

William Blake's Divine Vision

or

McGann's Consequence : Scatology and Eschatology

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PR EFACE

It turns out that the following paper is constructed too inductively. and its argument is too much understated. It is intended as a complete analysis of William Blake's organizing cosmography. If it were successful, it would be a contribution to Blake criticism. It contains a number of particular contributions. only one of which is expressly claimed.

It may be misleading. Persona such as Los, Urthona, Enitharmon and the like are not treated. but they are not unimportant. They are best understood after the organizing cosmography has been revealed. If I had the time. I would write up an Exhibit C. which would elucidate Los, and it would be an example of the understanding that can be achieved.

An awareness of the organizing cosmography also enables true understanding of the meanings and structures of Milton and Jerusalem. Exhibit B would be an example with respect to Milton. I would do Jerusalem in Exhibit D, but it would take too long. too.

Finally. it is not that there is a cosmography to be found in Blake's writings; it is that his writings are cosmography. Traditional criticism does not accord and to that extent is deficient and indeed deluded.

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Green's Motto

The man who gets his pipes
cleaned regularly through
legitimate channels does not
write the kind of stuff that
Blake wrote .

The Argument : Except in his short poems (quick jab shots) Blake was unable to pull off a decent climax . Either he folded up (as in Thel) or he petered out (as in The French Revolution) or he just talked about it (as in Jerusalem) .

Application: Blake attempted to state a complete theory of life and nature, but he had a problem and he knew that he had the problem and he never solved it and he knew that he never solved it.

I. INTRODUCTION

At the turn into the 19th century it seemed possible -- for the first time in human history -- for a man to formulate a complete and empirically validated cosmography. William Blake was one who took a shot at it. Another was the Marquis Pierre Simon de Laplace. Laplace wrote of a Divine Calculator (i. e. , of a sufficiently great mathematician). If such a being were told the position and momentum of each particle of matter at any given instant, he could determine everything that had ever occurred previously and everything that would

ever occur thereafter. ¹ Blake wrote of himself in about the same way. He said, "I see the Past, Present & Future existing all at once / ² Before me." Laplace's concept seemed validated by the fact that Newton's laws effectively subsumed all existing empirical data. Blake's concept seemed validated by his own insight experiences and by the apparent trend of history.

This paper is about Blake. I am using Laplace for counterpoint. I am big on Blake. I think he called Joseph Priestly a fart ³ ("Inflammable Gass the Wind-finder"). ⁴ I am not sure. I do know that when the gas bottle broke and the Pestilence got out, Priestly was out the door before he warned anyone, and then he ⁵ was the first one down the stairs and out into the fresh air. It is a wise man who knows his own inflammable gas. And it is a big fart indeed who beats the women and the others to the fresh air.

I mention this matter for three reasons. First, it endears Blake. Second, I am afraid my analytics will be soporific, so I intend to liven them here and there. No doubt the reader will forgive me. Third -- I will give the third reason later on.

A complete cosmography must treat both existence and process. Laplace described process but posited existence. That is, he copped out. He simply assumed the existence of an unspecified quantity of eternal matter which was in eternal motion because there

had been applied to it (somehow) an assumed unspecified amount of eternal energy.⁶ The Divine Calculator could trace out the Past, Present & Future by the simple application of Newton's laws.

Where did the matter and energy come from? According to the beliefs of Natural Religion there was a God who was in effect a master watchmaker who wound the spring and set the works in motion.⁷ Never mind where He got the spring and the works. Never mind where He got the strength.

It is this combination of God with Newtonian classical mechanics that seemed to constitute a complete and empirically validated cosmography of Nature. It seemed to explain everything. It seemed applicable to everything. For example, when the American colonies declared their independence of the British crown, they apologized that they were simply assuming that station to which they were entitled under "the laws of [1] Nature and of [2] Nature' God."⁸

Blake's cosmography was in part an explicit critique and rebuttal of the cosmography of Nature.

Now I will state exactly what I am going to do in this paper. The reason I do so is that, if I do not, then as Jerome McGann once said in a different context, "Everything gets all fucked up."⁹ In the next Section, Section II, I will discuss and evaluate Blake's attack on the cosmography of Nature, and I will give the third reason

for my bringing in Joseph Priestly. In Section III I will discuss and characterize Blake's O\N cosmography, and I will attack certain critics who pretend to understand it. In Section IV I will attack Blake. In Section V I will forgive Blake.

II. BLAKE'S REFUTATION OF THE COSMOGRAPHY OF NATURE

In all of Blake there is only one ultimate or generic criticism of the cosmography of Nature. It is presented in numerous metaphors, but it is the only one. It is that some reality actually disappears when treated by reason or by scientific method such as "demonstration." 10

(A) I am going to demonstrate three actual disappearances of reality according to Blake. 11 (B) Then I am going to isolate and identify the precise difference between Blake and the cosmographers of Nature. (C) Then I am going to evaluate Blake's refutation, and I will offer a comment from contemporary philosophy of nature. (D) Finally I am going to dispose of Joseph Priestly, Inflammable Gass the Wind-finder.

No doubt the reader will forgive the explicit statement of my procedures. No doubt the reader will recognize that I am simply trying to avoid what I think of as McGann's Consequence. 12

A. Three Actual Disappearances of Reality

Blake says that reason is the "Ratio" of sensate knowledge, 13

and I say that in his system it is by means of this Ratio that some reality disappears.

There does not appear to be any critic who has paid adequate attention to the concept of Ratio. For example, Frye called Ratio "the sum of experiences common to normal minds . . . •" and he¹⁴ linked it with the process of ratiocination. And according to Murry it is "the mental abstract: that idea or abstract image of the thing, which serves, in the ordinary commerce of life and thought, for the thing itself."¹⁵ And Bloom said that Murry is right, and he added that Ratio is "grossly inferior to the immediacy of the things themselves."¹⁶ And, finally, Damon said, "A Ratio is a limited system founded on what facts are available, and organized by Reason."¹⁷

Thus Frye, Murry, Bloom and Damon extrapolated mightily, but they overlooked the ordinary meaning of ratio:¹⁸ a ratio is a quotient, the result of a mathematical operation. Surely Blake contemplated this ordinary sense in selecting the term as his metaphor for the complex ideas which these critics later discerned.

A ratio may be the quotient of two pure numbers. For example, the ratio of 8 to 4 is 2. Or a ratio may be the quotient of two things or of two things having dimension or quality. For example, the ratio of 96 miles to 48 miles is 2, and the ratio of 6 aardvarks to 3 aardvarks is 2, and the ratio of 5.6 degrees of whiteness to 2.8 degrees of whiteness

is 2. These results may be collated as follows:

$$\frac{8 \text{ 96 miles} \quad 6 \text{ aardvarks} \quad 5.6 \text{ de rees of whiteness}}{4 \text{ - 48 miles} \quad - 3 \text{ aardvarks} \quad = 2.8 \text{ degrees of whiteness}} = 2$$

In the foregoing simple illustrations all of the ori
numbers. all of the dimensions. all of the things and all f the quali-
ties cancel out and disappear in the mathematical operati n. Every-
thing reduces to 2. The same phenomenon will occur in more com-
plex illustration as well, as is given in footnote.
19

I cite one of Blake's annotations to Lavater to sho that he
intended this ordinary mathematical sense of Ratio:

Deduct from a rose its redness. from a lilly "ts
whiteness. from a diamond its hardness. from
sponge its softness. from an oak its heighth, fr m
a daisy its lowness, & rectify every thing in Nat re,
as the Philosophers do, & then we shall return t
Chaos. & God will be compell'd to be Eccentric "f
he creates. O happy Philosopher. 20

In this passage there are six terms which Blake implicit! groups
into three ratio pairs. They are red rose and white lilly, hard
diamond and soft sponge. and tall oak and low daisy. In the first
ratio, red flower to white flower, color is deducted or cancels out,
and we are left with flower at the most. In the second ra io, hard
substance to soft substance, hardness is deducted or can els out. and
we are left with substance at the most. In the thirel ratio tall plant
to short plant. height is deducted or cancels out, and we re left with

plant at the most. Indeed it might also be that flower cancels out; that substance cancels out; that plant cancels out; that we have returned to Chaos; and that God will be eccentric if He were there.²¹

Thus reasoning is a process of Ratios, and in the process some reality actually disappears. Q.E.D.

