalised the cyclic theory of change universally at an early date (1767), as the following passage, also quoted by Rouche, makes clear:

--- vom Schlechten zum Guten, vom Guten zum Vortrefflichen, vom Vortrefflichen zum Schlechtern und zum Schlechten: dieses ist der Kreislauf aller Dinge. So ists mit jeder Wissenschaft; sie keimt, trägt Knospen, blüht auf, und verblüht.

(We shall discuss the ethical overtones of such statements later.) Already in his notes of around 1766 Herder writes:

1) das Ungebildete bildet sich aus

2) die Ausbildung geht durch alle Stufen
3) bleibt auf dem höchsten nicht lange

4) sinkt

5) stirbt, um wieder zu auferstehen.

Critics have been at pains to discover the sources of the cyclic theory of change as Herder uses it. We have already tried to show that it was a necessary result of the inner logic of his ideas; for the (ultimately mystical) quest for wholes in everything, coupled with the dynamic "Kraft" conception, leads to the abstract idea of the organism as the prototype of all dynamic wholes; the idea of development by growth automatically arises therefrom, as does also the analogy of growth cycles.

However, Rouché names Lambert, and especially his theory of "Maxima" (a favourite, though borrowed conception of Herder's), as a major source of the cyclic theory. But Lambert's "Architektonik", from which Rouché quotes a relevant passage, stating that cyclic change is universal, did not appear until 1771, whereas Herder had generalised the theory, as we have seen, five years earlier. Rouché later names Adelung as a theorist of cultural and social cycles and lists Polybius, Machiavelli, Bodin, Ibn-Khaldoun, Le Roy, Du Bos, Caylus, Winckelmann and Montesquieu as exponents of similar theories (to these we might add Vico), and finally opts for the literary "point de perfection" theory of the French classicists as Herder's main source for the idea. H.M. Wolff sees Rousseau as the writer from whom Herder derived his belief in historical cycles, Spitz names Wieland in the same connection, and Grundmann (following Julian Schmidt), followed later still by Regli, maintains that Iselin's writings led Herder to his "Lebensalter" theory of mankind's development. Pamp registers Bonnet's use of the idea, and Koller names Du Bos (and ultimately Tacitus) as a probable source.
No critics trouble to note that Herder himself names many sources of the idea in one or more of its applications. For example, he writes in his notes upon Creech's version of Lucretius in Riga: "Zeiten bringen einerlei wieder." The earlier quoted passage on cycles of change from his 1766 notes adds references to Euler (mathematician and scientist), Voltaire (as a historian), Mallet (either the famous historian of Denmark, or the engineer and mathematician named by Gillies in his edition of Herder's "Journal"), and Pontoppidan (another Danish historian). For the "ages" of the single organism or human being, Herder names Aristotle, Horace and Hagedorn as references, for the cycles of knowledge in human history he names Hemsterhuis, and for the idea of world-cycles he names the Egyptian and Persian religions of antiquity.

We may add that Herder knew Kant's cyclic theory of stellar evolution as put forward in the "Allgemeine Naturgeschichte" and that he had almost certainly encountered the following general statement in Kant's early essay "Ob die Erde veraltete":

Eben dieselben Ursachen, durch welche ein Ding zur Vollkommenheit gelangt und darin erhalten wird, bringen es durch unmerkliche Stufen der Veränderung seinem Untergange wiederum nahe.

(We should note Kant's use of the word "Vollkommenheit"; this source, if indeed any external source is required, explains adequately why Herder applied similar value-judgements to cyclic phases, and no reference to the "point de perfection" theory of French classicism, which Herder nowhere specifies, is necessary.) Herder himself used another analogy from the natural world when he compared the cycles of human cultures to the supposed annual migrations of the herring shoals from North to South.

In view of all these possible sources of many of Herder's applications...
of the cyclic theory, we conclude that he may have been influenced by all or any of them, but that we ought surely to attach greater importance to those which he names himself. Besides, we repeat that sources of particular applications are of little importance - they are too varied to be evaluated as a coherent tradition, and Herder would almost certainly have arrived at a cyclic theory even if he had encountered none of them.

Rouché sees nothing scientific in Herder's use of the analogy of growth cycles to describe social change. But his belief that the theory came from a purely literary source in French classicism is not enough to justify this contention. In Kant and Euler, and later in Lambert, Herder had more or less scientific sources for his idea, and he never once mentions the French theory. What really makes it unscientific is that it originated as an a priori belief that reality consists of dynamic wholes, which may be treated as organisms. These "organisms" are purely abstract, not concrete, biological units. (This explains why Herder readily used alternative "mechanical" models, from mathematics and physics, such as planetary orbits, pendular oscillation, Lambert's "Maxima", etc.. We shall discuss these later.) But a priori origins do not necessarily render a theory unscientific, unless it is incapable of being anything more than a priori. The cyclic theory of social and historical change is of this kind, however, for exact data (for example, population statistics, etc.) are too scarce to allow us to reduce the cycles to quantitative changes. Such reduction is, however, possible in ecology, as we earlier noticed. But furthermore, the cyclic theory appears in prescientific philosophies. Popper notes that "the doctrines of life cycles of cities and races actually precede the primitive teleological view that there are hidden purposes behind the apparently blind
decrees of fate. At best, the cyclic theory provides a rough and convenient description of the rise and fall of states as political systems.

We conclude that, in history, the idea of cyclic change, though still flourishing in this century, has nothing particularly original or illuminating about it. As Rouche rightly observes, it is merely another aspect of Herder's relativistic approach to history, tempered elsewhere by a belief in progress. Applied to biological organisms, the theory of growth cycles is, of course, no longer a theory, but a statement of observed fact, and Herder's use of the idea is, in this case, beyond challenge; his theory of changing ecological equilibria, moreover, is well attested today. We shall discuss the scientific value of his attempts to describe cycles mathematically (especially in social change), and of similar attempts in modern sociology, when we come to examine his use of mathematics.

9. The dialectical method.

The notion of polarity, or of development by the conflict of opposites, frequently appears in Herder's works, and has received considerable attention from critics. Three articles have been exclusively devoted to it. This "dialectical method" of Herder's has interested critics of Marxistic leanings in particular, since it later became the organ of Hegelian, and then of Marxist logic. We have touched upon various "dialectical" conflicts within Herder's personality in our first chapter; further details are found in Dobbek's excellent essay. We shall now discuss the applications, sources, and philosophical and scientific implications of this method as Herder uses it, noting in particular where we disagree with previous critics.
a) Herder's applications of the dialectical method.

(i) The universal application.

Haym was the first to bring out the importance of Herder's essay "Über die dem Menschen angeborene Lüge", written in 1777. This essay, which we need not analyse in detail, extends the religious and ethical idea that man's self-negating (or divine) and egocentric tendencies are in polar opposition, and postulates a "lex contrariorum" which obtains throughout the universe:

Ueberall zwei Kräfte, die sich einander entgegengesetzt doch zusammenwirken müssen, und wo nur aus der Kombination und gemäßtigen Wirkung beider das höhere Resultat einer weisen Güte, Ordnung, Bildung, Organisation, Leben wird.

Boucke and G. Jacoby also point out the importance of this essay, as do many later critics.

But as early as 1766, in his rough notes, Herder had remarked that the principles of attraction and repulsion, contraction and expansion, are the universal mechanisms of change, not only in the physical world, but also in history. That is, all such changes come about dialectically. Herder reiterates this belief that the universe, in all its aspects (including the human mind), is sustained, and even created, by the conflict of opposing principles, as late as 1802.

However, he rejects the idea that fundamental "Antinomien" or "Dichotomien" exist within reason itself, as Kant suggested and Hegel later stated as a universal principle. Apparent contradictions arise only out of polarities in the objective world, and Herder goes on to say of nature "ihre Antiphonieen heben einander [sic]. ihre Gegensätze verschmelzen." Thus, all conflicts are ultimately reconcilable, and
never absolute, for Herder. This, as we have seen, is an overruling requirement of his nature (although he thrives upon conflicts within his ideas and interests, while seeking to reconcile them, especially in his earlier and more robust years, as Dobbek shows (64)).

(ii) The physical application.

The manuscript recently published by Irmscher, and already several times referred to, clearly shows that Herder, under the influence of Kant's "Allgemeine Naturgeschichte", believed that the physical world is created and sustained by the dynamic interaction of polarised "Kräfte". Harich had noticed Kant's influence some years before this new information appeared. For several other instances of the belief appear in Herder's works, and one, quoted by Irmscher, dates from a time before 1769, in which the newly published manuscript was written. Kant himself had made it clear that the Newtonian theory of gravity (upon whose dynamic and dialectical aspects he himself had greatly enlarged) was the principal source of his own cosmogony; Herder too appealed to this ultimate source, seeing gravity as produced by two forces which sustain this and other worlds. But in his later years he rejected the theory that the universe had also been created mechanically by two opposing forces, probably because of his antipathy to Kant; instead, he now appealed to yet another teleological "organische Kraft".

(iii) The biological application.

Herder had early extended Kant's theory of physical creation by two opposing forces, and proceeded to account for the formation of biological entities in a similar way. Just as Kant's forces create planets, etc., "so auch unsre Seele den Körper." Irmscher notes that Herder goes beyond everything that Kant ever advocated when he extends the idea to
the organic world. Again in the „Ideen“, Herder maintains that the transition, by way of crystallisation, from inorganic manifestations of the universal "type" to forms resembling plants, takes place through „Zusammendrang und Ausdehnung“. 472) Dobbek wrongly suggests that only Goethe, not Herder, applied the dialectical idea to biology. 473) (We shall attempt to evaluate Herder's influence upon Goethe later.)

(iv) The psychological application.

Herder's psychology teems with dialectical conceptions. Even in its physiological groundwork, which states that nervous reactions are produced by the expansion and contraction of nervous parts under varying stimuli, it rests upon a patently dialectical foundation. 474) Several critics, especially F. Berger 475) and Dobbek, 476) have realised that such pairs of complementary opposites recur on all levels of psychological activity for Herder, and culminate in his theory that two types of „Genie“, the one marked by „Innigkeit“, the other by „Ausbreitung“, may be distinguished. We have already seen that the highest level of all is the polarity of „Liebe“ and „Selbstheit“, in Herder's conception of the individual and society, as Dobbek 477) likewise notes. As Boucke 478) points out, Herder anticipates Goethe's conception of „Systole und Diastole“ in such psychological theories. Herder even uses the image of breathing, and the same Greek terms, on several occasions. 479)

(v) The historical application.

Herder at times applies the dialectical formula to history, as when he writes: 480)

In jedem Zeitpunkt des Strebens und Fortstrebens giebts immer Gegenparthaisen, die für und wider einander gebohren [sic] zu
This idea recurs in his later "pendulum" theory of progress, which he conceives of as occurring by movements between two extremes gradually approaching equilibrium.\(^\text{481}\) Rouche\(^\text{482}\) cites several other instances of this application, as do Spitz,\(^\text{483}\) Sommerhalder\(^\text{484}\) and Meinecke.\(^\text{485}\)

(vi) **The ethical application and the gravitational analogy.**

Herder early uses the gravitational analogy to describe man's ethical position. In the 1760's, long before he wrote the essay "Über die dem Menschen angeborene Lüge" and corresponded with Dalberg on this topic, he wrote: "Unsre Seele dachte, das ist ihre Centralkraft ---. Weniger Centralkraft, näher an Gott."\(^\text{486}\) This idea, along with other factors, caused him to postulate an "Analogie" between physical and moral worlds, whereby ethical "laws of nature" (already briefly mentioned) were formulated by analogy with physical laws. Such highly questionable formulations abound in Herder's works.\(^\text{487}\) This belief that man possesses two opposing ethical tendencies, one self-negating (or social, or divine), the other egocentric, is, of course, simply another instance of the familiar dualism of "Liebe" and "Selbstheit", reinforced here by physical analogies. We shall return to such ethical pseudo-laws later. Dobbek\(^\text{488}\) emphasises the ethical aspects of Herder's dialectic, and its significance in the theory of progress towards "Humanität", above all the other applications. Boucke\(^\text{489}\) had earlier noticed the importance of the gravitational analogy in this same connection.
The aesthetic application.

Dobbek has written a separate article in which Herder's aesthetic ideas of opposition and resolution or harmony, and the "Golden Mean", are thoroughly examined. Boucke refers to these ideas, more briefly, in his work. We need merely note that Herder applied the dialectical formula to aesthetics as well as to other disciplines.

The religious application.

The essay "Über die dem Menschen angeborene Lüge", of course, not only applies the dialectical principle to the universe as a whole and to ethics, but to the religious life in general. It is of interest to notice the Gnostic and Manichaean ancestry of this idea that forces which draw man closer to God are equally balanced by others which draw him away.

Conclusion.

This survey, though not exhaustive, should make it obvious that Herder applied the dialectical formula, as a means by which mechanisms of change, development, or mutual interaction can be demonstrated, to most areas of his experience and thought.

b) Sources and precedents for Herder's dialectical method.

(i) The universal application.

The dialectical formula was used, in a sweeping, universal manner, by thinkers as early as the pre-Socratic philosophers. We need not list such early versions in detail, since most of them are cited in Boucke's work; Boucke does not discuss Herder's own sources, however. Of the early universal dialectical theories, Herder knew and mentioned that of Empedocles, who imagined that all things were created and sustained by a
conflict between love and hate. Campanella (1568-1639), who, following Parmenides and Telesio, explained the creation of all things by a hypothetical conflict between hot and cold principles,\textsuperscript{494} is mentioned by Herder by 1768,\textsuperscript{495} and on many later occasions. Herder knew the work, at least in extract, of the biologist Needham, by 1766.\textsuperscript{496} Needham wrote that all effects observed in the universe can be reduced to a dualism of action and reaction.\textsuperscript{497} (He seems here to be rephrasing Newton's third law of motion, which states that, to every action, there is always opposed an equal reaction.)\textsuperscript{498}

(ii) The physical application.

Several critics\textsuperscript{499} have rightly named Kant's "Allgemeine Naturgeschichte" as the major source for Herder's belief that physical phenomena can be described as the result of dialectical conflict between forces. Witte,\textsuperscript{501} following the historian of philosophy Harms, suggests that Kant's early theoretical essay "Versuch, den Begriff der negativen Größe in die Philosophie einzuführen" (1763)\textsuperscript{502} may have been Herder's principal source. But although a copy of this work was in Herder's library,\textsuperscript{503} it simply justified dialectical formulations in the objective world by theoretical arguments, whereas Herder was interested only in practical applications, with little or no theory to back them up. We may add that Boscovich, whose ideas were known to Herder in some form by 1772,\textsuperscript{504} stated that the atoms of all bodies obey the magnetic laws of attraction and repulsion, and that the chemist Candido Pistoi, in a work which Herder read in the early 1780's, declared that the entire physical world functions through the polarised forces of attraction and "Ausdehnung".\textsuperscript{505} But Kant's physical theory, ultimately derived from Newton, is undoubtedly Herder's main source here.
We shall discuss later how the knowledge of magnetic polarity also influenced him.

(iii) **The biological application.**

Irmscher believes that Herder extended Kant's dialectical theory of creation by physical forces to the organic world. But, in fact, Herder had encountered a dialectical theory in biology by 1766 in the writings of the biologist Needham, and had noted that Needham's "vegetativische Kraft" operates by "Trennung und Zusammensezzung" in the growth of organisms as embryos. The organism develops further by a process of "Ausdehnung; diese haben Thiere und Pflanzen; indaß ist im Aether auch eine wiederstehende Kraft, sonst würden sie ins Unendliche zerstieben."

(iv) **The psychological application.**

Haym notices a parallel between Herder's theory of "Innigkeit" and "Ausbreitung" as the qualities of the two types of "Genie", and Burke's theory of expansion and contraction of the nerves, which were believed to produce the twin aesthetic emotions which we feel towards the Sublime and the Beautiful. Boucke makes the same comparison, which is indeed justified, since Herder had known Burke's work on aesthetics long before he wrote his psychological treatise, and had even, in 1769, contemplated translating it into German. Hoffart, Bulle and Rouche stress the influence of Hemsterhuis' "amour et égoïsme" upon Herder's theory of "Liebe und Selbsttheit" as the dialectical relationship between individual and society. Herder had, in fact, reviewed the relevant work by Hemsterhuis in 1772. To these sources we may add the theories of contraction and expansion of the nerves put forward by Montesquieu and by Gaubius, both of whose works were familiar to Herder, although he did not meet that of Gaubius before 1780, by
which time he had already formulated his dialectical theories of psychology. Boucke\(^{517}\) names a similar theory of Hutcheson, but not in connection with Herder. We may add that Herder did know of Hutcheson's work by 1769.\(^{518}\) Rouché\(^{519}\) and Irmscher\(^{520}\) also mention Hutcheson in passing. But Burke is probably the earliest, and most important influence of this kind.

(v) **The historical application.**

Regli\(^{521}\) maintains that Herder derived his belief that historical progress takes place by conflict between opposites from Iselin's work. Rouché\(^{522}\) says that Herder's theory of progress by oscillations between extremes smacks of "le dogmatisme rationaliste-chrétien". Haym\(^{523}\) and Boucke\(^{524}\) compare Kant's theory of progress through conflict between man's social and egocentric tendencies with Herder's idea of progress. But Kant's version, which appeared in an essay in 1784, is unlikely to have influenced Herder, who completely rejected it, although he had put forward analogous views in his own psychological writings. In so far as Herder's theory of progress towards "Humanität" by conflict has an ethical import, the supposed influences of Iselin or of "le dogmatisme rationaliste-chrétien" are, in a sense, of the sort which we should expect to find. For, in Herder's age, all theodicies which described history as a conflict between good and evil forces, the good eventually triumphing, proclaimed the same message. But Herder's idea of progress cannot be described as merely imposing theology upon history, as Rouché suggests,\(^{525}\) thus making Herder a German Bossuet. For Marxism and other non-theological theories explain historical progress towards an ideal state in a comparable way.

(vi) **The ethical application and the gravitational analogy.**

This brings us again to those theories which describe man's ethical
situation as a dialectical process in which "laws", analogous to gravity, are believed to operate. Mechanists such as Hobbes and Holbach had earlier used the analogy of attraction and repulsion to explain desire and fear, but we must look for more explicitly ethical sources. Spalding, as Haym points out, had compared man's conscience with the force of gravity. Haym, followed by many other critics, later observes that Dalberg used the same analogy in the manuscript work which inspired Herder's "Über die dem Menschen angeborene Lüge". And, as we have seen, several critics note the influence of Hemsterhuis upon Herder's dialectical theories. Hemsterhuis had, in fact, compared his "amour et égoïsme" to a "vis attractionis" and a "vis centrifuga", as Herder himself points out in his review of the work concerned in 1772. But, as we earlier saw, Herder uses this analogy in the 1760's, before he had met the writings of Dalberg and Hemsterhuis. Hartley also uses the analogy, but Herder read his work for the first time only in 1772. Boucke believes that Hutcheson was the first to compare gravity and ethics, but, as we have seen, Herder first mentions him only in 1769. But Boucke elsewhere remarks that Kant uses the analogy in his "Träume eines Geistersehers". Now Herder reviewed this work in 1766, thus it is highly probable that it first led him, as Boucke supposes, to employ the dialectical formula in this most characteristic way, attempting as he does to unify the scientific and the ethical worlds. (Kant probably derived the analogy in turn from Swedenborg, who applied it, however, on the transcendental, not the ethical level.) We must not forget that Spalding, whose work using the analogy of gravity and conscience appeared in its second edition as early as 1764, may have been an earlier source, for Herder greatly admired Spalding in his early period. The same analogy, applied to history, may have contributed also to Herder's theory of historical progress.
in its ethical aspects.

(vii) The aesthetic application.

In applying the dialectical formula to aesthetics, Herder is simply
renewing the classical conception of the "Golden Mean", known to all writers
on aesthetics in his age. We need not therefore search for more particular
sources.