B. The Precise Difference

The mathematical ratio process by which some reality disappears is a metaphor. It is not the actual process. I used it merely to demonstrate the disappearance phenomenon. The actual process is failure to perceive. Failure to perceive takes place by one or both of two methods, which are (1) closure or inherent limitation of the senses and (2) reasoning from sensible knowledge, such as in the making of Ratios through demonstration, abstraction, generalization, or contemplation. I have already discussed the second adequately.

With respect to the first, Blake distinguished between perception and sense and declared that perception is different from and is greater than sense. He made the declaration implicitly in the introductory argument to his tract There Is No Natural Religion (First Series).²² Then he made the declaration explicitly in the first proposition of his tract There Is No Natural Religion (Second Series).²³ He said, "I. Man's perceptions are not bounded by organs of perception; he perceives [sic] more than the sense (tho' ever so acute)

24
can discover."

It is this distinction and gradation between perception and sense that is the precise difference between Blake and the cosmographers of Nature. It is a crucial difference because it lines up Blake on the mind side of the mind-body question, which was the hot epistemological issue of the Age of Reason. Thus we have Blake and Berkeley versus Laplace, Locke and Newton.

It will be in Section III that I will treat Blake's own cosmography more fully. Here I have limited myself to isolating and identifying his precise rebuttal position.

But now I will not proceed without stating a foretaste of that which eventuates, according to Blake, from his pursuit of perception as against the pursuit of sense by the cosmographers of Nature. Blake is shooting to see the infinite, the eternally delightful (i. e., God). The others are shooting to see the finite, the bounded, the Ratio quotient (i. e., self). And there will be a conflict. And it will be a serious conflict. The reason is that Blake is not different in kind. He, too, has a body with its sense organs. Therefore he, too, has Reason, which is the Ratio of sense knowledge. His "Energy is Eternal Delight," but his "Reason is the bound or outward circumference of Energy."

Therefore it will turn out that Blake and his Energy eventually will have to struggle against and emigrate from his -Reason.

C. The Evaluation of Blake's Refutation

Insofar as Blake was a philosopher he had nothing of importance to say on the ancient question whether mind (i. e., perception) exists separately from body (i. e., sense). His idea of Ratio is neither philosophically profound nor mathematically elegant. It is true that he was aware of and was an eloquent participant in that epistemological debate of the Age of Reason, but it does not matter much that his annotations on Locke are lost. He was not a Berkeley. He was not adequately rigorous. And in pursuing his Poetic Genius he neglected Reason.

But you have to hand it to Blake insofar as he was a poet. He dressed the mind-body question in great wild metaphors. Also he had great tame metaphors. One of my favorites is one of his simplest, namely Dullsville:

If it were not for the Poetic or Prophetic character the Philosophic & Experimental would soon be at ratio of all things, & stand still, unable to do other than repeat the same dull round over again. 34 .

And elsewhere he added, "The same dull round, even of a universe, would soon become a mill with complicated wheels. " And in yet another version he made Dullsville a Mundane Egg reflecting back from a Mundane Shell.

Insofar as Blake was a prophet he crapped out without making his point. Although he offered divine visions, such as "Giants &

38 Fairies, " to overcome the Chaos and the Sleep of Ulro and the
 40 Delusion of Ulro, he was too far out. He was willing enough.
 41 Perhaps he even would have eaten dung, but if he had, he would
 have crapped out all the more. That is, he was Eccentric enough
 42 as it was. And how sad it was! He told his pain in a letter to a
 friendly patron:

. . .that I cannot live without doing my duty to lay
 up treasures in heaven is Certain & Determined, &
 to this I have long made up my mind, & why this
 should be made an objection to Me, while Drunken
 ness, Lewdness, Gluttony & Idleness itself, does
 not hurt other men, let Satan himself explain. The
 thing I have most at Heart -- more than life, or a
 1 that seems to make life comfortable without -- Is
 the Interest of True Religion & Science, & when-
 ever any thing appears to affect that Interest (Es-
 pecially if I myself omit any duty to my Station as a
 Soldier of Christ), It gives me the greatest of
 torments. I am not ashamed, afraid, or averse to
 tell you what Ought to be Told: That I am under the
 direction of Messengers from Heaven, Daily &
 Nightly; but the nature of such things is not, as some
 suppose, without trouble or care. Temptations are
 on the right hand & left; behind, the sea of time
 space roars & follows swiftly; he who keeps not straight
 onward is lost, & if our footsteps slide in the clay, 43
 how can we do otherwise than fear & tremble? .

Insofar as earlier I was addressing myself to Blake as a
 philosopher I want now to recant. Although he added nothing of im-
 portance to the mind-body question, no one else ever really did
 44 either. It always was a question and always will be. Therefore
 Blake is not to be faulted, and indeed he is to be applauded for the

poetry. For the truth is that many philosophers and scientists are
 personal jerks. ⁴⁵ They sleep the Sleep of Newton. ⁴⁶ They succeed
 in making philosophy and science Dullsville all the way. (I
 take the liberty of attaching Exhibit A. ⁴⁷) They need some poetry.

Sir Arthur Eddington was a scientist who was an exception.
 He is a contemporary commentator on the philosophy of nature, and
 now I offer his concept of Pointer Readings, which are about equivalent
 to that which Blake called Ratio:

Let us then examine the kind of knowledge which
 is handled by exact science. If we search the examination papers
 in physics and natural philosophy for the more intelligible questions
 we may come across one beginning something like this: "An elephant
 slides down a grassy hillside. . . ." The experienced candidate
 knows that he need not pay much attention to this; it is only
 put in to give an impression of realism. He reads on: "The mass
 of the elephant is two tons." Now we are getting down to business;
 the elephant fades out of the problem and a mass of two tons
 takes its place. What exactly is this two tons, the real subject
 matter of the problem? It refers to some property or condition
 that we vaguely describe as "ponderosity" occurring in a
 particular region of the external world. But we shall not get
 much further that way; the nature of the external world is
 inscrutable, and we shall only plunge into a quagmire of
 indecipherables. Never mind what two tons refers to; what is it?
 How has it actually entered in so definite a way into our
 experience? Two tons is the reading of the pointer when the
 elephant was placed on a weighing-machine. Let us pass on. "The
 slope of the hill is 60°." Now the hillside fades out of the
 problem. . . . 60° is the reading of a plumb-line against
 the divisions of a protractor. Similarly for the other data
 of the problem. The softly yielding turf on which the elephant
 slid is replaced by a coefficient of friction. . . .

And so we see that the poetry fades out of the problem, and by the time serious application of exact science begins we are left with only pointer readings. . . . (Some emphasis supplied.)⁴⁸

Lest the reader be suffering McGann's Consequence, I assure him that everything will be okay after I dispose of Joseph Priestly, Inflammable Gass the Wind-finder.

D. The Disposition of Joseph Priestly

The biggest problem in the study of Blake is how to deal with the superabundance of the particulars of the imaginative, poetic, divine perceptions that he eccentrically created in lieu of the Chaos of the senses. In the excitement of argument he even demanded that those perceptions be treated as reality and in fact as the only reality. He said, "Mental Things are alone Real; what is call'd Corporeal, Nobody Knows of its Dwelling Place: it is Fallacy, & its existence an
⁴⁹
Imposture. "

I am going to deal with the superabundance problem by a quite
⁵⁰
novel method. I am going to use a concept and technique from the calculus. If the reader does not know calculus, he will have to risk McGann's Consequence, but I have protected the reader by relegating
⁵¹
the descriptive details to the footnote. Here I will state only that in a certain operation, namely differentiation, it happens that certain terms disappear and that in the reverse operation, namely integration,

these terms are not restored as such but are allowed for by the addition of an indefinite representative term called "the constant of integration." ⁵²

I mean that Ratio is a one-way street. Once you cancel out the elephant by "differentiating" him to two tons, how do you "integrate" him back? That is, if you are given the datum two tons, how do you know that it is an elephant in particular? The answer is that you do not ever know. What you do is allow for the missing elephant by putting in a kind of constant of integration, and that constant represents anything -- an elephant or anything else -- that weighs two tons.

Such is Blake's imaginative, poetic, divine vision. It is an integration of the Ratio. All of his superabundant particulars are constants of integration which grow out of his integration of his own ⁵³ Single Vision. They could be anything that he perceived. Blake was at absolute liberty to represent the disappeared reality by any ⁵⁴ mental reality whatever that he perceived.

Consider Priestly. It is not known whether Blake ever met ⁵⁵ the man. Yet apparently Blake called him a fart. Whether Blake ever met him or did not meet him, Priestly was in either case an Imposture in person but a reality in the mind of Blake, according to the system of Blake. And the fartness of Priestly is just such a

mental reality, too. Certainly it has become a reality in my mind and I hope in the reader's as well. And the reason that I have been bringing Priestly in again and again is that I wanted to give a strong example of the bull's-eye license which Blake had in drawing in the integrated essences of perception from the differentiated powers of sense.

Now I am at Section *III*, and I think it will help to give the reader an overview. I will be discussing and characterizing Blake's own cosmography, his organized perception that is, in its aspect as a mental reality. I will need a constant of integration. I will need some indefinite term to represent all of the mental reality that Blake integrated from the differentiated Ratio of his senses. I intend to use the term "elephant wind" to represent all of that mental reality, all of the beings, all of the places, Golgonooza, Bowlaholla, Allamanda, the whole thing. And, of course, all of the Emanations ipso facto are included in the term, too. Quickly I apologize and assure the reader that I intend no disrespect to him or to Blake or to anyone. I have my reasons and will reveal them in the last judgment of Section V.

If the reader wants to bother with it, he can find a memorable anecdote in footnote.

III. THE COSMOGRAPHY WITHIN BLAKE'S ELEPHANT AND WIND

The cosmographies of Blake and Laplace coincide, as two circles may touch each other tangentially, in the concept of the observer for whom the Past, Present & Future are potentially accessible in their absolute entirety. As Blake said, "If the doors of perception were cleansed everything would appear to man as it is, infinite."⁵⁷ As Laplace said after describing his Divine Calculator, "The human mind in the perfection it has been able to give to astronomy affords a feeble outline of such an intelligence. . . . All its efforts in the search for truth tend to approximate without limit to the intelligence we have just imagined."⁵⁸

Laplace's observer is a calculator, an intelligence, an external immaterial thing that does not affect the data under observation. Blake's observer is man. It is a man. It is himself, William Blake.

Even Blake's friends and advocates did not really believe it that the whole universe would be accessible to him. For example, Gilchrist defended him as follows:

After all, no candid person would, even in society, have taken Blake for mad. Nor did he really believe his own vaunt, say his friends, when he uttered such things as . . ., "I can reach the sun with my hand if I stretch it out,"¹¹ & c. He believed them only in a non-natural sense. . .⁵⁹

But I think that Blake correctly believed that he could touch the sun in fact. The sun is like a fire, or perhaps it is a fire. A fire is incorporeal. It does not have any simple surface or boundary or location. It is a concentration of energy that is capable of acting everywhere within a considerable volume. For example, fire will ignite and consume a paper placed anywhere in a general vicinity. Likewise a simple lens will start a fire by focusing the sun anywhere in what we might call the sun's general vicinity. You would not want to be in the same room with the sun any more than you would want to be in the same room with Joseph Priestly. Some of the sun's aspects are visual and some tactile. For example, a blind man emerging from a shadow will feel the sun actually touching his skin. But the notion that the sun is untouchably remote, that it is "a round disk of fire somewhat 'like a Guinea,"⁶⁰ is a delusion which results from our regarding the visual sense while we ignore the tactile sense.

Blake must be rescued from his defenders. They are defending him from the charge that he thinks that he really can touch that round disk that is somewhat like a Guinea. But that disk is itself a figment, and there is no reason to think that Blake ever attempted to touch it or that he ever said that he did. But Blake did touch the sun. He touched the sun that has many aspects and that as such actually

occupies a considerable general vicinity of cosmic space, including the vicinity wherein the earth is located.

Now I must be most explicit. There are two ways of defending Blake's mental reality. The first is to say, as Gilchrist said, that such reality is a result of his perception epistemologically and that, yes indeed, imaginary things are real, in a manner of speaking.

Virtually all of Blake's defenders defend him in this way. The second way - and I do not know of anyone besides myself who strictly practices it with Blake - is to show that the underlying physical reality really corresponds with Blake's mental reality. I tried to show the correspondence in the case of Blake's touching the sun. And now I am going to go on to assert that all of Blake's mental reality, including the whole product of his imagination, corresponds directly to reality in fact.

I remind the reader that Blake, unlike Laplace's Divine Calculator, is the observer who participates in the processes of life and nature. "Where man is not, nature is barren." Blake believed that the whole universe was connected to him and somehow appeared in him. I am going to examine this belief and its consequences in Blake's cosmography.

And now I am going to restate and organize what I have said and what I will say in this Section III. (A) I am going to deal with

the crucial concept of the omniscient observer. (B) Then I am going to suggest an interpretation of elephant wind. (C) Then I am going to describe Blake's cosmography, his theory of existence and process. (D) Finally I am going to attack some of his critics.

A. The Concept of the Omniscient Observer

Laplace's Divine Calculator was a phony, a physical impossibility, an Abstraction as Blake would say. Of all of the conceptual objections to him the only one that I am going to identify is the objection that it would be necessary for him to disturb the system in order to calculate it. In modern microphysics this objection is formulated as the Indeterminacy or Uncertainty Principle: in order to ascertain the position or momentum of something you must disturb it with at least one quantum of energy, and thereby you will alter and obscure the very thing that you are looking for. The point is that the observer and the system must interact. The observer will be affected by the system, too. In modern relativity physics a knowledge of the condition of the observer is recognized as being essential to a knowledge of the system.

When Blake declared himself an observer in the Cosmos, he made it clear that his own condition would be of utmost importance. He would be affected by events. Sometimes he would be better able to perceive and sometimes less able. Much of his writing is an at-

tempt to understand the fluctuations in himself.

It will turn out that Blake's cosmography is a function of his alternating states.

B. Physical Reality and Elephant Wind

No doubt a preliminary working model of Laplace' Divine Calculator would report his results in tabular rows and columns densely printed on oversize IBM paper. Blake reported his observations in drawings and, in a manner of speaking, in stenographic transcripts.⁶⁴ Sometimes he would speak what he perceived. Such are the inherent limitations of line and word, however, that it was physically impossible for him to communicate the totality of his perceptions.

He resorted to metaphors, which I call "elephant wind" and which Bloom, for example, calls "poetic argument."⁶⁵

I say that it is impossible to represent reality except through metaphors. Natural science itself must resort to metaphors such as formulas, laws, IBM tabulations, and concepts like ether and ether drift and indeed the whole cotton-picking, pointer-reading output of natural science. (The reader will be well advised to take a breath and to hold his nose and then to take a fresh look at Exhibit A.) Blake described the scientific output as a garden of fruits {i.e., as a tree of knowledge} planted by Urizen when he created the pointer-reading

implements and standards of science:

6. And Urizen, craving with hunger,
Stung with the odours of Nature,
Explor'd his dens around.
7. He form'd a line & plummet
To divide the abyss beneath;
He form'd a dividing rule;
8. He formed scales to weigh,
He formed massy weights;
He formed a brazen quadrant;
He formed golden compasses,
And began to explore the Abyss;
And he planted a garden of fruits. ⁶⁶

Now, to avoid McGann's Consequence, I want to make it clear that I regard Blake's perceptions of reality as being on the same scale as those of Euclid, Newton, Einstein, Freud, Jung, Laplace, Marx and other such pretenders to empirical universality. To put it in Blake's system, he and all of these universalist cohorts of his were sincerely glimpsing the Divine Vision, each one doing so through the more or less "narrow chinks of his cavern." ⁶⁷ My point is that the band of cohorts did exactly what Blake did - that is, it reported its joint and several findings in that gamut of literary and scientific metaphors which men perforce must use to describe reality.