(viii) The religious application.

The religious application of the dialectical formula has a long and
turbulent history through Gnosticism and other heresies within Christianity.
These details need not concern us. Dobbek\(^536\) suggests that the ideas of
Bruno and Böhme were among Herder's sources. We have seen earlier that
Herder knew of Bruno's ideas in the Bückerburg years, as his unpublished
manuscripts show. This was before he wrote his "über die dem Menschen
angeborene Lüge", in which the dialectical theory of religion is most fully
expounded. Rasch\(^537\) too considers Böhme as Herder's major source for this
theory. Herder indeed mentions Böhme as early as 1767.\(^538\) Lovejoy\(^539\)
shows that the related idea of opposites being resolved when the believer
immerses himself in the deity (the coincidentia oppositorum) was connected
epecially with neo-Platonic mysticism. No critic has yet noticed, however,
that Herder frequently refers to earlier sources for the religious idea of
dialectical dualism in his "älteste Urkunde". Such are the Zoroastrian
dualism of light and darkness, good and evil, and the many dualistic creation
myths of the Ancient Near East. Such myths usually say that the universe
was created, and is sustained, by two symmetrically opposing agencies or
divinities; these can no doubt be reduced eventually to the functions of
the two sexes as described in even earlier mythologies. We may further
remark that Herder, on several occasions (from the early excerpt "Wahrheiten aus Leibniz"\textsuperscript{540} onwards), mentions the English theologian Fludd. Fludd believed in a universal conflict between light and darkness, heat and cold, and between God and creation. These beliefs, according to Lovejoy\textsuperscript{541}, were derived ultimately from the philosophy of Telesio, and the Cabala. Fludd, however, contends, as does Manichaeanism, that both dualistic poles are divine.

Of all these possible sources for Herder's religious use of the dialectic principle, none may have given rise to it directly, since it was already well prepared for in his ethical application of the same formula, which, as we have seen, was probably derived from Kant. But Herder's mentioning of them all shows that his interest in the idea was constant, and they provide further proof that his dialectical formula, one of whose main functions is to show that similar principles apply in both religion and science, led him far beyond religious orthodoxy.

Conclusion.

We conclude that the Newtonian theory of gravity, amplified and modified by Kant, was the principal source, later reinforced by others, for Herder's "dialectical method". Herder extended it, encouraged by the precedents of Needham in biology, Burke in psychology, and Kant himself in ethics, to ever wider areas of his thought, using it as a universal formula to cover the disparate data of his mental experience.

e) The philosophical and scientific implications of Herder's dialectical method.

(i) The subjective and the objective basis of the dialectical method.

Engels declares that Hegel's dialectical laws are mistaken:\textsuperscript{542}
The mistake is that these laws are foisted on nature and history as laws of thought, and not deduced from them.

For "the dialectics of the brain is [sic] only the reflection of the forms of motion of the real world, both of nature and of history." With these words, Engels shows us the two conflicting ways in which the dialectical formula has been used as a philosophical method - subjectively and idealistically (logically) on the one hand, and objectively or empirically on the other.

Now we have seen that Herder dismissed Kant's suggestion that any fundamental contradiction might be inherent within reason itself, the subjective world. The only subjective dichotomy, he declares, is that between the limitless imagination and the determinate understanding; but this is rather an existential, emotional dichotomy than an essential, logical one. Herder never hints that reason itself might be self-contradictory.

As an objective principle, the dialectical method was first legitimated in theory by Kant's early essay "Versuch, den Begriff der negativen Größe in die Weltweisheit einzuführen"; Kant showed that "contradiction", or conflict, is possible between real or natural entities, whereas logical contradiction is of an entirely different order, involving not so much conflict as an error in our reasoning, an error which can be overcome. Herder used the dialectical principle objectively, although there is no reason to suppose, as Witte does, that Kant's essay, which merely justified in theory what Newtonian science and the study of magnetism, for example, had long recognised in practice, had any influence upon him. The later Kant, followed by Hegel and his school, concentrated his attention on contradictions within reason itself. Marx and his followers reestablished the dialectic as an objective, empirical principle.
The number of dialectical opposites, and the legacy of Lucretius.

Before we proceed further, we now ask why the conflicting agencies supposed to be active throughout nature are so often said to be two in number. Cusanus, on the other hand, said that there were really as many antinomies as things existing. Hobbes' theory of the state of nature spoke of a conflict of all against all. And Lucretius, and the whole school of Epicurus, envisaged a conflict not between two, but between all units of the natural world. This generalised version of dialectics, through the medium of Malthus, culminated in Darwin's theory of a universal struggle for existence.

We have already seen that Herder used this generalised theory of conflict from an early stage, and that it led to some of his most fruitful scientific ideas. It therefore seems that he employed the more formalised dialectic of two poles as a special case. In fact, its mystical and aesthetic connotations, and its value as a means of facile and sweeping synthesis of opposites, explain why it appealed to Herder. It is, furthermore, perhaps more than a coincidence that Hegel was so fond of Böhme's works. (Strange to say, manuscript copies of Böhme's writings were found among Newton's papers too.) The real roots of the dialectical formula are mystical; therein lay its appeal for such men as Blake. It has value in science only in so far as it reflects the more complex theory of conflict between many units as propounded by such men as Lucretius.

Often, in fact, "dialectical" accounts of natural phenomena are excessively laboured. They attempt to bend observations to fit the predetermined idea that an opposition of two (and only two) units must exist behind the phenomenon under discussion. Thus, one "pole" is often a mere fiction, a foil to the other. For example, we have seen how Needham introduced a certain "résistance" or, in Herder's paraphrase, a
"wiederstehende [sic] Kraft im Aether" as the opposite to the expansion which is inevitably observed in the growth of all organisms. Similarly, Candido Pistoi\textsuperscript{544} postulated an ill-defined "Ausdehnung" as the opposite to the known laws of chemical affinity, in order to account for the breaking-up of chemical bonds. And later students of Newton, including Kant, were at pains to emphasise the centrifugal component of gravitational orbits, although Newton's law of gravity served its purpose well by dealing only with gravitational attraction. Such examples could be multiplied indefinitely.

As the student of Marxism Sidney Hook writes:\textsuperscript{545}

When we consider the set of conceptions identified with dialectic as a method of analysis and discovery, we notice that they represent a characteristic exaggeration of some features found exhibited in non-dialectical scientific enquiry.

Herder makes use of the relativistic theory of manifold conflict in history, but this is not derived from the formalised polarity described in Kant's work on cosmogony, as Harich\textsuperscript{546} supposes; it originates, as we noticed earlier, from the Lucretian views he had imbibed in the 1760's (later fostered by the similar views of Einsiedel, as Dobbek\textsuperscript{547} realises). Herder's later enunciation of the theory of conflict in terms of a polarised dialectic (usually ethical) of progress is far too schematic, and is not even related to actual historical agencies such as the antagonistic social classes of Marxist dialectics, but merely to (ethical) "Kräfte". Those who, like Reimann and Harich, seek dialectical materialism in Herder's writings, are doomed to disappointment.

(iii) \textbf{The function of the dialectical method in science.}

Is the dialectical method a means of prediction, of discovery? Suppose
we discuss the interaction of two forces. (The number two need not necessarily arise.) We can predict what the magnitude and direction of the resulting force will be, where two forces are involved, by means of the parallelogram of forces, but only if the magnitudes and directions of the two initial forces, acting upon some body, are already known. Formulating the problem dialectically does not help us to solve it; it merely enables us to define it on a more abstract level, and gives us no new information. As Hook says of a similar case "--- what we have here is not an hypothesis to be developed but a delimitation of a subject matter in terms of a convenient organising category." The dialectical method, applied to the objective world, can describe, but not predict.

(iv) The dialectical method as applied to dynamic "Kräfte".

We have seen that, as Herder applies it to the natural world, the dialectical formula ("formula" is really a more suitable word than "method") usually describes processes, whether physical, biological, psychological or historical. It is therefore a dynamic conception.

But a conception can be dynamic in two ways; it can describe actual motions, which can be reduced to quantities, or it can postulate unknown agencies as motor forces. The latter is Herder's usual procedure: his dialectic is a conflict between "Kräfte":

--- Anziehung und Zurückstoßung? was will das sagen, wenn ich nicht eine Monas setze, die Kraft, die eingeschränkte Kraft hat, und das ist Seele!

Engels, on the other hand, writes of his own materialistic dialectic:

It is expressly to be noted that attraction and repulsion are not regarded here as so-called "forces", but as simple forms of motion.
He might almost have been replying to Herder.

Kant, however, in the preface to his "Allgemeine Naturgeschichte," denied that any similarity between his avowedly "mechanical" theory of creation and the Lucretian theory existed. His use of (two) "Kräfte", which were supposedly divinely implanted, was expressly designed to prevent any such inferences. Yet in Engels' and in later theories, only the Lucretian materialism survives, and the qualitative "Kräfte" are gone. Similarly, Herder combined the Lucretian idea of conflict (often between many units) with the saving clause that the conflicting units are "Kräfte". But, since he often maintained that no "Kraft" could operate without its (material) "Organ", his "Kräfte" tend at times to fade into insignificance. This is the case in his theory that the child develops by touch - touch does not take place between "Kraft" and "Kraft", but between our body and external bodies. A "Communikabilität von Geist und Wirklichkeit", as Irmscher calls it, is tacitly assumed.

As appearing in Herder's dialectical formulations, "Kräfte" serve therefore not only to indicate dynamic change, but also to avoid the Lucretian, mechanistic implications which emerge when the formula is applied in science. These "Kräfte" are not quantities, and can rarely be reduced to these. Thus the scientific element in Herder's "dialectical method" consists in the legacy of Lucretius with his idea of conflict between many units, not in the dual poles of the mystical tradition, or the "Kräfte" used by those who sought to dissociate themselves from materialistic mechanism.

(v) The dialectical method and holism.

Biological polarities are subordinate, in man, to psychological polarities, which in turn exist within social and historical ones, and so on.
Even on the physical level, attraction is itself a relationship between two units, whereas attraction and repulsion, occurring together (as on the two poles of a magnet) constitute a polarity of polarities.

All this shows that the formula has holistic implications. Furthermore, each polarity within higher polarities is usually composed not only of two parts, but also of the new quality or product which arises out of their mutual relations, the "synthesis" of Hegel, or the "Steigerung" of Goethe. (We shall study Herder's theories concerning synthesis later.) And, if the dialectic is applied to a process, for example to history, it is tacitly assumed that changes to the part produce, or "call forth", changes in other parts, and in the organic whole of which the process is believed to consist.

(vi) *The relations between the two dialectic poles.*

Dobbeck distinguishes three senses in which two units can be said to be in "real opposition" to each other. These are:

1) Opposition within a higher concept (e.g. black/white)
2) One pole is superseded by, or becomes, its opposite (e.g. youth > age)
3) The two poles are interdependent (e.g. North/South, male/female).

We shall, however, ask in what senses one pole can be said to enter initially into any relationship whatsoever with its opposite in an empirical situation, and by what methods Herder describes this interaction. We shall attempt, in particular, to estimate their scientific value.

Firstly, in the Lucretian sense, whereby many units compete or conflict among themselves, as in Herder's theory that a struggle for existence brings about a changing ecological equilibrium, the single contacts which occur between the various units must be fortuitous in themselves, but the result of the many fortuitous single contacts is that a law-governed and necessary
state arises. Secondly, where only two poles are involved, one may actually suppress the other. In this way, evil always ministers to good in the classical age, as Dobbek\textsuperscript{553} realises, and it is merely a foil to its opposite; Herder, as Dobbek\textsuperscript{554} points out, had passed somewhat beyond this position (which Dalberg had adopted) and, until his later years, stressed the equal importance of both ethical poles. Boucke\textsuperscript{555} earlier makes this same point. But Herder, although he placed equal emphasis on both ethical poles in his almost Gnostic "Über die dem Menschen angeborene Lüge" essay, writes already in 1787:\textsuperscript{556}

\begin{quote}
Alles Böse ist ein nichts, wir nennen aber Übel, was Schranke, oder Gegensatz, oder Übergang ist und keins von dreien verdient diesen Namen.
\end{quote}

Here, one pole suppresses the other, just as one class suppresses the other in the Marxist theory of history. Thirdly, the two poles may coexist in an equilibrium, which may be either static or dynamic, as Dobbek observes.\textsuperscript{557} Or, fourthly, if one pole becomes part of the other, or becomes like the other, what Herder calls a process of "Vereinigung" or "Verähnlichung" takes place.

This process is described in the three "laws" enunciated in Herder's "Gott":\textsuperscript{558}

1) \textit{Beharrung, d.i. innerer Bestand jeglichen Wesens}

2) \textit{Vereinigung mit Gleichartigem und vom Entgegengesetzten Scheidung}

3) \textit{Verähnlichung mit sich und Abdruck seines Wesens in einem andern.}

A slightly different formulation of these "laws" appears in an essay of the same year,\textsuperscript{559} and the last law appears later on as follows (also quoted by Rouche\textsuperscript{560}): "Alles was sich liebt, verähnlicht sich einander."\textsuperscript{561}
But first of all, let us consider the possible sources of the second "law". (The first scarcely concerns us here, since it merely reaffirms the principle of "Selbsttheit", individuation or self-preservation, and uses a new word borrowed from Lambert.) Rouché,\(^{562}\) following Boucke,\(^{563}\) says that this idea of like uniting with, or attracting, like, and repelling its opposite, is clearly unscientific in origin, since, in magnetism, like poles repel, and unlike poles attract each other.

Now Herder refers, in the same context as these "laws", to the magnet, strangely enough, as "ein flüssiger Tropfen".\(^{564}\) He also writes:\(^{565}\)

\[\text{Daß wo ein System von Kräften eine Axe gewinne, sie sich um dieselbe und um ihren Mittelpunkt so lagern, daß jedes Gleichartige zum gleichartigen Pol fließt ——}\]

These sentences give us the clue to Herder's meaning. He had read too many works on magnetism to have misunderstood it so basically as Rouché and Boucke imply. The main authority he had consulted\(^566\) was the Dutch scientist Anton Brugmans. His "Philosophische Versuche Über die magnetische Materie", translated in 1784, treat magnetism as essentially a fluid phenomenon; there are two "magnetische Flüssigkeiten" distributed in everything, and magnetic phenomena arise when all like elements, constituting one of the fluids, flow to one pole, dissociating themselves from, or repelling, the opposite fluid.\(^567\) This explains why Herder's account of magnetism is so paradoxical. "Jedes Gleichartige" is the like liquid, not the like pole of another, external magnet.

It could, on the other hand, be argued that a misprint appearing in the table of contents of this work by Brugmans, which lists an "Erklärung der Ursache, warum sich die gleichnamigen Pole anziehen", did lead Herder to misunderstand magnetism basically. But the error is not repeated in the
body of the work itself, \textsuperscript{568}) from which Herder, also using many similar works, had made copious extracts. It was undoubtedly Brugmans' theory that each magnetic fluid converges upon its like pole which encouraged Herder to use magnetism as an illustration for his "law" that like unites with, or attracts, like. Besides, this "law" presumably applies to the attraction and union of the two sexes, although these are no more alike than are the opposite poles of a magnet.

The second and third "laws", as we shall see, are never exactly distinguished from one another in their sources and applications. Their origins could be several in number. Firstly, there is the religious, or rather mystical precedent, named by Strothmann, the medieval "Omnia intendunt assimilari Deo". \textsuperscript{569}) Rouché, \textsuperscript{570}) again following Boucke, \textsuperscript{571}) suggests Plotinus' similar conception as Herder's source. Secondly, we may notice that Plato's theory of gravity involved an "innate tendency of bodies of like nature to come together". \textsuperscript{572}) This led in turn to "the neo-Platonic theory of cosmic sympathy", \textsuperscript{573}) which Herder may well have encountered. Thirdly, we earlier met Herder's theory of perception by "Analogie": the subject recognises and takes into its consciousness that which, by "Einfühlung" or by some unspecified process of preestablished harmony, can be conceived by analogy with the self. On a higher level, this same theory led to Herder's idea that love, and mutual assimilation by love, are the highest form of "Erkennen". \textsuperscript{574}) Similarly, Dalberg, as Haym \textsuperscript{575}) notes, formulated a "law" of "Aehnlichwerdung" by love (c.f. Herder's "Verähnlichung"). The loved object is presumably analogous to the loving self; as Hemsterhuis puts it: "--- le degré de la force attractive se mesurera constamment par le degré d'homogénéité de la chose désirée" \textsuperscript{576}) (N.B. Hemsterhuis was a Platonist).
But fourthly, there is also a biological precedent within Herder's own writings. He wrote in the "Ideen", Pt. II, of the human "Lebenskraft":

--- in Gesundheit und Krankheit stehet sie uns bei, a•similirt gleichartige Theile, sondert die Fremden ab, stößt die feindlichen weg.

Thus, our diet ("gleichartige Theile", substance akin to our own) is assimilated, and "Veränlichung" takes place in its transformation into the substance of our bodies. Siegel notices this biological application in his history of "Naturphilosophie", saying that the second "law" is simply a description of the process of nutrition. Needham may have been Herder's particular source here. He writes that there are various combinations of two principles in each organism:

--- elles [i.e. ces combinaisons] sont attractives ou répulsives, et produisent les sympathies ou les antipathies physiques, selon que l'action ou constitution particuliè re de chaque substance spécifique est plus ou moins semblable, plus ou moins analogue à celle d'un autre.

We may add that the third "law" in particular clearly has a further biological basis in the notion of mating and reproduction by two sexes.

The first of the two biological usages, the idea of nutrition, implies that one pole completely overcomes the other. But what of the second usage? Herder had stated this point more clearly on an earlier occasion, saying that each organism possesses the ability "--- den Abdruck sein [sic] selbst mit allen in ihm wirkenden Kräften an seiner statt der Welt zu geben." Similarly, Hemsterhuis speaks of "--- la faculté de produire, par le moyen des deux sexes, un composé qui lui ressemble." The polarity of the sexes, therefore, as Dobbek suggests, does not involve the cancellation of one pole by the other. We may note in this connection that Herder's
three "laws", seen as the ideas of individuation, union, and reproduction, themselves constitute a dialectical triad.

We have seen that, in the applications to Herder's theory of love, and to the biological ideas of nutrition and reproduction, the second two "laws" cannot clearly be distinguished from one another. We have further seen that it is not enough to say that his theory of "Vereinigung" and "Veränlichung" by polarity simply derives from religious (actually, mystical) premises, as Rouché and others do. Its scientific affiliations, as we have shown, are just as pronounced, although we cannot claim that the "laws" themselves are comparable to genuine scientific laws.

Herder never explains what actually causes mutual attraction. Goethe speaks of the "Fordern" of one colour by its opposite, Hegel talks at times of one dialectical pole "evoking" its opposite, and Herder likewise believes that some sort of necessity operates in such polarities, but does not explain precisely why this should be so. Presumably, "Kräfte" are once more responsible, as in magnetism. The idea of a mysterious necessity led Herder, like Goethe, to employ the analogy of chemical "Wahlverwandtschaften". Herder compares this type of affinity with the inter-sexual relation in an early version of the "Ideen", Pt. I. He later refers to "Wahlanziehung". Such forms of attraction are necessary, but they must simply be accepted without being explained, he later declares:

--- in der Chemie sind Wahlanziehungen und Repulse die gemeinste Beobachtung, ohne daß wir die innere Ursache wissen, oder uns darum kümmern.

It is this substratum of unexplained "Kräfte", not any religious source, which renders Herder's theory of polar "Verähnlichung" unscientific, more like Romantic "Naturphilosophie" than present-day science.
But when all is said and done, theories concerning the relationship between opposites in the history of dialectical thought are incorrigibly vague. This applies particularly to Herder's ambiguous theories of attraction and of magnetism, and to his ill-differentiated ideas of "Vereinigung" and "Verähnlichung". For the "law" of "Vereinigung" should imply that union takes place between identical entities; the "law" of "Verähnlichung mit sich" that units different or opposite to one another should become similar or identical before uniting. But the failure of Herder, and of many of the writers he consulted, to distinguish clearly between unity and identity, make it impossible for us to separate the second and third "laws" clearly. As Sidney Hook observes: 586)

Just as Nicholas von Cusa calmly uses the phrase "coincidentia oppositorum" - identity of opposites - interchangeably with "connexio oppositorum" - the unity of opposites - so Hegel speaks of the "Einheit" and "Identität" of "Widersprüche" and "Gegensätze" as if they meant the same.

This confusion in the ideas of two notable dialecticians is exactly parallel to Herder's confusion of "Vereinigung" and "Verähnlichung". The confusion no doubt originates in the mystics' belief that mystical union involves a loss of separate individuality, and ends in pure identity of the mind and the divinity. Union would therefore appear only as a half-way stage to identity, the two states differing only in degree.

(vii) The nature of the dialectical synthesis.

Dobbek 587) names two forms of synthesis which are possible:

1) In the divinity. (This involves a static condition, of course.)

2) In a new and higher "Kraft" arising out of two old ones. (This is a dynamic, and more secular variety of synthesis.)
The latter sense is aptly styled "eine spannungsgeladene Einheit des Gegensätzlichen", and Dobbek correctly considers it as more characteristic of Herder, and of Goethe, than the former sense.

We have already met such syntheses, which, however, usually involve more than two units, in Herder's theories of dynamic equilibria in growth processes, in ecology, and in history. The original units may indeed retain their separate identity, while a new, law-governed state arises out of their interaction.

We may recall for a moment the cases where one pole suppresses the other, as in Herder's later theory of good and evil. This is an instance of what Hegel called the "negation of the negation", whereby one pole overthrows the other, and a new state (which should scarcely be called a "synthesis") arises. But whereas new "syntheses" are forthcoming after every conflict, according to both Hegelians and Marxists, Herder's ethical conflict entails simply the monotonous alternation of good and evil, the same two poles, over an indefinite period of time.

Rouché writes of Herder:

> En tout cas, Herder se distingue de Hegel en ce que chez lui l'alternance de la thèse et de l'antithèse n'aboutit pas à une synthèse.

This is certainly true of the ethical dialectic we have just discussed. Does nothing then correspond, in Herder's work, to Hegel's "synthesis" or to Goethe's "Steigerung"?

"Synthesis", as the term is usually employed by dialecticians, denotes a new state which arises out of an earlier conflict. It is not simply the sum of the earlier parts, but differs from them in kind, in quality (as we observed with reference to its holistic aspects). This is what Hegel calls
"the law of the transformation of quantity into quality and vice versa". Herder's "drittes mittleres Gute", already mentioned, arises out of the conflict of two extreme factions in history; it is one of a few almost Hegelian syntheses in Herder's works. A new quality, something historically superior to the separate forces which constitute its parts, emerges. "Quality", as usual, introduces a value judgement, and, as such, has no place in scientific thought. A similar value judgement appears in a later "synthesis" in Herder's "Kalligone". He writes: 

Nicht Gegensätze sind das Erhabne und Schöne, sondern Stamm und Äeste eines Baumes: sein Gipfel ist das erhabenste Schöne.

Can the idea of "synthesis" then be acceptable in any sense to scientific thought? Instead of a new quality, or something more valuable, we can sometimes speak, in considering natural changes, of something more complex which arises out of simpler interacting units. We find that Herder does use the dialectical formula in this way too, in his "Ideen":

Elastizität und Reizbarkeit grenzen an einander, wie Fiber und Muskel zusammen grenzen. So wie dieser nur ein verflochtenes Kunstgebilde jener ist: so ist auch die Reizbarkeit wahrscheinlich nichts als eine auf innige Art unendlich vermehrte Schnellkraft, die in dieser organischen Verschlingung vieler Theile sich aus dem todten Fiberngefühl zur ersten Stufe [sic] des thierischen Selbststreizes erhoben. Die Empfindsamkeit des Nervensystems wird sodenn die dritte höhere Art derselben Kraft seyn, ein Resultat aller jener organischen Kräfte ---

(Herder falls back into the generalised version, not the dualistic version of dialectics here, as the phrase "vieler Theile" shows.) Such syntheses, which substitute the idea that dialectical processes produce new levels of
complexity, rather than of quality or value, abound in the works of
dialectical theorists of biology, such as J.B.S. Haldane, in the present
century. Haldane's dialectical triad of heredity, mutation and variation
is analogous to Herder's "genetische Kraft", climate, and (racial and animal)
variation. In Herder's case, however, a vitalistic basis, foreign to
such modern thinkers, is always present. We should recall Herder's theories
that the child's mind develops (again in complexity) by its (dialectical)
experience of touch, and that the embryo develops (again in complexity) by
contact with its surroundings. These are similar instances of the
belief that dialectical development leads to greater complexity rather than
better quality.

Let us conclude with a word on the way in which all these dialectical
statements are formulated. The dialectical theorist of the natural world
usually begins by picking out some complex object or state, and then discovers
its simpler basic ingredients or earlier phases. But he goes on to state
his dialectical proposition in the reverse order, as a progression from
simple to complex. Besides, it is a paradoxical fact that the transition
from two (or more) initial poles to one, the synthesis, appears, formally, to
be a transition from complex (a plurality of two or more) to simple (unity).
Herder undoubtedly considered the formula most often in this latter sense,
as more in keeping with his desire to reconcile all dualisms in some final,
simpler, monistic synthesis. This is the way of the artist, and of the
mystic: out of two arises one, out of chaos order, out of variety unity.
The paradox which this difference between the formal progression from complex
to simple and the actual empirical progression (as in growth processes,
social development, etc.) from simple to complex presents, adds not a little
to the aesthetic piquancy of the dialectical formula, as Goethe assuredly
knew when he propounded his theory of "Polarität und Steigerung".

Thus, we have seen that Herder does define syntheses, new states which arise dialectically, despite what Rouché says. The many other instances of dialectical pairs which are simply complementary, and involve no real synthesis, such as "Liebe und Selbstheit", "Innigkeit und Ausbreitung", etc., require no elucidation here.

(viii) Conclusion.

What then is the scientific value of Herder's dialectical method? Of all the senses in which he uses it, only the original, Lucretian sense, involving many units, does justice to the complexity of natural change, and mitigates the obscuring influence of the "Kräfte" theory. The use of the number two has no scientific justification whatsoever. The theory of dialectical change towards great complexity upon a higher level is much used today, as we shall later see, and is clearly foreshadowed in Herder's works. Other usages are either quite outside the province of science, or are truisms (such as the observation that the magnet has two poles); otherwise, they are ambiguous, like the "laws" of "Vereinigung" and "Verähnlichung", or too devoid of nuance to be informative, as is the theory of historical change through pendular oscillation.

Furthermore, the "dialectical method" is in no sense a new logic, as Hegel claimed, but merely a descriptive formula. As Popper remarks, in an enlightening article upon the dialectic:

> It is not scientific reasoning itself, not scientific arguing, which is based on dialectic, but it is only the development of scientific theories which can, with a certain amount of success, be described in terms of dialectic method.

However, Herder never made any such claims for the formula, which he used
only as an applied, descriptive device.

The formula cannot make predictions, as we have seen. As Hook says:  

There is always a number of syntheses or supra-ordinate systems that can be construed to resolve "oppositions" --- In abstracto, all oppositions may be solved, but in concreto what prevents us from admitting that some oppositions may be irreconcilable?

Dialectical examples in science merely show, as Popper remarks  

Dialetical examples in science merely show, as Popper remarks "--- that the world in which we live shows, sometimes, a certain structure which could perhaps be described with the help of the word 'polarity'." He adds:  

Any development whatsoever will fit into the dialectic scheme; the dialectician need never be afraid of any refutation by forthcoming experiences.

And, so far as history goes, the dialectic claims to reveal not the patterns of causality, but those of destiny, as Hook points out. A cosmic end is postulated, a veiled teleology is introduced. The whole world is governed, in such schemes, by panlogical forces, as soon as we attribute any independent rationale to the polar "Kräfte" supposed to govern human progress. This is especially clear, of course, in the case of Hegel's World-Spirit.

However, Herder never used the dialectical principle as a key to all knowledge. He used it as a descriptive model on most occasions, as one methodological tool among many others, and frequently fell back upon the Lucretian variant.

All this criticism has seemed necessary in view of the somewhat exaggerated claims made for Herder's use of dialectics by the Marxist critics Reimann and Harich, whom even Dobbek does not refute. Herder uses it as a formal, methodological principle, and, as such, it is not committed to any particular ideology, as these critics believe. It is used by thinkers as
different as Zoroaster and Marx, and can be harnessed to a legion of different ideologies. Reimann⁶⁰⁴) speaks of "die materialistische Philosophie Herders", as if this were the necessary outcome of Herder's dialectical usages, and Harich⁶⁰⁵) emphasises only the concrete, physical applications of the idea, with a similar intention. Rouche⁶⁰⁶) overemphasises the religious background of the idea, Boucke⁶⁰⁷) concentrates upon its ethical and cultural implications, and Witte⁶⁰⁸) upon its logical background (in Kant's essay on the subject). Dobbek's excellent essay somewhat neglects the scientific applications of the formula by Herder, and emphasises the ethical and Hegelian aspects, contending that Goethe, rather than Herder, applies it to the natural world.⁶⁰⁹) This, taken together, is the reason why we have examined all its applications in some detail. Once more, we have found Herder applying a formal category to all levels of existence, in his monistic, synthesising fashion. Some applications are more or less scientific, by later standards, but no single aspect should be emphasised to the exclusion of others.

But, as we noted in our introduction, Dobbek himself applies the dialectical notion to great effect, as a critical method for analysing Herder's complex personality. This is his outstanding achievement. Far too much has already been made of Herder's own use of the formula.

We conclude that many scientific thinkers still find the dialectical formula advantageous when applied to the natural world, and that Herder did so in more varied ways than his contemporaries, anticipating Goethe's (more conscious) application of it. For Goethe admitted⁶¹⁰) that he lacked the dialectical idea in his descriptions of the natural world in the early 1780's, when Herder had already used it in the most diverse ways. The grotesque misuse of the idea by later "Naturphilosophen" such as Schelling is
admittedly foreshadowed in part in Herder's works; but so, after all, are many of its subsequent uses by modern scientific thinkers.


a) Herder's knowledge of mathematics.

Herder became acquainted with mathematics at an early stage in his career. Haym notes that he attended Buck's lectures on the subject at Königsberg. A considerable quantity of unpublished material relative to the subject survives among Herder's early manuscripts. From his early period as student and teacher date the three manuscript sketches "Theoremata der Longimetrie", "Lehrsätze der Planimetrie", and "Lehrsätze der Stereometrie", all unpublished, and all in the same notebook, the last two grouped together. Irascher, in his catalogue of the Tübingen manuscripts, considers the first of these to be based on Kant's lectures in Königsberg, the second (perhaps because of the title "Lehrsätze") to be preparatory notes for teaching in Riga; the third is not separately classified. However, it is obvious from the titles that all three are connected: the first treats of the elements of linear geometry, the second deals with the geometry of plane figures, and the third with the geometry of solids, culminating in a proposition concerning the area of the surface of spheres. The very first of Herder's surviving notebooks, compiled during the earliest Königsberg period, contains jottings on extremely elementary geometry, consisting of diagrams of parallelograms and the construction for the theorem of Pythagoras. The later notes are thus of a considerably more advanced standard, proving that Herder knew little or nothing of geometry before he arrived in Königsberg.
Two further groups of unpublished manuscript notes (already mentioned in our discussion of the physical aspects of „Kraft“), „Vorerinnerungen in der Mathematik“ 616) and „Vorläufige Erinnerungen“, 617) are catalogued, like the notes on linear geometry, as associated with Kant’s lectures. The first contains a careful and detailed scheme (which scarcely looks as if it had been noted directly from lectures) of all the branches of mathematics, from pure mathematics to the applied physico-mathematical sciences. These notes, as well as the second group, deal rather with the general logic of mathematical statements than with any particular mathematical problems. The second series gives exact logical definitions of fractions, powers, proportion and series in arithmetic, and, once again, a brief résumé of the functions of linear, plane and solid geometry, becoming sketchier, and tailing off rather abruptly at the end. Irmscher’s catalogue remarks that the first group of notes is partially based upon the German version of Chr. Wolff’s „Elementa Matheseos Universeae“, although we have searched in vain for any correspondence with the Latin version of that work. (Unfortunately, the German version has proved unobtainable.) However, the notes show that Herder had received a serious grounding in the elements and logic of mathematics, particularly in geometry and arithmetic.

Herder taught mathematics to the third class in the Collegium Fredericianum in Königsberg in 1763, as Caroline’s memoirs inform us. 618) A letter from Herder to Lindner in 1764 shows that he taught the subject to the „Sekunda“ of the same institution in the following year. 619)

The „Journal meiner Reise“ testifies to his continued interest in the subject, and reveals especially a new desire to study applied branches such as navigation and acoustics. He names d’Alembert, Bouguer, Euler and La
Caille in this connection. \(^{620}\) The fourth "Kritisches Wäldchen"\(^{621}\) shows that he did possess some knowledge of mathematical acoustics in the same year, but Caroline writes in her memoirs that his plans for studying the mathematical sciences, drawn up in the "Journal", were among the few projects he failed to carry out. \(^{622}\) Navigation and naval architecture - "ein Theil der Mathematik, den ich noch nothwendig lebendig studiren muß"\(^{623}\) - were no doubt subjects which attracted him at this time because of his enthusiasm over the sea voyage, and his revulsion against abstract learning as opposed to practical activity. Nonetheless, it was Herder (if the editors of his works are correct in attributing the review to him) who was called upon to review the (predominantly mathematical) "Novi commentarii Societatis Regiae scientiarum" of Göttingen in the "Frankfurter gelehrte Anzeigen" in 1772, \(^{624}\) and throughout his works references to the mathematical writings of men such as Barrow, the Bernouillis, Newton, Kästner, Leibniz, Lambert, Maclaurin, Maupertuis and Wolff show that he continued to consult works on the subject. His library contained at least ten other works on mathematical science. \(^{625}\)

Herder was interested, above all, in applying mathematics to concrete situations: \(^{626}\)

\[
\text{Mathematik ist die wahreste Wissenschaft, nur durch Physik wird sie lebendig, so wie die Zahl nur in Dingen, die gezählt werden, da ist.}
\]

Several similar utterances appear elsewhere in his works, ranging from the earliest to the latest period. \(^{627}\) But the actual applications which he suggests are, from the start, quite remarkable. For instance, he suggests, in the fourth "Kritisches Wäldchen" of 1769, not published in his lifetime,
that aesthetics may one day become a physico-mathematical science. He is not referring merely to such popular, pseudo-mathematical "line of beauty" theories as Hogarth and others advocated, for he names the exact science of optics as the proposed foundation for the psychology and aesthetics of vision. Similarly, he consulted several mathematical treatises on musical acoustics, but, in this case, he decided that they were not enough, with their analyses of intervals etc., to explain our pleasure at musical sounds. At first sight this objection reminds us of Goethe's later revolt against Newton's physical and mathematical theory of light. But, on the other hand, Herder says of unpleasant sounds:

--- alle diese widrige Gefühle ließen sich durch unregelmäßige Linien --- ausdrücken, an denen sich die Mathematik intensiver Größen weithin versuchen könnte.

Eighteenth century scientists, such as Euler and d'Alembert, both of whom Herder mentions in a group which also includes Diderot, Mersenne, Gravesande and Sauveur, had attempted to extend the uses of mathematics in acoustics, endeavouring, for example, to represent the vibrations of a string mathematically. But Herder believes that the mathematical and physical analysis of objective sound is of little value for aesthetic purposes; the only application he suggests is that quoted above, the description of subjective "Gefühle". He considers that these are produced by movements of the "Gehörfibern", and the differences within the "Nervenäste des Gehörs."

In der Verschiedenheit der Nervenäste des Gehörs muß auch die wesentliche specifische Verschiedenheit der Töne und Tonmaßen, das ist, der Schälle liegen, so fern sie der Qualität nach, der Grund des Musikalischen Wohlaus- oder Übellauts ist.
He attempts to distinguish the subjective, qualitative "Ton" from the purely quantitative "Schall", the object studied by mathematics and physics. His meaning becomes clearer when he identifies "Ton" with "timbre", and gives as examples the distinctive sounds produced by various instruments. Such qualities, he believes, cannot be reduced to pitch, volume, or intervals.

Thus, Herder envisages the use of mathematics in the physiology of hearing, especially in representing our reactions to quality of sound. This was a truly progressive idea in that the physiology of sound was not studied mathematically until the time of Helmholtz (1862), who also explained the origin and physiology of timbre, or "Klangfarbe", as he called it, taking into account the sympathetic vibrations of the fibres of the basillary membrane, part of the end organ of the auditory nerve; the physiology of sound had been relatively neglected up till then, as Herder already realised.

But Herder was wrong in believing that quality or timbre could not be explained directly and quantitatively by mathematics and physics. It can, in fact, be explained quite objectively in this way; the distinctive quality of a "pure" note produced by a certain instrument comes from the harmonics (rejected in Rameau's theory by Herder as irrelevant) which arise in the instrument, alongside the basic note, through auxiliary vibrations of segments within the instrument, as, for example, of fractional parts of a complete string which also vibrates as a whole. Nonetheless, he correctly believed that subjective or physiological explanation must complement objective research. This reflects his growing sense for the importance of physiology.

As for the representation of unpleasant "Gefühle" by mathematics, their objective basis can be represented by irregular lines. For example, "noise
[i.e. as distinct from all musical notes] affects us as an irregular succession of shocks. The only condition necessary to the production of a musical sound is that the pulses should succeed each other in the same interval of time.\(^{637}\) Musical dissonances, likewise unpleasant, can be described graphically by an irregular curve which shows their increase and decrease with varying musical intervals; Helmholtz represented them in this way.\(^{638}\) Thirdly, the actual frequencies producing dissonance can be represented directly by undulating lines portraying the vibrations associated with two or more discordant notes, but the lines themselves, in this case, are regular, since the individual notes are musical.

But all three involve the quantitative representation of objective sounds, and Herder, as we have seen, rejected such applications as virtually useless in aesthetics, which studies quality, not quantity. We can only conclude that he was uncertain in his own mind whether mathematics should be used symbolically here, to represent subjective feelings, much as Hogarth's "line of beauty" was used in the visual arts, or literally, but applied to the vibration of parts of the inner ear, rather than to their external counterparts which produce the initial sounds (e.g. the strings of an instrument). Such uncertainty would be in keeping with the development of Herder's ideas on mathematics; for he began, as we have seen, by studying the subject as the method of the applied sciences, yet later, as we shall see, he attempted to use it analogically or symbolically. The more literal, physiological sense is, however, more in keeping with the relatively mechanistic views he entertained in 1769 - he suggests, in the fourth "Kritisches Waldchen" which we have been discussing, that it may be possible "jeder Gefühlsart gleichsam ihre Gegend in der Seele einzumeßen", and even remarks "wie es also ---"
überhaupt eine materielle Seele gebe"; 639) he vehemently rejected such ideas later, after his Bückeburg experiences. Thus, his later attempts to apply mathematics to the subjective world were no longer physical, or rather physiological, as in 1769, but purely analogical, as we shall see.

Let us now briefly consider what Herder deemed to be the nature of mathematical knowledge. He writes in his "Metakritik": 640)

"Wäre dem Mathematiker kein Raum und im Raum kein Körper als möglich oder wirklich, d.i. durch innere oder äussere Erfahrung gegeben: so könnte er von Körpern keine Flächen, von Flächen keine Linien absondern, noch solche als Begriffe im Raum construiren.

He therefore rejects Kant's thesis that all mathematical knowledge is a priori.