So elephant wind is everyman's constant of integration. It is the totality of the metaphors that a man must use when he tries to describe what he perceives beyond the Ratio. ⁶⁸

C. At Last Blake's Cosmography

In this section McGann's Consequence will menace us at its maximum. But here is the outline of what I am going to do, and I hope it will save us all. (1) I am going to state Blake's theory of existence, and I am going to distinguish it from the existence that is regarded in the cosmography of Nature. (2) Then I am going to do the same with Blake's theory of process. (3) Then I am going to trace out three of Blake's metaphors for existence. (4) Then I am going to trace out his major metaphors for process, and in so doing I will make an important original contribution to Blake criticism. (5)) Finally I am going to summarize and restate the whole thing. And I am going to identify the subsections in a way that I think will help the reader.

III C (1) Existence

In Blake's cosmography all existence is God Himself and consists of His energy-bound ⁶⁹ into-substance. (It is that simple. Later on I will elaborate by discussing the metaphors.)

In the cosmography of Nature, as Descartes put it, "Substance ⁷⁰ is that which requires nothing but itself to exist. " Such was the substance, the matter-in motion, that Laplace's Divine Calculator was supposed to observe. Although Natural Religion dreamed up a master watchmaker for the purpose of turning on Laplace's system in

the first place, He was completely outside the system. He did not exist everywhere or anywhere within it.

The philosophical difference between the existences in these two cosmographies is the difference between monism and pluralism, monism being the doctrine that there is only one ultimate principle or substance. Pluralistic farts like Priestly made it a practice to demonstrate the existence of numerous ultimate substances.

III C (2) Process

In Blake's cosmography process consists of recurrent separation from and reunion with God. (It is that simple.)

In the cosmography of Nature process consisted of classical mechanics, which is the behavior of substance according to Newton's laws.

The philosophical difference between these two kinds of process is the difference between free will and determinism. When Blake sees the Past, Present & Future, he is "under the direction of Messengers from Heaven, Daily & Nightly; but the nature of such things is not, as some suppose, without trouble or care. Temptations are on the right hand & left. . . " ⁷¹ When Laplace's Divine Calculator sees and calculates the Past, Present & Future, he is just sitting there with his feet on the desk, and he is working a crossword puzzle or something while the IBM machine turns out the oversize tabular pages. Someone else

has even punched the starter button for him.

So Blake's cosmography is free will monism as explicitly opposed to the deterministic pluralism of Locke and Newton. Everything else in Blake is elephant wind and detail, but I will treat it anyway. Actually the reader is well advised to quit right now. If it happens that he continues reading, I will give him some memorable fancies.

III C (3) Metaphors of Monism

Now I will trace out three metaphors of existence. They are (a) Creation; (b) The Marriage of Energy and Reason, Including the Concept of Perturbation; and (c) The Printing House in Hell. (d) Then I will recapitulate.

III C (3) (a) Creation

Blake says that creation "was an act of Mercy" ⁷² by "a very ⁷³ Cruel Being. "

The Being was cruel because by creation he imposed confining corporeality onto some unfettered quality of His own. Blake calls the quality imagination. It is both infinite and eternal. Corporeality is both finite and temporal. When that confining corporeality was imposed on that unfettered imagination, it was an act of reduction, of shrinkage, of limitation, amounting to "a Thump on the Head." ⁷³ It was a cruel contraction.

The Being was merciful: he could have contracted imagination all of the way down to nothing, but he "found" a limit. The limit is called "Adam,"⁷⁴ for it is established in the context of recurring analogs of Genesis, but it is not man himself. It is the contraction of man down to but not beyond the point at which his imagination can expand and get him back to infinity and eternity.

This residual or limiting possibility of reexpansion is available only on a condition, and the condition indicates Blake's theodicy. That is, Blake characterized the contraction phenomenon as death, and then he went on to specify how to overcome death:

The Saviour mild & gentle bent over the corse of Death,
Saying, "If ye will Believe, your Brother shall rise again."
And next he found the Limit of Contraction, & nam'd it Adam,
While yet those beings were not born nor knew of good or Evil.⁷⁵

This chance to reexpand by virtue of belief depends upon the exercise of imagination. That is, it depends upon a man's ability and willingness to see, to perceive beyond the Ratio. The Saviour was merciful in this respect, too. He "found the Limit of Opacity, & nam'd it Satan."⁷⁶ Later on I will deal with this limit. It belongs to the domain of process.

In his concept of the limit of contraction Blake seemingly was influenced by a sensational mathematical argument that had been raging between Bishop Berkeley and "an infidel Mathematician." I

have protected the reader by relegating this material to the footnote.

III C (3) (b) Marriage and Perturbation

Somehow God got Himself bound into matter. I think that Blake was seriously trying to figure out the mechanism by which He managed to pull this off.

Perhaps contemporary cosmogony would help him. In the Big Bang theory all matter and heat and light and all other energy at one time were accumulated into a fantastically dense undifferentiated "hot nuclear gas"¹¹ which expanded and cooled, thus enabling matter to condense from this original monistic form into the hundred or so varieties of atoms that we find nowadays.⁷⁸

And in relativity theory each atom has encapsulated within itself an amount of energy given by the formulation $E = mc^2$.⁷⁹

This monistic scientific metaphor is exactly parallel with the monistic metaphor of Blake's Urizen cosmogony. I have had my secretary, Miss Florence Wisnie, type into the footnote Blake's description of the Big Bang from The First Book of Urizen.⁸⁰

Now I will identify the Big Bang and Urizen trigger mechanisms, which turn out to be of considerable significance. In the scientific metaphor it was disequilibrium of thermal, gravitational, magnetic and other forces that disrupted the original fantastic concentration. In Blake's metaphor it was a "perturbation:"¹¹

1. Lo, a shadow of horror is risen
 In Eternity! Unknown, unprolific,
 Self-clos'd, all-repelling: what Demon
 Hath form'd this abominable void,
 This soul-shudd'ring vacuum? Some said
 "It is Urizen." But unknown, abstracted,
 Brooding, secret, the dark power hid.

2. Times on times he divided and measur'd
 Space by space in his ninefold darkness,
 Unseen, unknown; changes appear'd
 Like desolate mountains, rifted furious
 By the black winds of perturbation. 81

In Blake the significance of the term perturbation is twofold.

First, it expressly epitomizes the theme of Chapter 1 of Jerusalem, 82
 which begins with "the perturbed Man" rejecting the Saviour.

That is, the premise of Chapter 1 is that there has been a disruption
 between man and God, meaning a disruption between man and his
 monistic principle. And, of course, that disruption was Urizen's
 perturbation resulting in a corporeal contraction in a zone of eternity.

the contraction extending all of the way down to but not exceeding

Adam, the limit of contraction. Second, perturbation not only is a . 83
 state of mental derangement such as King George III experienced;

also it is an astronomical term meaning "a disturbance of the regular
 elliptic or other motion of a celestial body produced by some force

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 additional to that which causes its regular motion." That is, in

Blake's time and earlier there were anomalies that had been dis-
 covered when Newton's laws were applied to planetary phenomena,

and these were called perturbations. For example, Jupiter and Saturn inexplicably lagged and accelerated in alternating deviations from their predicted paths. These anomalies caused widespread concern. Newton himself "had feared that the planetary melee would in time derange the solar system and that God's help would be needed to restore order."⁸⁵

I think that Blake knew and used "perturbation" in the sense in which it is referred to in this astronomical problem. For example, in rejecting the Saviour the perturbed Man made it a point to say, "By demonstration alone can man live, and not by faith."⁸⁶ Eventually the saviour turned out to be not God but Laplace, whose mathematical theorems finally demonstrated that the "peculiar wobbles . . . were minor, self-correcting blemishes which in no sense threatened the revolutions of the engine as a whole."⁸⁷

But now I had better restate my general point. There existed first an undifferentiated fantastic batch of energy. Then there was a disequilibrium or perturbation. And then the corporeal world ensued. I think the restatement fits both cosmogonies - that of the Big Bang and that of Urizen.