Bertrand Russell writes of this problem: 641)

"To the Greeks - and to the moderns until a hundred years ago - geometry was an a priori study like formal logic, not an empirical science based upon observation. Lobachevsky, in the year 1829, demonstrated the falsehood of this opinion, and showed that the truth of Euclidean geometry could only be established by observation, not by reasoning.

Once again we emphasise that Herder's solution does not display any marvellous or unaccountable insight. It is part of the whole naturalistic side of his thought, and is not arrived at by mathematical demonstration.

He had, in fact, learnt from the pre-critical Kant himself to study the empirical basis of mathematics; for the unpublished "Vorerinnerungen in der Mathematik" contain a fairly detailed historical introduction, showing how mathematics arose to meet practical needs: 642)

"Sie ist von der Bedurftheit [sic] der Menschen erfunden. Die handelnden Völker, die mit der alten Zählart bis 10 nicht zufried[en] seyn konnten. --- [etc.]"
A similar, but shorter historical introduction appears in the related "Vorläufige Erinnerungen". Herder further appealed to Kastner's writings in support of this proposition, and we know that Aristotle believed that things mathematical never exist apart from things sensory. Nonetheless, Herder's theory was destined to supersede that of the later Kant.

Finally, we note, along with Clark, that Herder believed mathematical propositions to be either analytical or identical (tautological), not synthetic, as Kant believed. The modern view is again that of Herder, who, in this case, did justify his opinion by correct logical argument in his final onslaught on Kant's a priori philosophy.

Before we proceed to examine how Herder applied mathematical formulae to historical and ethical contexts, and the resulting pseudo-laws he propounds, we must first digress in order to investigate the premises which, in Herder's eyes, justified such unusual practices.

b) The "Analogie" of physical and moral worlds.

We now come to the last of Herder's main uses of the idea of "Analogie", having already seen how he employed it in the problem of perception, and in the more scientific analogical method, as well as in the gravitational analogy for the dialectical pattern which represents man's ethical situation. We have seen how Herder's holistic outlook led him to apply several conceptions, such as the "type", the cyclic pattern, the idea of development, and the dialectical formula, to many levels of existence, often from the inorganic world to the ethical world of human behaviour. This should have made it obvious that his holistic monism naturally entails the belief that all these levels are parallel, or analogous to one another, and that the same
patterns, in varying degrees of complexity, occur on them all. Thus, just as he postulated an "Analogie" between the individual psyche and the objective world, we now find him proposing a similar one between the collective psyche of each society, or even of mankind as a whole, and the physical world. In this case, the collective mind is usually treated in its ethical aspects. This new analogy is merely a more extreme version of the one earlier discussed, but a logically inevitable consequence of it. This, then, is what Herder means when he uses the phrase "Analogie der Natur" throughout his works, and suggests that physical and moral "laws" are analogous. 648)

It was seen that the notion of an "Analogie" between the individual mind and the external world, appearing in Herder's attempts to solve the problem of perception, proved to contain at least three senses:

(i) The suggestion that the parallel between subject and object really arises through environmental determination of the subject by the object.

(ii) The subjectivistic belief that we comprehend the external world by applying our subjective knowledge of ourselves to it (c.f. anthropomorphism).

(iii) The belief that the parallelism is pre-established by some hypothetical, even divine mediation, or by some quasi-physical "medium", such as "Aether".

Exactly the same three senses recur in Herder's wider usage of the "Analogie":

(i) The minds, as well as the bodies, of (especially primitive) societies, or the mind of man as a whole, reflect their physical, or even cosmic, environment. 649) This influence extends even to their ethical codes. 650)

(ii) As Kühnemann 651) and Witte 652) observe, Herder often imagines that natural laws reflect the ethical qualities, such as goodness and wisdom,
enshrined in human society.

(iii) The physical and ethical worlds are, at other times, simply stated to be parallel, because the same divinity is manifest in both, in the physical universe and in human history. 653)

These three senses all imply forms of monism, and may be compared to the philosophical systems of positivism, idealism, and occasionalism (not without reservation, of course). Only the third sense is truly an analogy, for in the first, the object conditions the subject, and in the second, the subject conditions the object, by cause and effect. But all three senses contribute to Herder's belief that physical and social or ethical "laws" are similar. We may add that this wider use of the "Analogie" conception appears, in various forms, throughout his works, but that it is most fully elaborated in the "Ideen", whose main aim is to relate the natural world to the world of man.

Critics have, however, failed to distinguish all these separate senses of the "Analogie" conception. The eulogists who see in Herder a "Vorgänger Darwins" emphasise the first of the three senses; Kühnemann, 654) as always, emphasises the second, subjectivistic sense; and Rouché, 655) needless to say, emphasises the third, more religious one.

Let us briefly review the sources and precedents for the three usages:

(i) The first, or extreme deterministic sense is found, as Koller 656) shows, in the work of Du Bos, whom Herder early studied. Similarly, Montesquieu 657) believed that quasi-physical laws operate in the social, if not the ethical sphere (Herder, of course, early showed enthusiasm over Montesquieu's work).

(ii) Herder's belief that the laws of nature reflect the ethical qualities we appreciate in society is found in the works of Shaftesbury in
particular.

(iii) The belief that physical and ethical worlds are parallel (usually by divine appointment) occurs in Hamann's theory that nature and history are parallel "revelations", as Rouche\(^658\) and Sommerhalder\(^659\) observe. We might add that it appears in the works of Burnet,\(^660\) in Butler's "Analogy of Religion",\(^661\) in the works of Dalberg,\(^662\) Lavater,\(^663\) Leibniz\(^664\) and others, all of whom Herder mentions at some time or another. However, Butler and Lavater appeal to scriptural revelation in making this comparison, whereas Herder, and to a lesser extent the others named, believe that the parallel can be supported by naturalistic evidence alone. We may recall at this point that Herder's use of the gravitational analogy in ethics exemplifies this more naturalistic parallel.

It is therefore not sufficient to explain away Herder's belief in historical and social pseudo-laws, with their ethical overtones, simply by appealing to the influence of Hamann, for example, as Rouche does. Walter Pater, in his essay on Winckelmann, shows that these ideas are part of a much wider movement:\(^664a\)

The chief factor in the thoughts of the modern mind concerning itself is the intricacy, the universality of natural law, even in the moral order.

Herder had indeed pioneered an important side of this movement, by showing that all true art must reflect nature. He illustrated this by relating the artistic products of most earlier cultures to a natural way of life, directly conditioned by a geographical and physical environment, as in his studies of the Ossianic poems. The study of art led in turn to history, to which the same principles were applied. No wonder, then, that he came to relate all
cultural and historical phenomena, including ethics, to the natural world.

He must have suspected, however, that such sweeping generalisations are not entirely satisfactory. On one occasion, in the "Ideen", Pt. II, he makes it clear that natural "laws", in his opinion, govern human behaviour, but only up to the level of family existence: 665)

Die Natur leitete das Band der Gesellschaft nur bis auf Familien. Political behaviour, therefore, is no longer "natural". Yet it was in the very field of social and political behaviour that Herder, later in the same work, asserted that quasi-physical, natural "laws" are valid. Similar doubts concerning the universality of natural law arose in his mind before he attempted to reconcile his historical "laws" and human freedom: 666)

Wie könnte je ein denkender Mensch darauf kommen, alle Welttheile und Nationen in Bienenkörbe und Ameisenhaufen zu verwandeln und unveränderliche Regeln der Natur hiebei angaben?

But as Kühnemann 667) realises, Herder soon went beyond his original belief that history shows a rational pattern, and took up the less defensible opinion that it shows an ethical pattern. And although modern scientific sociology must assume that all human behaviour follows natural causal laws, no scientist would now agree with Herder that objective natural laws have any ethical significance, or, if they have, that scientific reasoning can tell us what this necessarily subjective significance is.

c) Herder's application of mathematics: the pseudo-laws.

Herder wrote in 1774 to the astronomer von Hahn: 668)

Haym quotes a similar passage from another letter to the same person. These utterances show that Herder, after his more radical views of 1769 had toned down, wished to apply mathematics analogically to philosophy rather than directly to physical science, or even physiology, as before. Having satisfied himself, as we have seen, that physics and ethics are analogical, and having used the analogy of gravitation from an early date, he found that the way was henceforth open for those mathematical pseudo-laws which eventually appeared in the "Ideen", particularly in the theoretical chapters upon historical development. The first of these pseudo-laws are as follows:

(i) Mathematics tell us, Herder maintains: "daß zum Beharrungszustande eines Dinges jederzeit eine Art Vollkommenheit, ein Maximum oder Minimum erfordert werde, das aus der Wirkungsweise dieses Dinges folget." (This recalls the first dialectical "law" of "Beharrung" in the contemporary "Gott").

(ii) He says: "daß alle Vollkommenheit und Schönheit zusammengesetzter, eingeschränkter Dinge oder ihrer Systeme auf einem solchen Maximum ruhe."

(iii) If an entity or system is disturbed "aus diesem Beharrungszustande seiner Wahrheit, Güte und Schönheit", it eventually returns to its previous state: "durch innere Kraft, entweder in Schwingungen oder in einer Asymptote."

He goes on to apply these "laws" firstly to the individual man, and, secondly, to the individual society; thirdly, he generalises their common features as "eine Menschenvernunft", and, fourthly, traces "eine Kette der Cultur", in which single nations, each governed by the "laws", form the separate links; fifthly, he observes that "Maxima" are never permanent.

All critics, from Haym onwards, are agreed that the physical terms "Maximum" and "Minimum", as Herder himself, making statements similar to
these "laws", admits in his "Gott",673) are borrowed from the philosopher and mathematician J.H. Lambert. We need not give exact references to Lambert's writings, since Kühnemann674) and Rouche675) name the exact sources in those works. Boucke,676) followed by Rouche677) and Clark,678) maintains, however, that Herder merely used Lambert's formulae to reexpress earlier ideas of his own. We must now ask what these earlier ideas are.

For the first "law", Rouche679) asserts that Herder's idea of cultural autarchy is an important precedent. To this we reply that, as we earlier showed, organic holism necessarily arrives at the idea of individual dynamic wholes which exist in equilibrium. Such wholes appear, as we have seen, on all levels of existence for Herder, from the growing organism to mankind as a whole, and not merely on the level of individual cultures. Lambert's "Maximum" etc. is simply a concise formula for expressing the idea of dynamic equilibrium, conveying a superficial impression of mathematical exactitude and quasi-physical regularity, in the unusual context in which, with the ambiguous word "Vollkommenheit", it here appears.

Rouché rightly compares the second "law", an extension of the first, with Herder's ideas of "Kompensation" ("correlation des parties"), type, and of the solar system as a process in equilibrium. Once more, however, these are only two of many levels. Herder makes it clear in his second "law" that he really has ethical categories, concepts of value, in mind.

The third "law", for which Rouche suggests the precedents of Spinoza's "persévérance dans l'être" and Aristotle's belief "que chaque être --- représente l'état d'équilibre d'un système de forces" (Aristotle, we may confidently add, nowhere uses terms so reminiscent of post-Renaissance mechanics), is, we again affirm, a logical and necessary product of Herder's organic holism; this implies, by definition, that a dynamic whole whose
equilibrium is disturbed can only return, on the one hand, to a new equilibrium, or be destroyed, for its very existence can be defined only as an equilibrium, as a departure from equilibrium (towards non-existence), or as progress towards a new equilibrium. Herder's earlier theories of the changing ecological equilibrium and of racial changes in man exemplify this "law", which simply generalises and reaffirms such earlier, organismic principles.

Rouché also relates the "Maximum" idea, rightly enough, to Herder's belief in cyclic change; but he then relates this to the literary "point de perfection" theory. We have already shown that we cannot agree with this latter conclusion, and have discussed the idea of cycles, of which the "Maximum" conception can indeed be seen as a variant, in an earlier section. As for the five points by which Herder supplements his three "laws", they are simply an application of the "laws" to the ethical situations of the individual's life, social existence, national (political) growth and decline, and mankind as a whole; finally, and fifthly, making the link between the "Maximum" idea and the cyclic conception of rise and fall explicit. Rouché's comparison of the first point with the "homme anatomisé" theory reminds us of our earlier objections to applying this theory to Herder, while his comparison of the fourth and fifth points with the "point de perfection" brings us back to our earlier refutation of this belief. Besides, we noted, in our discussion of cyclic theories, that Kant too used the value-expression "Vollkommenheit" in describing the climax of a cycle.

Finally, Rouché states that Herder's mechanico-historical "laws" of progress, associated with those just discussed, differ from those of modern science, since they merely affirm "un progrès voulu par Dieu". We can
only reply that all humanist theories of history, and even the Marxist theory of history, believe in historical progress by quasi-mechanical necessity. Besides, Herder had abjured teleology by this time. We agree that such theories cannot be called scientific; they are emotional (ethical) in origin. But, as such, they do not afford sufficient evidence for Rouché's "voulu par Dieu", a conception which Herder, in his attempts to formulate naturalistic "laws", is at special pains to circumvent.

Let us briefly review the few further mathematical formulae which Herder employs in a similar way. He attempts from time to time to describe the pattern of historical development by various geometric curves. We have noticed, for example, that he names the asymptotic curve in the third of his above "laws". The same image, that of an asymptotic hyperbola of progress, or growth which approximates indefinitely to a point but never reaches it, is used in several other places in his mature works. Rouche\(^{682}\) points out that the image appears in the works of Lambert and Hemsterhuis. We may add that Dalberg also uses it,\(^{684}\) although Hemsterhuis, as Rouche says, is probably Herder's major source. On another occasion,\(^{685}\) Herder suggests a spiral as an alternative way of describing progress. (This, of course, combines the line and the circle, the progressive and the cyclic, the absolute and the relativistic in a way typical of Herder.) At other times, beginning in 1778, the elliptical orbit, with its perihelion and aphelion, is used as an image to describe the cycles of man's development.\(^{686}\) Here, the idea of progress is absent. This image is, of course, related to the gravitational analogy, and is probably borrowed, like that of the asymptote, from Hemsterhuis, as a letter from Hamann to Herder of 1781 suggests.\(^{687}\)

On another occasion, in the "Humanitäts-Briefe" of 1793, the cycloidal curve
is used to depict cycles. 688)

Kühnemann speaks of Herder's "laws" as "dieser Sieg der Mechanik über die Geschichte", seeing in them a regrettable departure from his earlier insight into "das sittlich-organische Leben der Kulturen."689) Haym argues in like fashion.690) But as we have maintained, Herder is thereby only describing cyclic, organic growth on the level of human life in a more formalised way than before, and emphasising his ethical feelings towards it. The mechanico-mathematical formulae are purely superficial. This is no doubt what Jean Paul, who understood Herder's mind better than most other contemporaries did, meant when he said of him:691)

---,um das trockne Kernhaus eines Lamberts zog er eine süße Frucht-Hülle. That is, he combined Lambert's bald formulae with his original ideas. And mathematical or "mechanical" descriptions of regularities need not imply that these are caused mechanically; such regularities, as we shall see, can just as well be purely statistical. Herder never intended to prove that historical change was a mechanical process. If, on the other hand, Kühnemann means that the rationalistic belief in progress, which he deplores, increasingly supplants the earlier relativistic theories of Herder, we reply that the mathematical "laws" we have just discussed do not in themselves imply absolute progress, but only a cyclic rhythm. Apart from the image of the pendulum, which combines the ideas of progress and of cycles, it is only in other, non-mathematical passages, and in the isolated reference to the spiral curve, that Herder puts forward an unqualified theory of progress, which we shall now examine. (These "laws" of progress are no longer examples of Herder's use of mathematics; but since they are closely related to the mathematical "laws", and, like them, claim to be "natural laws" in the scientific sense, we feel justified in discussing them here.)
Among the pseudo-laws of progress, one especially stands out: it is
the "law" of the self-destruction of evil in history, appearing in the
"Ideen", Pt. III. In this first formulation, "Übermacht", not evil,
is seen as the self-destroying force. It reappears shortly after as the
contention that "zerstörende Kräfte" must gradually give ground to "erhaltende
Kräfte", and that increasingly destructive warfare must eventually make itself
impossible. Herder then says that more "Erhalter" are born among men
than "Zerstörer", and that a "friedliches Gleichgewicht" has arisen among
peoples. (This was written, ironically enough, in 1787.) We may add
that this time-honoured idea of a "balance of power" is thoroughly holistic,
and fits in well with Herder's similar ideas on many other levels. However,
in the "Humanitäts-Briefe", Herder, now fully pledged to the belief that
ethical progress is manifest in history, restates these "laws" more fully,
and again affirms that preserving forces are stronger than destructive ones.

We have discussed some implications of these ideas in our last section,
as examples of the dialectical conflict between good and evil. But we may
now note that the source of Herder's "law" that constructive forces must
prevail over destructive forces is almost certainly the "Ideen" of the
materialist Einsiedel, which Herder had excerpted at great length, or even
copied in full. Einsiedel wrote:

Die Natur schuf im Menschengeschlecht zwei Hauptgenera, verderbende
und erhaltende; jenes das kleinere, dies das größere Genus: diese
erhielten die große Balance.

Furthermore, the apostle of Lucretius, Knebel, wrote that progress is a
"Verminderung des ausgezeichneten groben Egoismus" in history; Herder
incorporated this remark, with other passages by Knebel, in his 1792 version
of the "Humanitäts-Briefe". Perhaps these ideas came from Herder's own
influence; nonetheless, Knobel, the opponent of teleology, found them acceptable. Like Herder, he believed that progress in history, as in the natural world, lay in "das wachsende Maas der Dinge unter einander." All this shows that Herder's pseudo-laws of progress, as enunciated in the "Ideen", Pt. III, are not merely extrapolations from theology, a "progrès voulu par Dieu", but an attempt to combine ethical and scientific standards in history, while avoiding any appeal to the supernatural. They are, of course, unscientific in themselves. We must finally note that these "laws" of progress are distinct from the "laws" of the "Maximum", etc., although some of them are appended to the chapter in which the latter occur. The link between the two groups is the conception of "Schwingungen", the image of the pendulum, which, like that of the spiral, Herder uses to combine the idea of progress with that of cycles. We discussed the cyclic and dialectical aspects of this image in our study of dialectics.

Herder's belief in the Golden Mean is an earlier, static version of the later, dynamic idea of the "Maximum". Rouché notices this connection, without bringing out the distinction between static and dynamic. He also contends that Herder's notion that man and the planet Earth conform to this mean is a reaffirmation of "l'éminente dignité de la terre et de l'homme postulée par l'orthodoxie chrétienne", yet admits elsewhere that the idea is of Aristotelian origin. Herder himself links the aesthetic conception of the Golden Mean to the mathematical formula of the "Maximum" in his "Kalligone".

The "law" of "Wiedervergeltung", appearing as early as 1781, is also an earlier version of the "Maximum" theory, in non-mathematical terms; it is the "do as you would be done by" mandate, the mainstay of all naturalistic systems of ethics which contend that the moral world regulates itself without
the need for punishments or rewards in an afterlife. The same formula is
applied to politics, peoples, and to mankind as a whole in the "Ideen",
Pt. III, 707) and thenceforth reappears on numerous occasions. 708) It is a
moral "law" of "Kompensation" (Herder actually uses this word in a similar
ethical context 709), applied to various wholes within the moral world.
Leibniz was probably the source of this "law", which he claims is purely
natural, and even "méchanique". 710) Stadelmann 711) correctly observes that
it contradicts another "law" of Herder's, that of the triumph of the
strongest; but we should add that the latter "law" appears only in a
rejected manuscript for the "Ideen". 712) Herder tempered this more Lucretian
conception to fit the requirements of ethics in his final version - but not,
we should observe, the requirements of theology.

Finally, Herder's "law" of a "Nemesis" or "Adrastea", as Kühnemann 713)
points out, is a later version of the same "Maximum" theory. Once again,
as in the Golden Mean conception, Herder chooses an antique rather than a
Christian image, although he applies it to the Christian theory of ethics in
particular. 714) Once again, he uses the word "Kompensation" to describe
the workings of this "law". He had moreover related it to the "Maximum"
idea himself on one occasion, in his "Gott". 715) It is interesting to find
that Linnaeus spoke of a "Nemesis divina" which, he believed, operates in the
ethical world, and which he compared to his previous observations upon the
balance which obtains in ecology. 716)

The only other "laws" Herder formulates are a group of ten which appears
in his "Gott". 717) These are either variants upon those already discussed,
including the dialectical ones, or restatements of the "Kraft" principle in
its metaphysical and religious aspects, and, as such, have no scientific
validity.

Why, we now ask, did Herder use the mathematical formula of the "Maximum" and "Minimum" of forces to describe ethical equilibria in his major work, while non-mathematical versions are more common in his earlier and later works? The answer is that his other images are instances of a straightforward dialectic between the two poles of good and evil, preservation and destruction, whereas the "Maximum", applied to societies, nations, and to mankind as a whole, attempts to do justice to many "Kräfte", constructive and destructive, and is therefore a more complex idea. Besides, it is more naturalistic, for, while there are only one each of the abstract poles of good and evil, there are many separate human agents in society and in history. Herder actually speaks, in his second "law", of "Systeme" as the units governed by the "Maximum", not of polarities. The dialectical dualism of two "Kräfte" may therefore be seen as a special case of a wider theory of natural laws which cover many "Kräfte". (We shall return to this in our next section.) Thus, the mathematical theory of the "Maximum" applies ethical judgements to the overall states of societies or groups of human beings, and not to the individual agencies who contribute to this state of balance or imbalance, as does the cruder dialectic of good and evil. Besides, it was only this dialectical formula, as in the image of the pendulum, which introduced the idea of progress. The more complex "Maximum" does not necessarily involve this belief in itself.

To conclude our remarks upon Herder's particular mathematical and physical descriptions of ethics and society, we ask whether, resting as they do upon the belief in an "Analogie" of physical and moral worlds, they are part of that aspiration to see history and nature as two forms of revelation, the aspiration which Herder, according to Rouché (as we earlier noticed),
had derived from Hamann. Hamann roundly denounces such theories on encountering them in the works of Hemsterhuis, and writes to Herder that: "--- das Uebergewicht der Trägheitskräfte gegen die Anziehungskräfte zur Grundlage aller Moral und zum Erzeugungs-Prinzip des Universi, kommen mir als portenta dictionis und fictionis vor", adding: "verstehe nichts von seinen Perihelien und Cometen-Revolutionen." He deplored Herder's admiration of Hemsterhuis, that mathematician of morality, as the letter of 1781, from which these words are taken, reveals.\(^{718}\)

Having studied Herder's usual applications of mathematics, we ask in conclusion whether they have any counterpart in modern scientific thought. Meinecke observes that Herder's theory of an equilibrium in groups of living entities, as a working hypothesis, is still of value to biology and psychology.\(^{719}\) But Kühnemann\(^{720}\) aptly remarks that Herder's "Kräfte", in a historical context, cannot be reduced to exact quantities. It would have been of value if Herder had equated his "Kräfte" to available statistics on populations, or natural resources, for example.

However, it is not Herder's insight into "das sittliche=organische Leben der Kulturen", praised by Kühnemann\(^{721}\) at the expense of Herder's mathematical, "mechanical" approach, which survives in modern science. His theory of equilibria, as we noticed earlier, proved fruitful in ecology, and has now been defined mathematically.\(^{722}\) But what of the sociological application? Economics, for example, represents cycles by mathematical formulae: as one writer on the subject observes:\(^{723}\)

The general business cycle is usually likened to the motion of a frictionless pendulum which satisfies a simple Newtonian second order differential equation.

Or again:\(^{724}\)
Lewis F. Richardson has attempted the mathematical determination of a point of equilibrium in world politics.

Furthermore, as S. Nilson, the writer whom we cite, points out, the existence of observed regularities need not imply that men act like mechanical automata in their social and political behaviour. This is what Haym and Kühnemann, objecting to Herder's "mechanical" theory of change, appear to have feared.

A modern biologist similarly writes: 725)

--- relaxation oscillations appear in certain physical systems, and in many biological and demographical phenomena as well. A general theory of periodicity is a desideratum in various fields.

The same writer affirms the conceptions of equilibria and rhythmic change in these fields, and sees these as essential steps towards a general system theory of the sciences. 726)

Thus, Herder made use of analogies and hypotheses which have been acclaimed in modern scientific thought. His ethical judgements and his neglect of the quantitative basis deprived of any scientific value his own applications of these ideas, however.

But the use of such analogies in sociology can lead to dangerous oversimplifications. Popper decries "the scientistic misuse of the examples of physics and astronomy", still prevalent in sociology, and calls such examples "little better than a collection of misapplied metaphors." 727) "Scientism" is in fact a good term to describe impassioned attempts by seekers after synthesis to unify all knowledge under a few sweeping catchwords borrowed from the exact sciences.

11. The formulation of natural laws.

We encountered an exceptional case in which Herder, in embryology, once
suggested that a single "Kraft" might be responsible for producing an orderly configuration of forms - the embryonic organism. More often, we later observed, he believes that regularities arise through the dialectical interaction of two "Kräfte". Then, in Herder's conception of a "Maximum", or dynamic equilibrium, as also in the theory of the "type" and many other ideas, we found that a group or system of several "Kräfte", by their interaction, produces a law-governed state or pattern of forms.

Having dealt, in our analysis of Herder's Baconian method of induction, with the epistemological requirements for the formulation of natural laws, we now ask which of the three empirical cases listed above is the basic one, seen by Herder as responsible for those objective regularities which can be defined as fundamental laws of nature.

It is upon the last of these three cases, that of many "Kräfte", that his clearest definition of natural law rests: 729)

Wirkt jede Kraft in ihrer Natur, so wirkt sie frei, und wenn sie durch andere eben so freiwirkende Kräfte eingeschränkt, d.i. in Wirkungen begrenzt wird, so entspringen daraus höhere Gleichungen, die man Gesetze der Natur nennt.

This definition appears in the "Metakritik" of 1799. But in 1777, 730) Herder had stated the same proposition in terms of two polarised "Kräfte", which are therefore a simpler case of the later, more complex one.

Herder, as we have repeatedly noticed, found that he could bridge many dualisms between science and other areas of thought by his vague conception of "Kraft". But within science itself he came to realise increasingly how inadequate it was. It described the content, not the form of the natural world, and efforts to reduce it to more specific, verifiable proportions invariably led to materialism. He therefore, as we have so often observed,
came more and more to emphasise formal categories, such as natural laws, in endeavouring to describe the orderly workings of the natural universe. In his final conception of natural law, quoted above, he combines the dynamic "Kraft" conception, which was always associated with power, and often with disorder, with the idea of an orderly form which arises out of the conflict of interacting "Kräfte".

Initially, we studied the origins of the essentially metaphysical Leibnizian conception of "Kraft". On the other hand, we traced the theory that conflict eventually produces order, back to Lucretius and the school of Epicurus. Herder's fundamental theory of natural law combines the two.

But how can "Kräfte" come into conflict? As Herder often says, they are themselves incorporeal. Yet they are always associated with a material "Organ". Is then the "conflict" of "Kräfte", for Herder, simply the random motion and collision of the material bodies with which they are associated, as in Lucretius' atomic theory? We know that Herder would never have admitted this consequence, since it would have rendered his "Kräfte" more or less redundant, and committed him to unambiguous materialism. In fact, the "Kräfte" concerned were, for him, not forces of random motion, but forces of expansion. A force expands the body or "Organ" in which it resides by a process of assimilation. This assimilatory, expansive force is seen, as we earlier remarked, as gravitational or magnetic attraction, for example, on the physical level, as nutritive assimilation on the biological level, and as apperception of objects analogous to the subject, to take another single instance, upon the psychological level. Such associations, we found, are all present in the theory of "Verähnlichung" in Herder's "Gott".

Such conceptions, however, can hardly be called Lucretian theories of
conflict. Nonetheless, the sterner Lucretian fundament, the idea of relentless conflict, is revealed in earlier statements. In the 1769 manuscript published recently by Irmscher, Herder speaks of the total indifference of each planetary "Genius" towards lesser beings such as man, who may suffer unnoticed just as the worm which is unwittingly crushed by man.\textsuperscript{732} The same manuscript notes refer to competition among plants for nourishment, and state that "Gewaltsamkeit" governs everything.\textsuperscript{733} In the "Ideen" Pt. I, Herder enunciated his familiar theory of struggle for existence among plants and animals\textsuperscript{734} (without, however, introducing any evolutionary conclusions). Again, he states in the same work that the "Kräfte" of humbler organisms can become sublimated only by assimilation into higher ones, so that "--- jede Zerstörung ist Übergang zum höheren Leben."\textsuperscript{735} The implications of such a theory are truly sinister. Only Herder's mitigating belief in the supremacy of love, and in the equal dignity of man and woman, can have prevented the logical extension of this theory to the social level; even in this case, hints of such usages appear in the early "Genie" theory, and in the theory, appearing in "Auch eine Philosophie", that certain great historical figures may be exempt from the conventional canons of morality.\textsuperscript{736} In this respect, Goethe went further than Herder, with his theory of the daemonic personality, whose rise to greatness may involve the sacrifice, one might even say the assimilation, of lesser personalities. Only Herder's theory of the planetary "Genius", indifferent to lesser beings, fully anticipates such ideas; and it arose in 1769, that year of exceptionally "free" thought for Herder:\textsuperscript{737}

--- der Genius hört auf mich so wenig, als ich auf das Schreien eines Wurms! Er ist zu Groß dazu --- Ich bin ihm zu klein!
Thus, a body is expanded by the action of its indwelling "Kraft", which absorbs humbler "Kräfte", or arrives at a state of balance with equal ones. For, as it expands, it eventually encounters similar expanding "Kräfte". At this stage, a Lucretian conflict begins, continuing until a state of equilibrium is attained. We can even speak of collisions between material entities in many such cases, especially on the physical and biological levels; such, as we have seen, is the (dialectical) theory of embryonic growth, whereby the foetus develops by contact with its surroundings,738) and the belief that man's faculties develop by touch.739) Herder says of the body:740)

Er [i.e. der Leib] ist also von ihr [i.e. der Seele] durch eine Art von fühlbarer Anziehung gebildet.

All the elements we have mentioned are present in this sentence: the "Kraft" (the "Seele"), manifesting itself in assimilation ("Anziehung") by contact ("fühlbar") with external entities. But such dialectical formulations are merely simpler versions of the theory which postulates many "Kräfte". Herder writes of the complete organism in his "Ideen":741)

Denn was ist eine Organisation, als eine Masse unendlich-vieler zusammengedrängter Kräfte, deren größter Theil eben des Zusammenhanges wegen von andern Kräften eingeschränkt, unterdrückt, oder wenigstens unsern Augen so versteckt wird, daß wir --- nicht die einzelnen Wesen selbst, sondern nur das Gebilde sehen, das sich zur Nothdurf des Ganzen so und nicht anders organisiren mußte.

The same process creates the ecological equilibrium, the social "Maximum", and the political "balance of power", as we have already seen. Herder also explains the rise of technological inventions in history "--- nach der Kosmogonie des Epikurs, durch ein Zusammentreffen der Atomen ---! Reihen
von Ursachen wirkten zusammen, gegen und nach einander --- ohne Plan und Regel drängte eins das andere ---. 741a) Such earlier formulations are later modified in favour of form and order, of course, but their basis remains unaltered. Thus, Herder's dialectical and mathematical theories of orderly change should simply be seen as special cases of this fundamental, and more general theory of natural law.

What are the sources, if any, for this singular hybrid of Lucretian and Leibnizian theory as applied to the objects of science? Firstly, Kant's theory of cosmic evolution by gravitational forces, and Needham's theory of growth by "expansion" and "résistance" were examples, early known to Herder, as we have seen, of the special case of growth by two dialectical forces. So also is C.F. Wolff's theory of growth, 742) which Herder, however, only encountered much later. But Kant, in one passage of his "Allgemeine Naturgeschichte", lapsed back into the older Lucretian theory that order arises out of collisions between many elementary particles, not of a duality of forces, as he suggests on all other occasions in this work. A balance arises 743) "--- indem die Theilchen ihre Bewegung unter einander so lange einschränken, bis alle nach einer Richtung fortgehen". Herder had also encountered the doctrine in the De rerum natura of Lucretius himself at an early date, as his Riga notebooks show. 744) (We may add that it was Herder who introduced Knebel, the greatest German translator of the poem, to this work of Lucretius, with the highest recommendation; 745) this fact is not generally known.) However, it is clear that Herder combined the modern, ultimately Leibnizian theory of growth by expansion (or accretion) with the Lucretian theory of conflict. This may even have been suggested by some passages in the works of Leibniz himself, but Leibniz applied his theory only to a metaphysical idea, not to particular situations studied by science, as
Lucretius had done.

The essence of this whole theory received its clearest expression in a late essay of Goethe's entitled "Die Lepaditen".\(^746\) It is one of the finest of his shorter scientific writings. He illustrates "die nach dem Regellosen strebende, sich selbst immer regelnde Natur" in a way in which Herder had described it in general long before; but his words have a plastic clarity which Herder, preoccupied with his amorphous "Kräfte", never commanded. Goethe describes the growth of the stalk of the crustacean lepas polliceps, a variety of barnacle, as governed by the expansion of many shell-like points upon the stalk's surface:

--- und hier, bei genauer Betrachtung, scheint es als wenn jeder Schalpunkt sich eile, die nächsten aufzuzehren, sich auf ihre Kosten zu vergrößern, und zwar in dem Augenblicke, ehe sie zum Werden gelangen. Eine schon gewordene noch so kleine Schale kann von einem herankommenden Nachbar nicht aufgespeist werden, alles Gewordene setzt sich mit einander ins Gleichgewicht.

Herder's theory of natural law admirably reconciles freedom with determinism when applied to society; the freely developing individual is limited in his actions by those of others. E. Zilsel, a modern writer on sociology, recognises this fact.\(^747\) It can similarly be used, as in Popper's theory, earlier mentioned, to show that the individual scientist may be no less subjective than his fellows, yet that science becomes objective through its public character (by the balancing influence of the conflicting opinions of other scientists).

In its best known form, the "struggle for existence" theory, this conception had, of course, an enormous influence. Lovejoy\(^748\) asserts that Herder discovered this "sinister" aspect of biology, without becoming an
evolutionist himself. Götz\(^749\) and Schmidt-Cürtow\(^750\) say the same. Lovejoy\(^751\) says that Herder's discovery was "the main source, alike of the most important scientific hypotheses of the nineteenth century, and of certain of the most significant and characteristic developments of nineteenth century philosophy - especially of philosophical pessimism." But a great deal of the credit for these developments must go to those earlier thinkers whom we named as Herder's sources. Besides, the idea of struggle had earlier appeared in the social theory of Hobbes, and, in Herder's lifetime, in the economic theories of Adam Smith and the Manchester school, as well as in the population theory of Malthus, which greatly influenced Darwin.

Finally, we should notice that the modern belief that certain natural laws (or even all natural laws, according to some theorists) are statistical averages, irrespective of the particular causality, or even freedom, non-causality or arbitrariness, behind the actions of individual units within a process, incorporates much of Herder's theory of natural law. Of all Herder's critics, only F. McEachran,\(^752\) it appears, has noticed this parallel, but he mistakenly adds that such a theory implies an anarchic universe. On the contrary, individual units obeying statistical macro-laws may be governed also by various causal micro-laws, as, for example, individual molecules do in their motion, although their collective motion is summed up by the purely statistical second law of thermodynamics.

Statistical laws can become a vehicle of prediction only in association with the theory of probability. Herder knew various writings on the theory of probability, mentioning those of (Jacques) Bernouilli and Lambert, and the non-mathematical ones of Hume and Mendelssohn\(^753\) in his "Journal". But, lacking the data of, and interest in, exact statistics, he failed to apply
the theory to natural laws, although Einsiedel, in notes copied by Herder, suggested that the analogies (i.e. regularities) observed in nature are perhaps merely a result of the laws of probability, and Lambert put forward the remarkably modern hypothesis that compound laws (the result of a plurality of simpler laws) may be formulated only numerically, and employed only in accordance with the theory of probability.

Herder's theory of natural law tallies well with this one of Lambert, which may indeed have influenced him, since he had studied the work concerned by 1769 at the latest. Like Lambert, Herder would declare that every individual event has a cause - for there is no trace in these writers of ideas like the modern physical theory of indeterminacy - although the causes may either be obscure (i.e. unknown "Kräfte") or complex (as in history). His historical "laws", such as that of the "Maximum" (borrowed, we should recall, from Lambert himself) were of this kind, but they lacked all statistical support, as we earlier observed. Lambert himself mentions the related "law" of "Beharrung", also adopted by Herder, as an example of his theory.

In conclusion, we shall sum up and classify Herder's views upon natural laws, remarking upon their relationship to modern science:

1) Herder accepts the Baconian definition of the natural law as an inductive generalisation. This, as a modern philosopher of science observes, is a definition in keeping with the phase of natural history which preceded the rise of many of the newer sciences. It describes observed regularities in generalised terms, instead of defining physical causes or functions. Of this kind is Herder's "type" principle, when applied to animal structure, postulating as it does a constant regularity in all species.
2) The mathematical "laws" borrowed from Lambert are an attempt to apply physical laws of motion, in a questionable way, to human society. Such physical laws, in themselves, are no longer regarded as irrefutable inductive generalisations, as Herder would have contended, but, as S. Toulmin points out, as "axioms — which are accepted so long as applications of them are found to fit the facts." The non-mathematical pseudo-laws of progress are, of course, in no sense comparable with modern conceptions of law.

3) Herder's final, general definition of natural laws seeks to delineate the mechanism by which all observed regularities, within dynamic processes at all levels, are brought about. This is no longer a mere description of static regularities in natural history. The laws are averages produced by the interaction of many, or sometimes of two natural units. Their encounter may be fortuitous, but their individual actions and mutual interactions (such as attraction) are causal processes, even if imperfectly understood, as when caused by the nebulous "Kräfte". This is the most satisfactory portion of Herder's theory of natural law, although, as we have seen, he had to fall back upon undiluted vitalism in one of his major attempts to explain how the animal embryo is formed.

But we must remember that Herder applied none of these classes of law in an exact or quantitative manner, although some of them were capable of such reduction, and have received it in recent times.

12. **Levels of organisation in the natural world.**

Again and again we have found that Herder employs concepts which either embrace, or treat as parallel yet distinct, several ascending levels of existence, from the physical to the social, and even on into ideal levels.
Such comprehensive conceptions were the Chain of Being, the "type", analogies, holism, the cyclic and developmental ideas, the dialectical formula, and both pseudo- and natural laws. They all give evidence of his wish to synthesise all areas of his experience, and to see them as a single, integrated harmony.

We now ask what he understands by each level in the concrete world, how he attempts to relate them all, and whether his conclusions possess any value today in the realm of scientific ideas.

The usual levels of the concrete universe which Herder treats as separate, while always attempting to relate them to others, are the physical, the biological, the psychological, the family group, the individual society, the nation as a political unit, and the whole of human history. Within physical reality he at various times distinguishes between the astronomical level, and that of the terrestrial objects of physics and chemistry; within biology, we find him dealing separately with embryology and physiology. All of these successive stages exhibit some degree of organisation, as Herder always insists, and we may use the modern terms "levels of organisation" or "integrative levels" to describe them.

Many critics have noticed that Herder uses broadly similar principles in dealing with the parallel levels of the individual human being, the single society or nation, and mankind in toto. Indeed, he admits as much himself when he enumerates them separately, applying to each his "Maximum" theory, in the "Ideen", Pt. III. 761) O. Temkin, in his excellent article on principles of ontogeny around 1800, notices that, in Herder's thought, the development of the single organism (or human being), that of man as a whole through various "ages", the successive creation of species, and the history of man (considered as a succession of civilisations), are all parallel but
distinct levels. Kuhfus notes in general of Herder: 763)

In dem großen Naturbereich hat so jeder Teilbereich seinen eigenen Seinsstand, der aber nicht in sich abgeschlossen dasteht, so daß es keine Verbindung zu dem andern gibt. Jeder Seinsstand läßt vielmehr in mannigfachen Übergängen seine Geöffnetheit zu den andern sichtbar werden.