And now I comment that the Big Bang trigger (disequilibrium of thermal, gravitational, magnetic and other forces) is more satisfying intellectually than the Urizen trigger (mere perturbation). Admittedly the Big Bang theory is 20th Century stuff. Admittedly no one

of Blake's own age had anything better to offer than perturbation. But Blake's perturbation had no causal mechanism other than that which he pumped in by means of personifying Urizen through giving him the following motivation: "I have sought for a joy without pain, / For a solid without fluctuation. / Why will you die, O Eternals? / Why live in unquenchable burnings?"⁸⁸

And that personifying Urizen motive that Blake pumped in is nothing but elephant wind.

And the ultimate inexplicability of perturbation was a problem that Blake never solved. For example, the abrupt folding up of Thel in The Book of Thel was an abortive perturbation: Blake did not know how to conduct her successfully into the corporeal world.⁸⁹

And now it is Memorable Fancy time.

First Memorable Fancy: William Blake is sitting at his table, working with his copper and his tool. He is under the direction of Messengers from Heaven. He is writing virtually automatically, writing what they dictate to him. He is in or near eternity. No more than ten feet from him in this corporeal world - separated from him by such corporeal distance and by the thickness of a corporeal bedroom wall - is Mrs. Blake. She has unbuttoned her cotton blouse and has taken out her sweet breasts. She has erected the sweet nipples by squeezing them with her fingers. She cries out, "Mr. Blake, Will you come here?"

Mr. Blake lays down his copper and lays down his tool. He rises, and he goes and stretches out his hand to open the corporeal bedroom door.

In Blake's metaphors the trigger of perturbation eventuates in a contraction into corporeality, and that corporeality is a marriage of energy and reason. And something dies in marriage and is carried away in "the Marriage hearse." ⁹⁰ And something dies in contraction and "if ye will believe. . . shall rise again." ⁹¹

In the strict philosophy and practice of monism it is necessary that all contraries be reconciled. They are equal aspects of the same one principle. It is not a matter of choice or volition, it could not be otherwise: it is the way it is, it is the nature of things. ⁹² In *The Marriage of Heaven and Hell* Blake explicitly announced the reconciliation of the following contraries: attraction and repulsion, reason (hell) and energy (heaven), love and hate, good and evil, body ⁹³ and soul.

When it comes to metaphors to represent the various reconciliations, Blake generically uses the idea of englobing encapsulation such as appears, for example, in the remark that "Reason is the bound or outward circumference of Energy." ⁹⁴ And, of course, the primal or Urizen contraction is exactly that sort of englobing encapsulation. But also encapsulation is in the form of enchainment.

Los forges rivets and links of chain for every change in Urizen during
the progress of his encapsulation,⁹⁵ and the "Giants who formed this
world into its sensual existence, and now seem to live in it in chains,
are in truth the causes of its life & the sources of its activity. . . ." ⁹⁶

When reason and energy thus are reconciled or encapsulated
or enchained, they are married. It is a distressing condition. Blake
came right out and said so in the London poem of the Songs of Ex-
perience:

In every cry of every Man,
In every Infant's cry of fear,
In every voice, in every ban,
The mind-forg'd manacles I hear. .

But most thro' midnight streets I hear
How the youthful Harlot's curse
Blasts the new born Infant's tear,
And blights with plagues the Marriage Hearse. ⁹⁷

III C (3) (c) The Printing House in Hell

⁹⁸

Blake's Printing house in Hell has the function of printing
reason onto the surface of corporeal mineral things so that Reason
will endure and pass on information from generation to generation
in the corporeal world.

According to the marriage concept Reason and Energy are
chafed together, but the enchainment is accomplished in such a way
that Reason is the outward boundary. Therefore, if you look at a
corporeal substance, you should see Reason. And you do. Or if you

touch, taste, smell or hear a corporeal substance, you should touch, taste, smell or hear Reason. And you do.

The reason that Blake calls Reason the Ratio of sensate knowledge is that the senses have no power except to encounter the Reason surface. For example, a telescope or a microscope will not see beyond the Reason surface; it will simply alter the Ratio. Or, to put it more poetically:

How do you know but ev'ry Bird that cuts the airy way,
Is an immense world of delight, clos'd by your senses five?⁹⁹

And Blake announced that he intended to accomplish his prophetic purposes "by printing in the infernal method, by corrosives, which in Hell are salutary and medicinal, melting apparent surfaces away, and displaying the infinite which was hid."¹⁰¹

There are two kinds of corporeal substances in Blake's metaphor. First there are living things, which are called generate and vegetated, constituting a great big polypus.¹⁰² Second there are all other things, which are called metal.¹⁰³ This bifold scheme corresponds to the classic categorization of everything as being either animal, vegetable or mineral.

It is in the Printing house in Hell that minerals or metals are given their surface of Reason.¹⁰⁴ The production technique is batch casting,¹⁰⁵ in which the rubbish of the last batch is cleared away be-

fore the next batch starts. The plant is a cave. Physically it is the inverse of a womb and opens into infinity. The materials are "gold, silver and precious stones." The materials are melted and cast by "Unnam'd forms." They are cast into the womb. That is, they are cast through the mouth of the cave. That is, they are cast into the expanse of the corporeal world. When men receive them, the surface reason is upon them: "they took the form of books & were arranged in libraries." ¹⁰⁶

And there is one last piece of this metaphor. And that is that the cosmogonic Urizen has books of metal, in which he says that he has "written the secrets of wisdom, / The secrets of dark contemplation. . . ." ¹⁰⁷ It is by means of these books, printed in the Printing house in Hell, that knowledge is transmitted from generation to generation.

III C (3) (d) Recapitulation

No doubt it will help avert McGann's Consequence if I give a brief overview of Blake's existence metaphors.

Blake is a monist. All existence is God. Because of perturbation there was contraction down to the limit, and the corporeal world emerged in generate and metal form. It is still God, but He is locked into the corporeality. All apparent corporeal things have an outside surface which Blake loosely calls Reason. They have an in-

side which he loosely calls Energy. The outside is encountered by the sense. The inside is encountered by poetic genius, by imagination, by perception. If perception is faulty or misled, one sees only the Ratio, as Milton did in seeing Jesus. ¹⁰⁸

Now I am going to go to the process metaphors, but I want to conclude this subsection with an explanation of Blake's poetic statement of purpose in his preface to Milton. My point is that the statement is a function or consequence of his monistic view. Blake asks four questions, and the answer to each one is yes:

And did those feet in ancient time
Walk upon England's mountains green ?
And was the holy Lamb of God
On England's pleasant pastures seen ?

And did the Countenance Divine
Shine forth upon our clouded hills ?
And was Jerusalem builded here
Among these dark Satanic Mills ? ¹⁰⁹

The answers are yes because God is everywhere. He is locked in. He is locked in everywhere in the corporeal world, even in England.

III C (4) The Metaphors of Process

I will begin with a contribution to Blake criticism. Hitherto no one that I know of has understood Blake's concept of Emanation. The reader will recognize the importance of a correct understanding. The critics had an incorrect understanding in this respect: generally they discerned the metaphoric or elephant wind meaning

but they did not notice the literal reality that Blake thought he was describing.