But no complete demarcation of Herder's divisions within the natural world, or study of how he relates them, has yet been undertaken. Yet the whole problem of what constitutes a separate level of organisation is as important today as it was in Herder's time, since it involves such fundamental questions as what makes living matter different from inanimate matter, and how man as an animal differs psychologically and biologically from other animals, as well as from man as a collective sociological unit.

The least successful of Herder's efforts to interrelate various levels of organisation is that based upon „Kräfte“. We have noticed how he adapted Haller's categories of „Elasticität“, „Reiz“ and „Empfindung“, setting them up as separate „Kräfte“ in order to differentiate different degrees of physiological and psychological organisation. 764) Similarly, he distinguishes superficial physical changes affecting an organism from inherited changes by introducing a „genetische Kraft“, responsible for inherited characteristics. 765) But the unqualified idea of „Kraft“ in itself serves to demonstrate that a common, not a distinct content, exists behind divergent forms; thus, Haller's three „Kräfte“ are stated, in the „Ideen“, to be different aspects of one and the same „Kraft“. 766) Temkin maintains, probably correctly, that the same „genetische Kraft“ operates, for Herder, within embryological, ontogenetic, phylogenetic and historical areas. 767) Thus it is clear that the „Kraft“ idea in itself rather unites different levels than distinguishes
them. Herder uses it, in fact, to explain dynamic transitions from one level to another. For example, the "Kräfte" of animals are sublimated by assimilation into the human organism, and the "Kraft" of each human being migrates to a new "Organ" on a higher, spiritual level. Clearly, this whole scheme in itself, including such temporal transitions, is ideal and metaphysical, and neither distinguishes nor interrelates different levels of organisation satisfactorily from the point of view of science.

A second attempt by Herder to relate different levels of organisation likewise tends to identify rather than to distinguish between them. We have seen how he applied physical laws to social, historical, and even ethical spheres. He believes this to be justified: "--- da Geist und Moralität auch Physik sind und denselben Gesetzen, die doch zuletzt alle vom Sonnensystem abhängen, nur in einer höheren Ordnung dienen."768) This time, formal laws rather than amorphous "Kräfte" are employed, but the result is essentially the same as before. No scientist would deny that physical laws, such as that of gravity, for example, continue to apply to biological units as well as to inanimate ones. (Matter does not become weightless when animate.) But Herder suggests that they apply "in einer höheren Ordnung" of mind and morality, which is quite a different proposition. He says, on the one hand, that they are derived from the constitution of the solar system, implying that they directly determine the workings of these highest levels. On the other hand, as we have seen, they are used only analogically, not literally. This second attempt to draw parallels between levels is therefore self-contradictory, and unsatisfactory as a scientific theory. In its "organic" variant, which assumes that the processes associated with the growth of organisms recur on all (holistic) levels of organisation, it led,
as we observed in our examination of holism and organicism, to some more interesting conclusions.

Herder, however, does employ other means of relating different levels, without obscuring the distinct individuality of each. The simplest of these means is the dialectical method, which solves the problem dynamically. For, as we briefly remarked while discussing this method, he used it to demonstrate how a developing unit can progress from a lower to a higher level through conflict or opposition; for example, the polarised "Kräfte" of expansion and contraction produce crystals, and even plant-like forms, in the inorganic world,\textsuperscript{769} the human infant acquires its powers of apperception by its tactile activity, the interaction of nations leads to a peace-preserving international balance of power, and so on. Hegel developed this idea, backing it up with more theoretical reasoning; the result was his "law of the transformation of quantity into quality",\textsuperscript{770} which asserts that quantitative changes among units existing on one level can produce qualitatively different ones on a higher level. Herder had often applied this principle, as we have seen, without defining it in theory. Joseph Needham, in an essay on Whitehead's philosophy, indeed considers that the dialectical method necessarily leads to a theory of distinct levels of organisation, and rightly links this theory in turn to holism:\textsuperscript{771}

The syntheses at all successive levels of being, resolving the successive contradictions, form a series of envelopes, for they each include the elements of the contradictions on the levels below them as a series of parts. Like so many things in nature, the successive syntheses form a dendritic continuum or hierarchy of wholes.

Thus, this particular method of Herder's is still associated with scientific
thought on the levels of organisation among dialectically minded thinkers.

Herder's next solution to the problem of levels is the most complex, and the most satisfactory of them all. Before he adopted Haller's "Kräfte", he defined the differences between biological and psychological levels, in his language essay of 1770, as produced by the different arrangement of constant parts, rather than by the addition of new "Kräfte". He says of man and the animals: 772)

Der Unterschied ist nicht in Stoffen [sic], oder Zugabe von Kräften, sondern in einer ganz verschiedenartigen Richtung und Auswicklung aller Kräfte.

For example, the human reason is not a new "Kraft" or faculty: 773)

Nach richtigern Begriffen ist die Vernunftmäßigkeit des Menschen, der Charakter seiner Gattung, etwas anders, nehmlich die gänzliche Bestimmung seiner denkenden Kraft im Verhältniß seiner Sinnlichkeit und Triebe.

He later combines this formal distinction with Haller's "Kräfte" in the "Ideen", thereby making not distinct "Kräfte", but different arrangements of the same "Kraft" or content the means of distinguishing between physical and physiological levels. The passage in question was quoted in our section on the dialectical method, but it is worth quoting again here: 774)

Elasticität und Reizbarkeit grenzen an einander, wie Fiber und Muskel zusammen grenzen. So wie dieser nur ein verflochtenes Kunstgebilde jener ist: so ist auch die Reizbarkeit wahrscheinlich nichts als eine auf innige Art unendlich vermehrte Schnellkraft, die in dieser organischen Verschlingung vieler Theile sich aus dem toden Fibergenfühl zur ersten Stufe des thierischen Selbstreizes erhoben. Die Empfindsamkeit des Nervensystems wird sodenn die dritte höhere Art derselben Kraft seyn, ein Resultat aller jener organischen Kräfte.
The distinction through different "Kräfte" and the earlier distinction through the presumed rearrangement of constant components coexist uneasily in Herder's phraseology. A manuscript version of the same passage conveys the earlier sense more clearly:

In der Proportion und in der Temperatur des Gansens muß alles liegen.

Herder here again recommends that distinctions between animal and man should be based on this criterion of rearrangement, of increased complexity (already mentioned in our section on dialectics). We noticed, when reviewing Herder's methods of classification, that his other formal distinctions between animals and man, such as the variation of certain craniological angles, the relation of structure to biped or quadruped gait, and (much more satisfactory) the theory that the nervous system becomes progressively more integrated and complex in higher organisms, are all preferable to introducing new unknowns or "Kräfte"; principia praeter necessitatem non sunt multiplicanda. But Herder says even more clearly of the human soul, the psychological dimension, further on in the "Ideen":


Despite this admission, he proceeds to draw purely metaphysical conclusions; but this formula, using the criterion of increasing complexity within the same components in order to distinguish between levels, is closer to modern versions than any of those hitherto discussed. For example, Needham uses the same distinction in 1928 to demarcate, in this case, physical and biological levels.
--- the processes of living matter are subject to the same laws that govern the processes in dead matter, but --- the laws operate in a more complicated medium; thus living things differ from dead things in degree and not in kind.

L. von Bertalanffy writes around the same time:

The characteristic feature of life is thus not in some one peculiarity of the particular vital processes, but in the special organisation of all these processes among one another.

We have seen that Herder too uses a similar argument to distinguish between the physical and the biological, between „Elasticität“ and „Reiz“.

A few consequences of this comparison between Herder’s ideas and those of modern theorists must however be amplified. The units out of whose configuration a new quality arises are, in Herder’s case, the ubiquitous „Kräfte“, whereas in the modern theory, they are chemical processes. But this difference does not nullify our comparison, which is one between methods. The important point is that both Herder and the modern theorists believe that the content behind differing levels is the same, and that only in form and complexity of arrangement of the components are the different levels distinct. Both approaches are therefore monistic, and the method of looking for variation in formal regularities rather than for qualitative differences is the same. Herder’s „Kraft“ allows him to escape materialism, while he elaborates methods later found in association with materialism in science.

Within Herder’s thought, the idea that varying regular configurations arise out of constant elements should remind us of his theory of the natural law, created by a balanced configuration of „Kräfte“. In turn, we should compare his criterion of rearrangement with the simpler dialectical formula. But the dialectical approach in distinguishing levels usually involves a
conflict between the developing unit and its surroundings, rather than within the unit itself, as the rearrangement theory implies. Besides, the dialectical formula describes dynamic transitions from one level to another, whereas the rearrangement theory simply distinguishes between static levels. Finally, we should recall that the theory of levels in Herder's works is of importance for his system of classification from the lowest organisms to man. Such more successful attempts, we again note, are by no means "physiognomical", as Rouché contended.

The clarity of Herder's conceptual distinctions suffered greatly from the vague "Kraft" conception. He insists that laws obtaining upon lower levels continue to operate on higher ones, as we established initially. Yet he was aware, as it appeared, that a new configuration of elements could produce new and more complex situations. He never seems to have been certain what exactly constitutes this new complexity (apart from his excellent remarks upon progressive nervous integration), and employs such phrases as "auf innige Art unendlich vermehrt", and speaks of a new "Temperatur des Ganzen" to express the difference between levels. The more logical mind of Claude Bernard, for example, drew an exact "distinction between processes, laws and theories" which, as Goodfield's monograph on the history of physiology indicates, enabled him to show that inanimate and animate levels may well have the same components and follow the same laws, whereas new processes appear on the biological level. These processes may indeed prove, as the writer remarks, to obey new laws upon a higher level, like Mendel's Laws of Inheritance in biology. Only on one occasion does Herder appear to suspect that processes on a higher level may actually obey new and higher laws; no new material faculty of the mind should be sought,
he again says: 780)

Also ist eine schwache unphysiologische Vorstellung, sich das Gehirn als einen Selbstdenker, den Nervensaft als einen Selbstempfnder zu denken; vielmehr sind es, allen Erfahrungen zufolge, eigene psychologische Gesetze, nach denen die Seele ihre Verrichtungen vornimmt und ihre Begriffe verbindet.

Here once more, Herder seeks new patterns rather than new "Kräfte"; this was one of the best achievements of his mature period. The reason why he failed to achieve even greater results was that he never emancipated himself finally from his "Kräfte"; ultimately, too much depended upon them.

But Herder, in his best solutions to the problem of how levels should be differentiated, most closely approached definitions of life and of mind which could offer an alternative to vitalism, while avoiding the crasser aspects of mechanism, with its disregard for those distinctive characteristics which do supervene on biological and psychological planes. The criterion of new and more complex forms, combinations and processes appearing in the workings of basic elements of a constant quality is a theory which has almost completely usurped the position of the earlier vitalistic and mechanistic theories in modern theoretical biology. We have studied some of the details of this revolution in our section on "organicism", which is necessarily bound up with the modern theory of levels of organisation.

Further examination of sociological and political levels in Herder's thought is unnecessary, since this has been done in the sections upon pseudolaws. We have ignored the ideal levels of supposed higher beings, often imagined to inhabit planets and other celestial bodies, as having no place in our discussion of scientific methods. They will later receive attention in chapters devoted to the details, or results, of Herder's scientific
thought. Nonetheless, we note at present that such ideal levels are present, as part of the ideal side which always balances the realistic sides of Herder's mind.

We shall conclude with some short observations upon Herder's sources. The Chain of Being, and the chain of "Kräfte" behind it, form the scale of gradual transitions on to which the theory of distinct levels was imposed. Herder alone partially succeeded in separating the levels which the Leibnizian theory was at special pains to merge into one another, according to the principle of continuity. As for the theory of rearrangement of constant basic elements, Lucretius considers that life differs from the inanimate not because it possesses new sentient "parts", but because insensate elements appear in certain new combinations.\(^7\) If we substitute Herder's "Kräfte" for Lucretius' atoms, we have, as in the theory of natural law, Herder's own version. Such ideas were a step, in theory, towards the objective demarcation of the levels of matter, life, and mind. Kant's criterion of biological "Zweckmäßigkeit" was, in many ways, logically satisfactory as a subjective rule, but, sooner or later, it had to be complemented by empirical distinctions between the living and the inanimate.

Conclusion.

We have endeavoured to follow up in practice our initial contention that the history of scientific methods is more important than the history of detailed theories and results, since the latter acquire significance only through the former.

Nearly all of Herder's methods combine an interest in relativistic and absolute values. We have shown this to be true of his solutions to the problem of subject and object, his attitude towards the position of man in the
natural world, his "type" theory, his system of classification, his use of analogies, his attitude to teleology, his use of holism, his "genetic" method, his theory of development, his dialectical method, his use of mathematics, and his theory of natural laws. In each case, we have tried to prove that he does not merely impose one aspect upon the other, but that both coexist, usually in uneasy synthesis, as independent functions within his mind.

Where many critics have, in our opinion, over-emphasised one side of Herder's thought, we have tried to show that the other is equally important. Where the non-scientific facets of his methods have been stressed too heavily, as has so often happened, we have adopted a more positive approach to them; conversely, claims that particular theories of Herder's were preeminently modern and scientific have been examined in the light of the methods which Herder employed, and contrasted with the negative, less scientific aspects. Since some critics of his scientific thought, especially Rouché, the most thorough of these, have contended that orthodox theological doctrines were behind most of Herder's scientific interests, and that the latter merely ministered, in a subordinate position, to theology, we have been obliged to emphasise the relativistic aspects of his thought, in order to counteract such one-sidedness, while pointing out that a perfectly balanced picture of his methods must lose sight of neither side: both aspects are nearly always equally present, and equally important, and while each is often distorted in some way to facilitate its reconciliation with the other, each retains its basic independence. In this way, Herder's natural religion tends towards liberal theology, while his scientific efforts are tempered, and often vitiated, by metaphysical doctrines and mystical, ethical or aesthetic emotions.

We have maintained that the scientific thought of Herder and of more
modern theorists can be compared only with reference to the methodological equipment of each. We find that comparisons between his particular theories and those of today are misleading, and usually erroneous. As for methods, we find that these, as distinct from the conclusions based in part upon them, often exist as independent, relativistic modes of thought; these, as well as the other methods which Herder applied in order to compare and synthesise different areas of his experience (for example, the comparative, analogical and dialectical methods, and the theories of organicism, of natural law, and of distinct levels of organisation), have frequently reappeared in later and in modern scientific thought as valuable means of description and of enquiry. Several important applications of these methods were Herder's original contributions to scientific thought.

In every case, the methods compared are formal categories, not descriptions of the ultimate content of the natural world. We have seen that Herder supplemented his qualitative definitions of content more and more by formal ones, especially in his mature period. Theories of content in Herder's age can rarely be compared with modern ones, since, at that time, knowledge of the ultimate properties of physical, chemical and biochemical matter was almost entirely theoretical, whereas we now possess a mass of exact experimental evidence. Herder considered the ultimate content of the natural universe to be "Kraft". This provided the basis of his monistic theories of nature. Modern theories of science are usually either monistic, or indifferent to the "intrinsic" nature and number of the supposedly ultimate constituents of the universe, while applying broadly uniform principles to all areas of it; this indifference to number, coupled with uniform treatment, might be called a methodological monism, but not a
qualitative or dogmatic monism like Herder's. Thus, both Herder's theoretical methods and those of today assume that the same principles can be applied to all aspects of the natural world. A unitary theory of the natural world demands versatile formal methods of description and explanation. We therefore find that Herder's monism and modern unitary theories employ similar formal principles, while differing fundamentally in their views concerning the elements of which the universe is compounded.

So far as Herder's personal development is concerned, we have seen that he acquired the greater part of his theoretical equipment in his philosophy of science at a remarkably early stage in his life, and that, from the beginning, his strivings to reconcile the many conflicting sides of his wide experience and interests are manifest. In fact, it was such desires, the mark of the natural polyhistor and even of the mystic, which caused him to elaborate most of his characteristic methods. It is clear that the year 1769 saw a high water mark in his more radical scientific ideas. These ideas stayed with him for the rest of his life, and he continually renewed his efforts to assimilate them into the rest of his thought, although they never entirely lose their old identity.
Notes to text (Vol. 1)

In the following notes to the text, the surname of the author or first word of the title referred to is given first, followed by the number of the relevant work as listed in the bibliography at the end of Vol. 2 of the present study. Where a work consists of several volumes, the volume number appears in Roman numerals after the bibliography number, and the page number is given last. Thus a reference to p. 249 of the eighth volume of Goethe's scientific writings, in the Weimar edition, would be:

Goethe 267 VIII p. 249.

References to Herder's works, however, are to the Suphan edition (unless otherwise stated), and are prefixed by the letters SWS (Sämtliche Werke, Suphan). In the case of this frequently quoted edition of 33 volumes, the volume numbers, for greater brevity, are given in Arabic numerals, and are followed immediately by page numbers. Thus p. 78 of the thirteenth volume of Suphan's edition of Herder's works is written:

SWS 13, 78.

Herder's manuscripts in Tübingen and Weimar are referred to as follows. Those in Tübingen are deposited in the:

Stiftung Preussischer Kulturbesitz,
Depot der Staatsbibliothek. Tübingen.

We have abbreviated this to:

S.P.K. D.S.T.

The manuscripts are ordered by "Kapseln" and "Nummern". Thus a reference to MS number one, "Kapsel" number twenty-five, in Tübingen, runs:

Herder's MSS S.P.K. D.S.T. Kapsel XXV Nr. 1.

The MSS in Weimar are kept in the:

Nationale Forschungs- und Gedenkstätten, Weimar (Goethe- und Schiller-Archiv).
This is abbreviated as

N.F.G. (G.S.A.).

The title of the catalogue of Herder's library ("Bibliotheca Herderiana") is abbreviated to "Bibl. Herd."

Part I, Introduction.

1. Dobbek 80.
3. Kronenberg 158 p. 11. Haym, however, sees the influences of Kant and Hamann as harmonious and complementary.
4. Kühnemann 18, introduction p. LXVI.
5. Dachauer 142 p. 158.
6. Hoffart 152 p. 89.
7. McEachran 72 p. 43.
8. Kuhfus 159 p. 34.
12. Siegel 176 p. 130.
13. SWS 8, 246.
14. e.g. SWS 5, 293; also id., 7, 321; 7, 360; 8, 183; 24, 575; 29, 706, etc.
15. SWS 13, 25.
17. We shall evaluate "dialectical" and Marxist interpretations of Herder in the section "The dialectical method" in the following chapter.
18. Lovejoy 226 p. 293. Compare p. 7 of this same work: "There is, for example, a practically very important difference between "esprits simplistes" (we have no English term for them) - minds which habitually tend to assume that simple solutions can be found for the problems they deal with - and those habitually sensible of the general complexity of things - - - ."
19. Clark 66 p. 398. Clark stresses "the empirical or pragmatic conviction of Herder that the individual fact, event, and personality are prior to any generalisation." Also op.cit. p. 99: "The ultimate pillars of knowledge were for him, in 1769, biological and physical science and history; we shall find this idea predominant in his work till 1775." Also op.cit. p. 3: "I find that he remained impervious to Hamann's mysticism."
21. op.cit. p.533.
22. Dobbele 80 p.41.
23. Dauchauer 142 p.69.
26. SWS 1, 418. Fragmente, 1767.
27. Dauchauer 142 p.80.
28. Steinborn (misspelt "Heinborn" in several bibliographies) 126 p.97.
29. SWS 21, 321; c.f. SWS 1, 419.
30. quoted in Haym 68 II p.691.
31. We shall show that this was Kant's meaning by citing Herder's lecture notes in our section on "Kraft" later in this chapter.
32. Siegel 176 p.9; c.f. id., p.129.
33. SWS 21, 34. Metakritik; c.f. SWS 21, 36.
37. SWS 13, 115.
38. SWS 13, 15.
40. SWS 8, 320. Vom Erkennen und Empfinden, 1778; c.f. SWS 8, 232-233, where Herder notes Bacon's distinction between "Paarer" and "Unterscheidungsmacher" and Pascal's "esprit de justesse" and "esprit de geometrie". C.f. Goethe 267 VII p.171, who says "daß Sondern und Verknüpfen zwei unzertrennliche Lebensacte sind."
41. SWS 8, 171. Vom Erkennen und Empfinden, 1778.
42. c.f. Gillies 145 p.89: "Herder's vision of 'Humanität' sprang from a sense of the unity of all things and showed that the realisation of individuality within this unity was the grand purpose of Providence. --- Here was on the highest possible level --- Goethe's own idea of morphology, unity in variety and variety in unity."
44. c.f. Kühnemann 18 p. CXLV: "Wie dieser [i.e. Leibniz] in einheitlachen Streben Natur und Gnade, mathematische Naturwissenschaft und Theologie durch das Stufenreich der Wesen verband, so vereinte Herder die geistige Natur und die Religion."