Frye said that Emanation is the term corresponding to Spectre and that it means "the total form of all things a man loves and creates." ¹¹⁰ Bloom said that Emanation "is literally that which comes into being from a process of creation in which a series of effluxes flow from a creator. . . . [I]t is opposed to the Spectre. . . that has failed to emanate. to reach an outer but connected existence." ¹¹¹ Murry did not try to define Emanation. He was in the right ballpark, but he was only sniffing the elephant wind. ¹¹² Damon said such things as that Emanation "is the feminine portion, or 'counterpart,' of the fundamentally bisexual male." ¹¹³

Generically the critics' failure was that they applied the correct ordinary meaning of "emanation" - i.e., an efflux - to the incorrect creator or source of the efflux. For example, they believed that Albion's Emanation is an emanation from Albion, much as a fart would be an emanation from Priestly. Actually Albion's Emanation is an emanation to Albion.

In certain monist philosophies the one ultimate principle flows more or less downward into the many various substances by a process actually called Emanation. For example, the Gnostic philosophy "is characterized by association with the idea of emanation. a theory of

creation which postulates One Supreme Being from whom lesser beings or aeons have emanated as light emanates from the sun." 114

There was critical uncertainty over whether Blake himself was or was not a Gnostic, 115 but it makes no difference. I say that he employed the Gnostic concept and language in his use of "Emanation."

I am happy to advise the reader that Frye did not agree with me. Frye said:

There is no "chain of being" in Blake and no trace of any of the creatures invented by those who believe in a chain of being: no gods, no eons, no emanations (in the Gnostic sense: Blake's use of this term is different), no world-soul, no angelic intelligences bound on the spindle of necessity..... 116

But Frye was wrong. He was right that Blake was not a Gnostic, but he was wrong about his use of Emanation.

My reading of Emanation gives some important results. For example, as applied to Chapter 1 of Jerusalem, it explains the Saviour's thematic accusation of Albion and His thematic promise of redemption:

Where hast thou hidden thy Emanation, lovely Jerusalem,
From the vision and fruition of the Holy-one?
I am not a God afar off, I am a brother and friend;
Within your bosoms I reside, and you reside in me:
Lo! we are One, forgiving all Evil, Not seeking recompense.
Ye are my members, O ye sleepers of Beulah, land of shades! 117

In Jerusalem and in all of Blake "the passage through Eternal Death" 118 is the duration vile in which the Imagination, the Emanation from the one principle, is contracted and confined and enchained within

the outward boundary of Reason. And "the awaking *to* Eternal life" is the release of the Emanation so that it can reunite with the Holy One.

It is this enchainment and release that is the process in Blake's cosmography.

In Albion's case, he hid his Emanation "in jealous fears,"
 meaning that he did not want to give it back.¹²⁰ As he put it, "By
 demonstration man alone can live, and not by faith."¹²¹ That is,
 for example, the Sleep of Newton is the unwillingness to perceive;
 it is the unwillingness to release the Emanation.

The Songs of Experience also are illuminated by the correct
 reading of Emanation. In particular in the Introduction¹²² the earth
 qua planet is an Emanation which is kept hidden by Newtonian rotation.
 And EARTH'S Answer is clarified as being a specific reference to the
 cosmogonic or Urizen enchainment. This enchainment resulted, of
 course, in the jealous imprisonment of the Emanation, and Earth says:

Prison'd on wat'ry shore,
 Starry jealousy does keep my den:
 Cold and hoar,
 Weeping o'er,
 I hear the Father of the ancient men.

Selfish father of men!
 Cruel, jealous, selfish fear!
 Can delight,
 Chain'd in night,
 The virgins of youth and morning bear?.

Break this heavy chain
That does freeze my bones around .
Selfish! Vain!
Eternal bane!
That free love with bondage bound. 123

In The Book of Ahania there is another important view of the jealous confinement of Emanation. Specifically it links the jealousy with lust and sin:

7. Dire shriek'd his invisible Lust;
Deep groan'd Urizen! stretching his awful hand,
Ahania (so named his parted soul)
He siez'd [sic] on his mountains of Jealousy.
He groan'd anguish'd, & called her Sin,
Kissing her and weeping over her;
Then hid her in darkness, in silence,
Jealous, tho' she was invisible.
8. She fell down a faint shadow wand'ring
In chaos and circling dark Urizen,
As the moon anguish'd circles the earth,
Hopeless! abhorr'd! a death-shadow,
Unseen, unbodied, unknown ;
The mother of Pestilence. 124

The Book of Ahania was printed in 1795 and as an earlier concept defines Ahania as a "parted soul" rather than as an Emanation. Although this parted soul is clearly depicted as being outside Urizen, she is totally confined within the dark verdure that enveloped Urizen when the Tree of Mystery vegetated around him. Thus her tears fell around the Tree, and she lamented as follows:

But now alone over rocks, nmountains,
Cast out from thy lovely bosom,
Cruel jealousy! selfish fear!
Self-destroying, how can delight
Renew in these chains of darkness. .?125

Bloom said that Ahania's lament is an echo of Earth's Answer .

I say it is not an echo. It is the very same thing.

Now I should make it even more explicit, for the purpose of fending off McGann's Consequence, that there is a progression in Blake's own understanding of the process by which the Emanation separates from and unites with God. If I were to describe this progression fully, I would have to digress into extended readings of Milton and Jerusalem and indeed all of Blake . Instead I will summarize. I will do so in a rather long paragraph, and therefore I suggest that we pause here and refresh and prepare ourselves with another Memorable Fancy.

Next Memorable Fancy: When Mr. Blake leaves the bedroom, he is crying softly. He sits at his work table again. He takes up his tool to write, but the Messengers are gone. There is nothing he wants to say. He lays down his head and lets his tears wet the plate that he had been making.

Originally Blake conceived of the separation of the Emanation as being something that was caused by lust and sin. In The Marriage of Heaven and Hell he tried to be permissive about sin. He said, ' "The cherub with his flaming sword is hereby commanded to leave his guard at the tree of life. . ." ¹²⁷ (Emphasis supplied.) vWhen he does ¹²⁸ so, there will be "an improvement of sensual enjoyment. " And

by this means "the notion that man has a body distinct from his soul
is to be expunged." ¹²⁹ But the paradisiacal effect did not ensue,
and he began a new approach. He began to conceive of the separation
of the Emanation as something that was caused by that repression
process in which Reason becomes the outward boundary that locks in
delight. Thus he said:

My Spectre around me night & day
Like a Wild beast guards my way.
My Emanation far within
Weeps incessantly for my Sin. ¹³⁰

Essentially it turned out that repression by Reason was also a flop
as a device to deal with sin. He then developed a monistic reconcil-
ing notion: sin and its contrary, righteousness. are not inherent
characteristics of man but rather are transient states which man can
escape by believing in the Saviour and thereby freeing the Emanation. ¹³¹
But it was very hard for Blake, the Soldier of Christ, to convince
people that belief could thus redeem them:

But many doubted & despair'd & imputed Sin and Righteousness
To individuals and not to States. and these Slept in Ulro. ¹³²

Indeed, so long as Blake had his spectre around him night and day, he
could not convince himself that this redemption was possible: There-
fore, as his final measure, he annihilated his Self. ¹³³

The annihilation of self was really ultimate. For example,
sexuality was renounced. Male and female as contraries were at last

reconciled in the way that his monistic philosophy absolutely required that they be. And Blake forgave himself. And the act of forgiveness made virtually everything reconcilable.¹³⁴

But it is questionable whether Blake could hang onto this grand solution which came to him from the Daughters of Inspiration.¹³⁵

Time and again before hopefully he had achieved such pinnacles only to find later on that the Daughters of Memory¹³⁶ somehow had clothed him anew in chains of "rotten rags."¹³⁷ Something (Ore) always seemed to well up within him. This welling up was the problem that he could never solve. I will comment on this more fully in the attack on critics that I will give in Subsection D.

And now I am going to conclude my description of Blake's metaphors of cosmographic process. I am going to do so by locating all of the fantastic activity - labor and construction and weaving and wine making - that keeps taking place in his writing. The activity takes place within Blake, within everyman. That's where the action is. That's where it's at. He makes this location fairly clear in Milton. First he recites there once again his existential postulate that the world's corporeality came to be as a result of perturbation and ended in the form of encapsulated energy. And then he says:

Within labouring, beholding Vi'ithout, from Particulars to Generals
Subduing his Spectre, they Buildded the Looms of Generation;
They buildded Great Golgonooza Times on Tim.es, Ages on Ages. 138

That is, outside the surface or corporeality the proper function is to behold and it is for this reason that the merciful Saviour created the limit of opacity. And the function on the inside is to labor and to weave and to construct and to make wine until the time when redemptive Regeneration becomes possible .

And on the inside of Blake the ultimate metaphor is anatomical and physiological. And perhaps it is well now to conclude this view of his cosmography, to pass on so to speak, with his description of the gases and noises and procedures in the alimentary tract:

In Bowlahoola Los's Anvils stand & his Furnaces rage;
Thundering the Hammers beat & the Bellows blow loud,
Living, self moving, mourning, lamenting & howling incessantly.
Bowlahoola thro' all its porches feels, tho' too fast founded
Its pillars and porticoes to tremble at the force
Of mortal or immortal arm: and softly lulling flutes,
Accordant with the horrid labours, make sweet melody.
The Bellows are the Animal Lungs: the Hammers the Animal Heart:
The Furnaces the Stomach for digestion: terrible their fury.
Thousands & thousands labour, thousands play on instruments
Stringed or fluted to ameliorate the sorrows of slavery.
Loud sport the dancers in the dance of death, rejoicing in carnage.
The hard dentant Hammers are lull'd by the flutes' lula lula,
The bellowing Furnaces blare by the long sounding clarion,
The double drum drowns, howls & groans, the shrill fife shrieks
& cries,
The crooked horn mellows the hoarse raving serpent, terrible but
harmonious:
Bowlahoola is the Stomach in every individual man. 139

III C (5) Recapitulation

All of Blake can be understood quite easily through recognition of the monistic and Gnostic conception that he uses in his organizing

cosmography.

The conception is monistic in the sense that all contraries are subsumed by the one ultimate principle. Blake took considerable poetic and logical latitude in accomplishing this. For example, his contraries are not opposites, and they do not relate to each other in the same simple way that, say, left and right do. Thus it is that even inside and outside have different characters. And so do the primary
140
compass points. And likewise there is Reason enclosing Energy;
141
there is the Devourer consuming the excess of the Prolific; and in general there is Mental War between Blake's contraries. The function of the war is eschatological: man's imagination must battle to transport him **to** the eternality and the infinity that lies beyond the last judgment.

The organizing conception is Gnostic in the sense that the corporeal world is fallen. The Emanation from the one principle does not exactly lose its stuff when it flows out into corporeality, but it undergoes a scatological transformation. That which should be delight becomes fart and clap, and fart and clap are equally Pestilence. As Blake said in The Book of Ahania:

3. Efluvia vapor 'd above
In noxious clouds; these hover 'd thick
Over the disorganiz 'd Immortal,
Till petrific pain scurf 'd o'er the Lakes
As the bones of man, solid and dark.

4. The clouds of disease hover'd wide
Around the Immortal in torment,
Perching around the hurtling bones,
Disease on disease, shape on shape
Winged screaming in blood & torment. 142

And now I have finished the description of Blake's cosmography

D. I Attack Blake's Critics

When Blake applies his organizing epistemology on the level of ordinary man, on the level of himself, for example, he is bewildered. He cannot discover any satisfactory explanation or causal mechanism for the phenomenon in which he finds that he passes from a state of innocence (i. e. , from his pre-bedroom sense of unfettered communion with the infinite and the eternal) to a state of experience (i. e. , to his post-bedroom contraction into unregenerated dead ass corporeality.)

The bewilderment must have been horrifying to him. For the states are contrary ones, and in his way of thinking and feeling he could not have any relief until he subsumed them in the one ultimate principle.

One of his reconciling attempts was in his idea of Ore. Although Frye has dignified this attempt by defining "the Ore cycle," the entire concept of Ore does not really explain anything and is later abandoned by Blake in favor of the metaphor of the hiding of the Emanation. The failure of Ore is best shown in America, in which Ore simply wells up and does what he does. In the Preludium he has

the hots. But in *The Prophecy* he just wells up and causes the
American Revolution, and in so doing he is a *deus ex machina*.¹⁴⁴

Another of Blake's reconciling attempts was the annihilation
of Self, which is a conception that for some reason or other delights
Murry.¹⁴⁵ But it is a conception of the other world. The actual
living Blake was not Jesus: he could not really forgive everyone and
everything. For example, there is a terrible animus rampant in
Milton's great self-annihilation speech.¹⁴⁶

As for Bloom as a critic, he got lost when he decided that
Blake should be studied as polemic, for in such a study Blake's vital
cosmographic concerns simply shrivel and contract and become
nothing more than an idiosyncratic ranting.

Norman O. Brown stated a psychological view of Blake in
which he says, in effect, that innocence is the pleasure principle and
experience the reality principle. But Brown was concentrating on the
earlier Blake, the Blake of *The Marriage of Heaven and Hell*, the
Blake who wanted to be permissive of sensual enjoyment and eternal
delight. Brown said:

Freud and Blake are asserting that the ultimate essence of
our being remains in our unconscious secretly faithful to the
principle of pleasure, or, as Blake calls it, delight. To say
this is to call in question the psychological assumptions upon
which our Western morality has been built. For two thousand
years or more man has been subjected to a systematic effort

to transform him into an ascetic animal. He remains a pleasure-seeking animal. Parental discipline, religious denunciation of bodily pleasure, and philosophic exaltation of the life of reason have all left man overly docile, but secretly in his unconscious unconvinced, and therefore neurotic. Man remains unconvinced because in infancy he tasted the fruit of the tree of life, and knows that it is good, and never forgets. ¹⁴⁷

Now I am almost at the next section, in which I am going to attack Blake, but first I want to offer another Memorable Fancy.

Perhaps it will help to explain what went wrong with Blake's critics.

Last Memorable Fancy: William Blake enters the bedroom. Mrs. Blake is sitting on the bed, holding her sweet breasts, one in each hand, and tempting him. His palms are moist. He comes alongside her and with one finger touches first one sweet nipple and then the other *one*: She rises. She removes all of her garments, places one foot on the bed, and lightly strokes her sweet sex. Now he is on the bed. He is powerfully erect. His trousers are open as he pulls her down next to him. He rolls over and enters her and is determined that she will have an orgasm.. He strokes with great vigor, swaying atop her from side to side in an effort to rub and stimulate as much of her skin as he can. He thinks perhaps she is aroused, for she utters some ecstatic sound that is lost in his own husky breathing. In a moment she utters it again. Now it is somewhat more distinct. Once more she utters it, and he hears it plainly: "The teapot is broken. Can you repair it tomorrow?" Immediately he feels great spasms in his

gut. He continues to stroke, but now with each stroke he is in his mind seeing the building of Golgonooza. He strokes furiously, but Golgonooza will not stay up. In horror he finds himself shrivelling away. No amount of stroking avails. At last he slips out. And, as he does so, a volume of noxious gas escapes from him.

The problem with Blake's critics is that they have been going around sniffing elephant wind.

IV. I ATTACK WILLIAM BLAKE

It is very hard to understand Blake. And, as everyone who has managed it says, it is worth it.

Surely one reason it is hard is that certain of his terminology, such as "Emanation," is no longer current. But other of his terminology, such as "Ratio," is current still and ought to be readily accessible to precise metaphoric understanding.