46. Dobbek 25 p.250, to Sömering, 28th February, 1785: "--- das letzte Buch kann für den, der es nicht gelten lassen mag, meinenhalben wegbleiben; in meinem Plan und meiner Absicht wird damit nichts geändert."

47. Kühnemann 18 p.LXXI; c.f. also Kühnemann 70 p.381.

48. Rouché 170 p.331 (Rouché refers to a similar contradiction): "En somme, la contradiction --- est purement apparente; celle-ci est une concession consciente au goût du jour ---; celle-là, une fois l'audience du public assurée par la présentation scientifique des cinq premiers livres, exprime la pensée véritable [i.e. religious] de Herder."
Also op.cit. p.532: "La première partie des Idées utilise les résultats de la science moderne pour fonder en nature l'idéal d'humanité', forme laïcisée du christianisme."

49. SWS 13, 84.

50. Blumenthal 139 p.9: "Leibnizens Ausführungen interessieren Herder nur insoweit, als sie zur Ausbildung einer durchorganisierten, dem natürlichen Rhythmus unseres Lebens angepaßten Weltansicht beitragen ---"

51. c.f. the methods of Dalberg 261 p.8: "Ich vergleiche die unläugbaren Grundsätze der Physik und Moral, der Chemie und Politik, der Theologie und Psychologie u.s.w. Und da auch ich die Punkte der Ähnlichkeit unter ihnen auf." c.f. also C.F. Wolff, described by Nordenskiöld 230 p.250: "--- with a couple of phrases he throws a bridge across even the deepest abysses of natural science. --- In all this he is a precursor of the natural philosophy of romanticism ---"

51a. In all this discussion of the dual nature of Herder's personality, we have formalised the symmetry of his "two natures" to an extent which is permissible only in a general discussion, for the sake of clarity. We have no wish to imply that his was a schizophrenic nature; such conflicts as did arise in his mind were often grave enough, so that he eventually became profoundly, even pathologically out of harmony with his personal and national environment. But, until his latter years, he always succeeded in arriving at such compromises as we have described, even in his personal life, which was fortified by an unusually happy family existence; the crises he underwent could never damage irreparably the unity he had achieved within his varied personality.


53. Bärenbach 75.
54. Rouché 113.
55. op.cit. p.79.
56. op.cit. p.80.
57. op.cit. p.79.
58. op.cit. p.9.
59. op.cit. p.79.
60. op.cit. p.72.
61. c.f. op.cit. p.45 where S. Karpe's Jewish antecedents are adduced as probable influences in his work.
63. Schütze 173.
64. see Clark 79, esp. p.751 where Herder is seen as a precursor of Auguste Comte and an early exponent of the modern idea of energy.
65. see Schütze 173 XXI p.127 referring to "the general vitalism characteristic of modern philosophy." c.f. also Clark 79 p.752: "If it [i.e. "Kraft"] is purely metaphysical, then most modern physics is also metaphysical."
66. Sarton 233.
67. Bruntsch 78.
68. Grundmann 84.
69. Sauter 116.
70. Temkin 128.
71. Farrington 218 p.58.
72. Kohlbrugge 93.
73. Bacon 245 IV p.55.
74. Bertalanffy 189.
78. Clark 79; c.f. note 65 above.
79. Lange 196 II p.207.
80. see note 64 above.
82. Siegel 176 pp.126-132.
83. Irmscher 7 p.13.
86. op.cit. II p.691.
87. c.f. SWS 1, 419; 3, 137; 21, 66 et alia.
88. Martin 19 p.301.
89. Herder's MSS S.P.K. D.S.T. Kapsel XXV Nr. 45 and 46, entitled "Vorerminnerungen in der Mathematik" and "Vorläufige Erinnerungen".
90. SWS 21, 66.
91. e.g. Haym 68 II p.290; Blumenthal 139 pp.19, 27 and 48; Siegel 176 p.139. c.f. also Schmidt 172 p.17.
92. SWS 16, 450. Gott, 1787.
94. Lambert 301 II pp.20, 39, etc.
95. Siegel 176 pp.126-132.
96. SWS 21, 152.
97. SWS 21, 153 (c.f. Descartes' "cogito").
99. Maupertuis 308 p.31. Herder knew this work, and mentions it in 1774 - c.f. SWS 6, 273-274.
100. e.g. in his "Träume eines Geistersehers" - c.f. Nordenskiöld 230 p.270.
101. Kant 295 p.180. Similar remarks are made by Blumenbach, Burke, Berkeley, Euler, Needham, etc.
103. SWS 7, 381; c.f. id., 8, 177; 13, pp.10, 47, 161 and 358; 14, 605; 15, 264; 16, 551; 18, 342; 20, 180; 21, 173; 23, 512; 30, 395; 32, 227.
104. SWS 15, 533.
106. Lange 196 II p.204.
108. SWS 13, 84-85.
109. SWS 8, 99.
110. SWS 14, 692.
111. Engels 193 p.49.
112. SWS 23, 522.
113. Maupertuis 308 p.28.
114. see note 107 above.
115. SWS 8, 264.
116. SWS 14, 665.
117. see SWS 14, 585; also id., 30, 395; 31, 386; 32, pp.199 & 229, etc.
118. Probst 108 p.34.
120. Burkhardt 15 p.47.
122. SWS 32, 218.
123. SWS 8, 169.
124. Sulzers Vermischte Schriften, Berlin, 1773; his Berlin lectures, 1751 et seq.
125. SWS 13, 346; c.f. id., 17, 77.
126. Varnhagen 58 III p.292. The essay is undated, but its content suggests the late 1780's.
128. Schauer 51 I p.126.
129. Caroline 69 III p.192.
130. op.cit. III p.194. We shall discuss this later in detail.
131. Caroline 69 III p.250 quotes this from Jean Paul's "Vorschule der Ästhetik", 1804.
134. SWS 32, 193-194.
135. SWS 14, 605, "Versuch über die Kräfte", undated by Suphan but dated c. 1780 by Irmscher 8.
136. SWS 32, 228. Early undated sketch "Grundsätze der Philosophie".
137. Kant 283 p.329.
138. see SWS 1, 116.
139. SWS 6, 363.
140. SWS 10, 327.
141. Schaede 171 p.31.
142. McKachran 72 p.43.
143. SWS 7, 13; c.f. id., 30, 229. Compare the idea of Galen and others (cited Singer 236 p.268) that life is sustained through inhalation of the world-soul, diffused as "pneuma" in the atmosphere. Notice how Herder links religious and biological concepts.
144. Kühnemann 71 p.152.
145. Jammer 224 p.49.
146. op.cit., p.50.
147. SWS 11, 253, Vom Geist der ebräischen Poesie, 1782.
148. Strothmann 180 p.174 et seq.
149. Clark 79 p.749.
150. op.cit. p.743.
152. SWS 32, 147.
153. SWS 6, 440, æ teste Urkunde.
155. op.cit. p.151.
156. op.cit. p.158.
158. Herder's MSS S.P.K. D.S.T. Kapsel XXX Nr. 22 contains extracts from Toland as well as Bruno's „Buch vom Unendlichen der Welt“. Irmscher says in his catalogue that the notebook concerned was „benutzt größentheils in den Siebzigerjahren“.
159. SWS 24, 224.
162. Irmscher 17 p.289.
163. Unger 57.
164. op.cit. p.6. The second of Herder's letters is published in Lebensbild 34 V p.108 et seq.
165. SWS 8, 104, Plastik, 1769 version.
166. Unger 57 p.20.
167. SWS 14, 605.
169. Witte 186 p.313.
171. Schütze 173 XVIII p.296.
172. SWS 3, 137.
174. Clark 79.
175. Hoffmann 38 p.35 and note, p.127, to Nikolai, 10th January, 1769.
176. SWS 5, 591.
177. SWS 30, 396.
Part I, Chapter II.

1. SWS 16, 470.
3. e.g. SWS 22, 40; also in the "Plastik" etc.
4. SWS 28, 367, Der entfesselte Prometheus, 1802.
5. Goethe 32 VII p.203, Goethe to Frau v. Stein, 10th April, 1786; c.f. Varnhagen 58 II p.301, Herder to Knebel, April-May 1785.
6. SWS 32, 471, sermon, 1769.
7. SWS 21, 161.
8. SWS 15, 167 and id., 23, 523 et seq.
9. SWS 2, 257-258.
11. c.f. SWS 13, 120 note: "Meine Meinung ist aus vorliegenden Thier- und Menschenschädeln geschöpft."
12. SWS 13, 251.
13. Caroline 69 III p.194: "... er bedauerte es oft, daß Deutschlands Fürsten sich nicht vereinigten, um durch ihre geschicktesten Männer die Kenntnisse dieser Dinge gründlich aufzuklären."

15. Siegel 176 p.199.
17. Goethe im Gespräch mit Falk, 1809.
18. Schwarz 121 p.149. c.f. also Schwarz 120 p.170.
20. c.f. SWS 4, 439.
21. c.f. Schauer 51 I pp. 320-328 & p.342, etc.
22. op.cit. I p.342.
23. Suphan 181 p.73.
25. SWS 14, 672, Suphan's "Nachwort".
26. Herder's letters from Italy, in Dünzer 27, esp. those from Naples, are full of descriptions of landscape and scenery.
27. SWS 4, 391.
29. e.g. SWS 8, 265.
30. SWS 9, 352; c.f. SWS 9, 444.
31. e.g. SWS 13, 9; also id., 13, 110 & 13, 177.
32. SWS 14, 85: "Dem Naturforscher, der zur Kenntnis und Ordnung aller Classen seiner Reiche gelangen will, ist Rose und Distel, das Stink- und Faulthier mit dem Elephanten gleich lieb; er untersucht das am meisten, wobei er am meisten lernet."
33. SWS 15, 384.
34. Clark 79 p.751.
34a. Schütze 173 XXI pp.129-130.
35. Götz 82 p.166.
37. Noll 106 pp.319-320: "Es scheint uns aber der Nachweis zu genügen, daß Herder mehrdeutig vorgegangen ist und in seiner Stellung geschwankt hat."
38. Posadzy 168.
39. e.g. SWS 21, 41-42, also id., 20, 370, etc.
40. SWS 4, 465.

42. SWS 5, 411.

43. e.g. Herder's MSS S.P.K. D.S.T. Kapsel XXV Nr. 69-75 contain numerous and extensive extracts from Bacon's works. Critics, moreover, have not yet noted that Herder intended to produce a German, or even a Latin edition of Bacon's "De Augmentis", but was forestalled in both cases by others (c.f. Gelzer 31 p.120, Herder to J.G. Müller, 30th Dec. 1787).

44. Varnhagen 58 III p.457.

45. SWS 8, 301, Vom Erkennen und Empfinden, 1775 version.

46. SWS 31, 305, sermon, 1774.

47. For subjective variation in perception, see SWS 8, 156; also id., 15, 526 & 532; 24, 438. For similar variation in imagination see SWS 13, 299.

48. SWS 5, 411; c.f. SWS 8, 248, Vom Erkennen und Empfinden, 1774 version.


50. Gillies 67 p.86.

51. see esp. Kühnemann 71 p.66.

52. Hoffart 152 p.43.


55. Lisch 45 p.270, Herder to von Hahn.

56. SWS 4, 350.

57. SWS 7, introd. p.XXVIII.

58. SWS 8, 170; c.f. SWS 4, 10.

59. SWS 9, 506.

60. Popper 202 pp.155-156.

61. Clark 66 p.15.

62. SWS 8, 169-171.

63. Irmacher 17 p.293.

64. Haym 68 I pp.675-676.

65. SWS 8, 255.

66. Sommerhalder 177 p.29.

67. Strothmann 180 p.184. Again, we see this element as mystical rather than orthodox.

67a. SWS 8, 233-234.

68. SWS 21, 130.

69. e.g. SWS 8, 190-191.

70. Rouché 170 p.214 etc.
71. SWS 12, 7.
72. SWS 8, 193.
73. SWS 13, 77.
74. SWS 13, 81.
75. SWS 13, 78.
76. SWS 13, 175.
77. loc.cit.
78. SWS 8, 193.
80. SWS 8, 193.
81. SWS 15, 526.
82. SWS 13, 182.
83. SWS 21, 297.
84. c.f. SWS 21, 298.
85. loc.cit.
85a. SWS 22, 252.
86. SWS 5, 462.
87. Goethe 267 XI pp. 18-19, Glückliches Ereignis, c. 1817.
88. e.g. SWS 5, 576.
89. SWS 8, 207.
90. SWS 14, 499.
91. SWS 29, 135.
93. Wilhelmsmeyer 185 p. 222.
94. SWS 13, 155, also quoted in Berger 137 p. 26.
96. Kühnemann 71 p. 151.
97. op. cit. p. 161.
98. Haym 68 I p. 666 et alia.
100. May 101 p. 37.
102. SWS 13, 68.
103. loc. cit., note.
105. SWS 13, 69.
106. e.g. SWS 13, 66; also id., 13, 70; 13, 123; 14, 590; 22, 117.
107. SWS 14, 590.
108. SWS 13, 445.
109. SWS 13, 168.
110. Einsiedel 263 p.81.
111. Hettner 35 p.222, Forster to Sommering, 19th May 1785.
113. c.f. SWS 15, 535.
114. SWS 13, 101, also quoted in Siegel 176 p.135.
115. e.g. those of Nordenskiöld, Radl, G. Rattray Taylor, and others.
116. SWS 14, 693.
117. loc.cit.
118. SWS 4, 41.
120. SWS 13, 274.
121. SWS 18, 248.
122. Bruntsch 78 p.31.
123. Kohlbrugge 93 p.1114.
125. Lovejoy 226 p.280.
126. SWS 7, 75.
127. SWS 14, 693.
128. SWS 14, 590, early MS for "Ideen", also quoted by Suphan, SWS 14, 693.
129. SWS 6, 419. The "hieroglyph", with stars instead of points, appears on certain Masonic scrolls.
131. SWS 23, 533.
132. SWS 6, 485.
133. SWS 6, 320.
134. SWS 6, 422.
135. SWS 6, 347.
136. SWS 4, 351; c.f. SWS 6, 145-146, etc.
137. see Zöckler 243 I p.270.
138. SWS 13, 424.
139. SWS 14, 590 & 693.
140. SWS 14, 590 & 624; c.f. Herder's "Kopf", "Gerippe" and "Gliederwerkzeuge" (SWS 14, 590) or "Kopf, Rumpf, Hände und Füße" (13, 66) with Goethe's "anatomical type".

141. SWS 13, 86.

142. SWS 13, 274.

143. Rasch 73 p.128; the reference is to SWS 7, 79.

144. SWS 29, 110-111.


146. Rouché 170 p.216.

147. see Adams 209 p.68.

148. op.cit. p.73 etc.

149. op.cit. p.67.

150. Hansen 85 p.15.

151. Erhard 81 pp.171-172.

152. quoted by Thienemann 237 p.257.

153. SWS 14, 590 and SWS 22, 117; also SWS 13, 66.

154. e.g. comparison between brains, SWS 13, 123.


156. see Adams 209 p.206.


158. White 238 I p.43.

159. Kant 292 p.45 (1784).


161. Kühnemann 70 p.228.

162. op.cit. p.385.


165. Kant 283 p.349.

166. op.cit. p.367.


169. SWS 21, 136.

170. SWS 8, 170.

170a. SWS 15, 553.

172. Z. Markovic, "Boscovich's 'Theoria'", in Boscovich 252 p.132.


174. c.f. Thiemann 237 p.266.

175. quoted in Hesse 194 p.5 from his "Physics, the Elements".


177. example given by Hesse 194 p.66.


179. op.cit. p.226.

180. Hesse 194 pp.68 & 77.

181. op.cit. p.93.

182. SWS 4, 354.

183. In a letter to Sömmering, 28th Feb. 1785 in Dobbek 25 p.251. The work in question is Monro 309.


185. op.cit. p.52 et seq.


187. SWS 13, 118.

188. Goethe 267 VII p.199. The historian of biology Nordenskiöld, whose low estimate of Goethe's scientific abilities Rouché shares, claims that Goethe's discovery of the bone is neither original nor accurate (Nordenskiöld 230 p.280). Goethe did notice the bone independently of earlier anatomists, however, and Nordenskiöld does not dispute this. But he contends that Camper is more accurate than Goethe, since Camper says that man and the apes do differ, because the bone is usually invisible as such in man. But Camper, in fact, denied its existence in man entirely, saying: "Je ne le trouve pas, et je continue à prétendre que nous ne l'avons pas!" (see Wagner 59 p.469, Camper to Merck, 19th September 1785).

189. Hesse 194 p.85.

190. R.H.J. Brown, "Mechanical Models in Biology", in Models and Analogues 198 p.82.


192. SWS 13, 67-68.

193. see note 140 above.

194. SWS 13, 69.

195. see Düntzer 26 I p.100, Goethe to Herder, July 1789.

196. op.cit. I p.145, Goethe to Herder, 1793 or 1794.

197. op.cit. I p.75, Goethe to Herder, 27th November 1784.

198. SWS 14, 598.
201. op.cit. p.527.
203. SWS 21, 248.
204. Bertalanffy 190 p.134.
205. Rouche 113 p.54.
206. Kant 292 p.47; c.f. also Kant 288 p.418.
207. Thienemann 237 p.271.
208. SWS 2, 258. General surveys are useless if pursued "--- ohne auf die Besonderheiten einzelner Subjekte mit der Genauigkeit zu merken, mit welcher der Naturforscher die Körper der Thiere zergliedert." They should cover even "Ungeheuer, Mißgeburten, Seltenheiten".
209. SWS 8, 180; c.f. SWS 8, 319 (1775 version of same work): "Blendwerke, Visionen, Krankheiten, Träume charakterisiren den Charakter des Menschen und den Lebenssaft, der ihn durchwallt, stärker als allgemeine Worte."
210. SWS 4, 86.
211. SWS 14, 603.
212. SWS 16, 383.
213. SWS 4, 61; c.f. id., 5, 48, etc.
215. SWS 14, 681.
217. SWS 5, 44.
218. SWS 2, 257-258.
220. Rouche 170 p.201.
222. Koch 157 p.11.
223. SWS 9, 456-457.
225. SWS 9, 413.
226. SWS 11, 293.
228. Rouche 170 p.205.
229. SWS 13, 281. It is significant that an approving reference to Lavater in an earlier version of this passage is omitted in the final version.
230. loc. cit.
231. SWS 17, 358.
232. SWS 8, 178.
233. SWS 13, 256.
234. SWS 15, 286-287.
235. loc. cit.
236. see note 196 above.
237. Lovejoy 226 p.231.
238. SWS 8, 171 et seq.
239. c.f. Singer 236 p.49.
240. Rouche 170 p.204.
241. SWS 13, 72-76 & 79.
242. SWS 13, 76-77.
243. SWS 13, 90: "--- je roher ein Geschöpf ist, d.i. je minder die organische Macht seiner Reize und Muskeln zu feinen Nervenkräften hinaufgelautert und einem grössern Gehirn untergeordnet worden; desto mehr zeigen sie sich in einer verbreiteten, das Leben haltenden oder erstattenden organischen Allmacht."
244. Hansen 85 p.17.
245. SWS 13, 104.
246. SWS 2, 117.
248. SWS 5, 24.
249. Reimarus 314 p.23.
250. SWS 13, 358.
251. SWS 13, 161.
254. Toulmin 205 p.121.
255. SWS 8, 202.
256. SWS 21, 228.
258. Wells 132 pp.262-264.
259. SWS 21, 228.
261. SWS 13, 274.
262. He had written in his preparatory notes (SWS 14, 680): "Harvei [sic] nimmt impressio idealis an, wie im Kopf des Künstlers." This is very like Herder's statement quoted in the text. It is, however, untypical of his embryological theory.
263. Rouché 170 p.368.


265. SWS 31, 67; c.f. SWS 5, 127.

266. e.g. Siegel 176 pp.150-152; Steinborn 126 p.79; Lehmann 96 p.13; Grundmann 84 p.12, etc.

267. SWS 13, 446.


269. Buffon 255a p.50.

270. Kohlbrugge 93 p.1113.

271. see Götz 83 p.417 and Steinborn 126 p.79 for references to relevant passages.


273. loc.cit.

274. SWS 5, 479.

275. SWS 5, 505.

276. e.g. SWS 13, 191.

277. e.g. SWS 13, 141: the ape was denied vocal organs like man’s so that language might not be debased in its mouth, etc. Steinborn, Götz, Kühnemann and others list such passages.

278. Rouché 170 pp.196 & 236.

279. SWS 13, 191.

280. SWS 13, 401.

281. SWS 13, 483.

282. SWS 13, 48.

283. SWS 31, 614.

284. e.g. Kühnemann 18 p.CIII; also Kühnemann 71 p.194, Steinborn 126 p.81, Siegel 176 p.137, etc.

285. e.g. Grundmann 84 p.12.

286. SWS 13, 85; c.f. SWS 14, 86.

287. SWS 14, 83; c.f. SWS 16, 118.


289. Lambert 303 II p.393.

290. Meinecke 165 pp.421-422 notes this even in Herder’s writings during his religious phase, saying that he “von der schwebenden Behandlung der Urfönenbarung und der Entstehung des Christentums abgesehen, ein überrnatürliches Eingreifen Gottes in die Geschichte nicht anerkennen wollte.”

291. Rouché 170 p.201.
292. Maupertuis 308 p.18.
293. Reimarus 314 pp.407, 414, 420, etc.
296. see note 287 above.
297. SWS 14, 557.
298. e.g. SWS 16, 487 & 490, etc.
299. e.g. SWS 18, 290 (The earth will become uninhabited only after man's destiny is fulfilled) and SWS 30, 335 (Herder's Lutheran catechism: "--- in der Schöpfung ist alles auf's genaueste zu Zwecken und Absichten geordnet").
300. SWS 21, 238; c.f. SWS 23, 525. Kant himself had used the teleological proof in his "Allgemeine Naturgeschichte" (Kant 283 p.228).
301. SWS 23, 551; c.f. SWS 20, 243.
303. op.cit. p.362.
304. SWS 14, 628.
305. Buffon 255b p.104.
307. SWS 13, 141.
308. SWS 13, 298.
309. SWS 13, 75.
312. loc.cit.
313. SWS 13, 98.
314. Hoffart 152 p.22.
315. Rouche 170 p.196.
316. Bacon 245 IV p.57.
317. see SWS 14, 641. Einsiedel writes: "Nur aus dem was sie gemacht hat, kann man abnehmen, daß sie [i.e. nature] dies hat machen wollen." "Sie lässt die einmal gemachten Naturgesetze ihren Gang gehen, es komme Leben oder Tod heraus."
318. SWS 14, 706.
319. SWS 14, 699.
320. Düntzer 28 III p.90, Knebel to Herder, 30th December, 1792.
321. Haym 68 II p.239.
322. SWS 14, 699.
323. cited SWS 14, 701 by Suphan.
324. SWS 14, 575 note.
325. SWS 14, 582 note.
328. Kant 283 p.309.
329. Kant 295 pp.167-169 (1788)
330. op.cit. p.182.
331. Kant 288 p.420.
333. Braithwaite 191 p.XX.
334. SWS 13, 368.
337. Bertalanffy 189 p.14, quoted from Winterstein’s work.
338. Litt 163 p.93.
339. SWS 13, 350.
342. SWS 13, 14.
344. SWS 11, 296.
345. SWS 21, 247.
347. as Rouché 170 p.372 does.
349. Rasch 73 p.20.
351. Dachauer 142 pp.36-45, 150-160, etc.
352. SWS 13, 279.
354. Bertalanffy 190 p.139.
357. SWS 5, 22.
358. SWS 14, 661.
360. SWS 13, 68.
361. SWS 13, 96-97.
362. SWS 18, 248.
363. e.g. SWS 5, 38; also id., 13, 56 (on plants); 13, 105; 13, 153;
14, 590; 18, 248, etc.
364. SWS 13, 235-236.
365. SWS 13, 278.
368. Bertalanffy 190 pp.139 & 185.
371. SWS 13, 61.
372. SWS 18, 249.
373. Bertalanffy 190 p.51.
374. SWS 13, 61.
375. SWS 13, 287; c.f. SWS 13, 288.
376. SWS 13, 59.
377. SWS 13, 287.
378. Bertalanffy 190 p.52.
381. SWS 15, 523 et seq.
382. Schütze 118.
384. SWS 31, 542: "Die Gesellschaft der Menschen ist, wie Paulus sagt,
ein Körper mehrerer Glieder" (1783).
385. SWS 5, 134.
387. SWS 5, 104.
388. Bertalanffy 190 p.46.
389. c.f. SWS 17, 77.
390. SWS 14, 592; c.f. SWS 14, 586.
391. c.f. Russell 204 p.98: "I think the universe is all spots and jumps,
without unity, without continuity, without coherence or orderliness ---".
We earlier rejected Rouché's comparison between Kant's "eingepflanzte Kräfte" and Herder's "organische Kräfte", since Herder believes that configurations of "Kräfte", not the "Kräfte" in themselves, constitute natural laws, and he thus differs from Kant. We may add, however, that he does actually use Kant's term on two occasions ("eingepflanzte organische Kräfte" - SWS 13, 422 - and "eingepflanzte göttliche Kräfte" - SWS 14, 213).

Goethes Werke, Hamburger Ausgabe, Bd. 12 p.447 (Maximen und Reflexionen, Nr. 599). This aphorism appears to be among those unpublished in the Weimar edition.

Varnhagen 58 III p.244, essay of 1790.

Popper 202 p.144.

Statutes, in Mémoires de la Société, Tome I, Paris, 1868, p. III.

Dachauer 142 p.41.

e.g. Schaede 171 p.42; Posadzy 168 p.92; Stadelmann 178 p.59.

Haym 68 I pp.252 & 541.

Kühnemann 70 p.224.

Blumenthal 139 p.28.


quoted in Stadelmann 178 p.59.

Popper 202 p.423.

SWS 16, 109 et seq.

e.g. SWS 5, 504 & 588; SWS 9, 375, etc.

SWS 5, 477, etc.
422. SWS 5, 645.
423. SWS 6, 404.
424. SWS 1, 152f.
425. SWS 11, 125.
426. SWS 18, 329, etc.
427. SWS 1, 151, quoted in Rouche 170 p.526.
428. SWS 14, 655.
430. op.cit. p.373.
431. op.cit. p.86.
432. op.cit. p.371.
433. Wolff 188 p.758.
435. Grundmann 84 p.16; Grundmann names Schmidt's introduction to his edition of the "Ideen" as his source.
439. SWS 14, 660.
440. see note 425 above.
442. SWS 4, 450.
443. SWS 11, 125.
444. SWS 24, 541 et seq.
447. SWS 4, 351.
448. Popper 202 pp.159-160.
449. c.f. the theories of Spengler and Toynbee.
450. Rouche 170 p.85.
451. op.cit. p.375.
452. i.e. Reimann 110; Harich 88; Dobbek 80.
453. Dobbek 80.
454. Haym 68 II p.54.
455. SWS 9, 536 et seq.
456. SWS 9, 537.
457. Boucke 77 p.139.
459. SWS 14, 655.
460. SWS 23, 522.
461. SWS 21, 223 & 225.
462. SWS 21, 316.
463. loc.cit.
464. Dobbek 80.
466. Harich 88 p.54.
467. Irmscher 17 p.288 quoted from SWS 32, 229.
468. SWS 13, 47 and SWS 23, 514.
469. SWS 23, 518-519.
470. SWS 32, 229; c.f. SWS 4, 469.
471. Irmscher 17 p.291.
472. SWS 14, 583.
473. Dobbek 80 p.43.
474. SWS 8, 173-174; c.f. SWS 8, 272.
476. Dobbek 80 pp.31-32.
477. op.cit. p.36.
479. SWS 8, 174; also id., 12, 20; 15, 535; c.f. Jacobi 40 pp.492-493, to Herder, 30th June 1784.
480. SWS 11, 208.
481. SWS 14, 234.
482. Rouche 170 p.377.
484. Sommerhalder 177 p.38.
486. SWS 32, 228.
487. e.g. SWS 8, 99; also id., 8, 169-170; 11, 397; 14, 651; 15, 305; 16, 554; 21, 257; 22, 230.
490. Dobbe 143.
491. Boucke 77 p.179.
492. op. cit. pp.18-93.
493. SW 5, 305.
495. SW 32, 157.
496. SW 1, 246; c.f. Suphan's note.
499. e.g. Harish 86 p.63 etc.; Irmscher 17 p.290.
503. Bibl. Herd. 4 Mr. 3519h.
504. Düntzer 26 II p.20, Herder to Lavater, 30th October 1772.
505. Pistoi 313 p.231; c.f. SW 14, 681 where Herder's extracts from this work are mentioned.
506. Irmscher 17 p.291.
507. SW 1, 246 and SW 14, 666.
508. Needham 311 p.XI refers to "expansion" and "résistance".
509. Haym 68.
510. Boucke 77 pp.130 & 177.
511. c.f. SW 4, 103.
512. Hoffart 152 p.43.
514. SW 5, 468 et seq.
515. see Günther 222 p.60.
516. SW 13, 267.
517. Boucke 77 p.176.
518. SW 4, 5.
520. Irmscher 17 p.291.
524. Boucke 77 p.147.
527. op.cit. II p.54.
528. SWS 5, 468.
529. c.f. Willey 240 p.137.
530. see SWS 5, 269, editor's note.
532. SWS 1, 125-130.
533. Boucke 77 p.134. Kant (and Herder) also knew the similar theory of
the astronomer Thomas Wright, as we shall see in our section on
planetary habitation.
536. Dobbek 80 p.28.
537. Rasch 73 p.124.
538. SWS 1, 520.
539. Lovejoy 226 p.83.
540. SWS 32, 218.
541. Lovejoy 226 p.94.
543. op.cit. p.153.
544. Pistoi 313 p.231.
549. Irmscher 17 p.288.
551. Irmscher 17 p.293.
552. Dobbek 80 p.17.
553. op.cit. p.18.
554. op.cit. pp.20-21.
556. SWS 16, 570.
557. Dobbek 80 p.17.
558. SWS 16, 551-552.
559. SWS 15, 535.
561. SWS 16, 560.
564. SWS 16, 555.
565. SWS 16, 556.
566. c.f. SWS 13, 266 and SWS 14, 681.
568. op.cit., e.g. p.141.
569. Strothmann 180 p.185.
570. Rouche 170 p.532.
573. loc.cit.
574. SWS 8, 202; c.f. 16, 560.
575. Haym 68 II p.54.
576. Hemsterhuis 277 p.68.
577. SWS 13, 276.
578. Siegel 235 p.141.
580. SWS 13, 179.
582. Dobbek 80 p.17.
583. SWS 14, 586.
584. SWS 16, 558, Gott, 1787.
585. loc.cit.
587. Dobbek 80 p.17.
588. op.cit. p.18.
590. Rouche 170 p.376.
592. SWS 11, 208; c.f. our section on "the historical application" of dialectics, above.
593. SWS 22, 240.
594. SWS 13, 82.
596. op.cit. p.190.
597. see SWS 13, 284.
598. SWS 8, 104, studies for "Plastik", c. 1769; Herder here combines the
two theories, of mental and of embryological development.
599. Popper 203 p.418.
601. Popper 203 p.419.
602. op.cit. p.424.
605. Harich 88, throughout.
606. Rouvié 170 p.532.
607. Boucke 77 pp.130-182.
608. Witte 186.
609. Dobbek 80 p.45.
610. Goethe 267 XI p.11; to Kanzler von Müller, 1828, concerning the
"Naturfragment".
613. ditto Kapsel XXVI Nr. 5 p.21.
614. ditto.
615. ditto Kapsel XXX Nr. 1, Studienbuch A 1, pp.126 verso- 127 recto.
616. ditto Kapsel XXV Nr. 45.
617. ditto Kapsel XXV Nr. 46.
618. Caroline 69 I p.58.
619. Lebensbild 34 I p.312, Herder to Lindner, 5th October 1764.
620. SWS 4, 346 & 362.
621. SWS 4, 90 et seq.
622. Caroline 69 I p.135.
623. SWS 4, 362.
624. SWS 33, 222-223.
625. Bibl. Herd. 4 Nr. 3102, 3103, 3111, 3256, 3257, 3571-3, 3578, 3579,
3584, 3619.
626. SWS 8, 64, Plastik, 1778.
627. SWS 32, 32; also id., 4, 373; 22, 238.
628. SWS 4, 89.
629. SWS 4, 88-89.
630. SWS 4, 90-103, fourth "Kritisches Wäldchen".
631. SWS 4, 103.
632. SWS 4, 90; see SWS 4, 101 for more details on Euler’s theories.
633. c.f. Pledge 231 p.82.
634. SWS 4, 102.
635. SWS 4, 95 & 98.
637. op.cit. pp.49-50.
638. op.cit. pp.305-306. On all this, see also articles "Hearing" and "Helmholtz" in Encyclopaedia Britannica.
639. SWS 4, 105.
640. SWS 21, 32-33.
641. Russell 204 p.61.
643. ditto Kapsel XXV Nr. 46.
644. SWS 21, 32-33, Metakritik.
646. Clark 66 p.401.
647. SWS 21, 36, Metakritik.
648. For Herder's "Analogie der Natur", see SWS 5, 521; also id. 10, 338; 13, 9; 15, 177; 18, 406; 31, 567, etc. For the idea of parallel physical and moral laws, see references under note 484 above.
649. For the influence of environment upon the society and its collective mental attributes, see SWS 13, 305, Ideen, Pt. II. For the same influence upon the mind of mankind as a whole, see SWS 13, 20, Ideen, Pt. I.
650. SWS 13, 209 - the ethics of eskimos are influenced by climate etc.
653. SWS 14, 207 & 244.
656. Koller-Du Bos 262 p.73.
657. c.f. Regli 169 p.11.
660. c.f. Willey 240 p.33.
661. op.cit. p.77.
663. Haym 68 I p.507 gives a good synopsis of Lavater’s views on the subject.
664. c.f. Blumenthal 139 p.46; also Leibniz 304 p.622.
665. SWS 13, 382.
666. SWS 13, 448.
670. SWS 14, 225 et seq.
671. SWS 14, 225-226.
672. Haym 68 II p.236.
673. SWS 16, 469.
674. Kühnemann 18 p.CXI.
678. Clark 66 p.344.
680. op.cit. p.371.
681. op.cit. p.380.
682. e.g. SWS 17, 118; also id., 18, 329; 18, 339.
685. SWS 18, 329, Humanitäts-Briefe, 1792 version.
686. SWS 8, 209; SWS 18, 329.
687. see Hamann 33 VI p.193, Hamann to Herder, 3rd June 1781.
688. SWS 17, 118.
691. Stapf 54 p.145, quoted from Jean Paul’s „Vorschule der Ästhetik“.
692. SWS 14, 53.
693. SWS 14, 211 & 213.
694. SWS 14, 215.
695. SWS 17, 120-121.
697. SWS 18, 345.
698. e.g. SWS 16, 49, Zerstreute Blätter, 1792.
699. SWS 18, 345 (Knebel, quoted by Herder).
700. SWS 14, 230-234.
701. SWS 14, 234.
703. op.cit. p.190.
704. op.cit. p.370.
705. SWS 22, 72.
706. SWS 10, 400, Briefe, das Studium der Theologie betreffend.
707. SWS 14, 177.
708. e.g. SWS 15, 559; also id., 16, 150; 16, 375; 16, 547; 17, 108;
   19, 171; 23, 230; 30, 350.
709. SWS 16, 547.
710. Leibniz 304 p.622.
711. Stadelsmann 178 p.39.
712. SWS 14, 250.
713. Kühnesmann 71 p.220.
714. SWS 24, 58-59, Adrastea, 1802.
715. SWS 16, 469.
717. SWS 16, 569-571.
722. see Bertalanffy 190 p.52.
723. Nilson 201 p.205, quoting from Samuelson's "Foundations of Economic
   Analysis".
724. op.cit. p.209.
725. Bertalanffy 190 p.201.
726. loc.cit.
727. Popper 202 p.112.
728. op.cit. p.119.
729. SWS 21, 228-229.
730. SWS 9, 537, Über die dem Menschen angeborene Lüge.
731. e.g. SWS 13, 174, Ideen, Pt. I; SWS 21, 219, Metakritik, etc.
733. op.cit p.289.
734. SWS 13, 60-61.
735. SWS 13, 178.
736. SWS 5, 583.
737. Irmscher 17 p.288.
738. SWS 8, 104, notes for "Plastik", c. 1769.
739. e.g. SWS 8, 8-9, Plastik, 1778.
740. SWS 8, 104, notes for "Plastik", c. 1769.
741. SWS 13, 169.
741a. SWS 2, 65, Fragmente, 1768.
742. Wolff 320 I p.53.
743. Kant 283 p.266.
744. SWS 14, 660 (Herder's notes on Creech's translation - c.f. Lucretius 307).
745. c.f. Varnhagen 58 II p.223, Herder to Knebel, 11th September 1784; also ditto p.237, Herder to Knebel, 6th November 1784.
748. Lovejoy 100 p.173.
750. Schmidt-Gürtow 117 p.144.
751. Lovejoy 100 p.173.
752. McEachran 72 p.84, note.
753. SWS 4, 361.
754. SWS 14, 641.
755. Lambert 303 II p.323.
756. c.f. SWS 4, 89 (fourth "Kritisches Wäldchen", 1769) and editor's note.
757. Lambert 303 II p.394.
758. c.f. SWS 4, 464, notes for "Journal", 1769.
759. Toulmin 205 p.42.
760. op.cit. p.86.
761. SWS 14, 227-229.
762. Temkin 128 p.244.
763. Kuhfus 159 p.22.
764. see "Vom Erkennen und Empfinden", 1778, all of the first half.
765. e.g. SWS 13, 263.
766. SWS 13, 82.
767. Temkin 128 pp.240-244.
768. SWS 13, 20, Ideen, Pt. I.
769. SWS 14, 583, MSS for Ideen.
772. SWS 5, 29, essay on language.
773. SWS 5, 30.
774. SWS 13, 82.
775. SWS 13, 83.
776. SWS 13, 176.
778. Bertalanffy 189 p.34.
779. Goodfield 221 pp.151 & 160.
780. SWS 13, 182, Ideen, Pt. I.
781. Lucretius 307 I pp.165-166.