But there is just too much paralyzing and misleading obscurantism in Blake. More affirmatively, he intended that the elephant wind contain airplane glue, but he contaminated it, and in fact it contains MACE. Hence most of the critics who have penetrated deeply are shook by the effect of what they encountered, and they babble learnedly of Los and Enitharmon and Minute Particulars and Vala and Beulah and 6000 years and Tharmas and Vegetated and Emanation and Hatio and Spectre and Luvah and Abstraction and Ulro and the like.

Such babbling may be personally therapeutic, may clean out the old lungs, but it does not actually elucidate Blake.

But the real fault was Blake's and now I am going to identify his exact failure insofar as he was a poet. It is that he did not have the dramatic skill to handle any poem longer than The Little Girl 149 or The Little Girl Found 150. For example, in The Book of Thel the dramatic effect depends entirely upon the fact that Thel finks out at the very brink of her final commitment. Dramatically such a resolution must be foreshadowed. But the only foreshadowing comes immediately before she finks out when the Clod of Clay inexplicably says to Thel, "Wilt thou, O Queen, enter my house? 'Tis given to thee to enter / And to return: fear nothing, enter with thy virgin feet." 151

\Why on earth it is so given to her to fink out is a deus ex machina. It is the same order of dramatic fault - the inability to resolve - that infects America 152 through the inexplicability of Ore and that infects An Island in the Moon 153 and The Four Zoas 154 and all of his earlier and later longer pieces.

I must grant that Blake was vitally concerned with ultimate inexplicability. But I say that he did not display the inexplicability dramatically. In his longer pieces he simply used it as a dramatic contrivance. And where he did not use it as a contrivance, he simply stopped \writing, as in The French Revolution 154. And where he con-

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tinued writing, as in Jerusalem, he just kept on gassing away.

Someone has suggested that the vice in Blake's longer efforts

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is that he did not prune. But that was not the case. As Mrs. Blake would tell you, he pruned plenty, but he could not pull off a decent climax.

V. THE LAST JUDGMENT: I FORGIVE BLAKE

Blake was not always well. His works did not sell widely. He was married. His brother died. One must sympathize with him. As McGann said, he was lonesome. And perhaps with good reason: one of the psychosomatic concomitants of his hostile dependent personality is that probably you would not want to be in the same room with him. 157

But when Blake wrote those little poems, he was unexcelled.

Bonus Memorable Fancy: On August 12, 1827 he bursts out singing. 158

He closes his eyes for the last time, and he gives up the corporeal ghost in order

To see a World in a Grain of Sand
And a heaven in a Wild Flower,
Hold Infinity in the palm of [his] hand
And Eternity in an hour. 159

His Emanation is on its way. Lots of luck, you old fart.

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"Enough! or Too Much"

FOOT NOTES

1. The reader and the chance passerby are welcomed to these footnotes. Keynes, *Blake Complete Writings* (Oxford University Press, 1966) will be called Keynes.
2. . Please see Hall, *The Scientific Revolution 1500 - 1800* (Beacon Press, 1966) 276, 342; Mason, *A History of the Sciences* (Collier Books, 1962) 296; Eddington, *New Pathways in Science* (Ann Arbor Paperbacks, 1959) 74-5.
2. Keynes, *Jerusalem*, plate 15, lines 8-9 (15:8-9).
3. Keynes, *An Island in the Moon*, 44.
4. I was going to cite Erdman, but the library misplaced its copy.
5. Keynes, *op. cit.* note 3, 58-9.
6. The thermodynamic aspects of existence, and entropy in particular, were not of concern to Laplace. Carnot and other contemporaries were working on them. Mason, *op. cit.* note 1, 488-90.
7. "Descartes had no need of God, save only 'to give a fillip to set the world in motion.' But, for that at least, he was in very great need of God.¹¹ Gilson, *The Unity of Philosophical Experience* (Charles Scribner's Sons, 1937) 209. I think it was John Rader Platt (whoever he may be) who made up the name "master watchmaker." That name connotes the entropy and thermodynamic processes.
8. Introductory paragraph to *The Declaration of Independence*.
9. Jerome McGann, Remark uttered at 4:07 p. m. , C. S. T. , April 11, 1968. ..
10. Demonstration was the common name in Blake's time for the method of proof by experiment. There are too many books and papers on my desk, and I cannot find my reference authority, if indeed there is one.
11. The reader will note that actually I will demonstrate ten of them, but it depends on how you count.

12. Op. cit. note 9.
13. Keynes. There is No Natural Religion {Second Series) 97.
14. Frye. Fearful .Symmetry {Beacon Press. 1967) 22 .
15. Murry. William Blake {McGraw-Hill, 1964) 15.
16. Bloom. Blake's Apocalypse {Anchor Books. 1965) 19.
17. Damon. A Blake Dictionary {Brown University. 1965) 341.
18. I will not trouble the reader with a dictionary definition.
19. The hell with a more complex footnote.
20. Keynes. Annotations to Lavater. 81.
21. Here Blake identifies with God. Blake recognizes that he is thought eccentric because he creates imaginatively. and he thinks that God's creations would be of the same order and consequence.
22. Keynes. 97.
23. Keynes. 98.
24. Ibid.
25. Please see. for example, Gilson, op. cit. note 7; Beloff, The Existence of Mind {Citadel Press, 1964) 11-9.
26. Here I was going to give a lengthy comment on epistemology. The hell with it. Please see Frye. op. cit. note 14, Chapter 1.
27. Keynes. 97-8, 149.
28. Ibid.
29. Keynes. 149.
30. Ibid.
31. Blake's language in describing the Ratio in op. cit. note 20 is not mathematically precise.

32. Keynes, Annotations to Reynolds, 476-7; please see Frye, op. cit. note 14, 14.
33. "The name of Catherine Blake will go down to posterity as that of an almost perfect wife." 3 Encyclopedia Britannica (Encyclopedia Britannica, Inc. • 1968), Blake, 756.
34. Keynes, 97.
35. Keynes, 97.
36. Keynes, Milton 25:42, Jerusalem 59:2-9; and other places.
37. No doubt the reader is quite conversant with the terminology of the game of craps.
38. Keynes, Jerusalem, page 620.
39. Ibid at 622.
40. Keynes, Milton 26:45.
41. Blake was quite moved by the lengths to which prophets have to go. Keynes, The Marriage of Heaven and Hell, pages 153-4.
42. Whatever I was going to say here need not be said.
43. Keynes, Letter to Thomas Butts, 10 January 1802, 812-3.
44. Please see that lousy book Beloff, op. cit. note 25.
45. An actual list will be furnished on request.
46. I forget what I was going to say here. The hell with it.
47. Exhibit A is an actual appendix to this paper. appearing immediately after these footnotes. It consists of several pages randomly selected from the Bulletin of the American Physical Society, 1968 Spring Meeting in Washington, D. C. • April 22 - 25, 1968. It gives representative samples of the titles of papers delivered at this meeting.
48. Eddington, The Nature of the Physical World (Ann Arbor Paperbacks, 1963) 251-2.

49. Keynes, *A Vision of the Last Judgment*, 617.
50. Actually the method is not novel. The terminology is novel and is used only for kicks.
51. I have protected the reader even further by relegating the material out of the paper altogether.
52. Please read note 51.
53. Please read note 46.
54. Actually Blake's liberty was not absolute. He represented things by discovering their most salient characteristics, their essences. Please see the text discussion of Joseph Priestly.
55. Please read note 4.
56. A doctor was examining a patient and said, "Frankly, your lungs are in bad shape - worst I've ever seen. It must be from more than smoking. What kind of work do you do?" The patient answered, "I'm with a circus." The doctor said, "That doesn't sound too bad." The patient thought for a while and then said, "I think I know what's wrong. My job is to wash the animals. When it come to the elephants, I put up a big ladder and get up there and scrub them. Every once in a while you use that brush a little bit too hard in the wrong place, and then the elephant lets out a blast of gas that nearly knocks you off the ladder." The doctor said, "Well, it is certainly ruining your lungs. You've got to find some other kind of work." The patient exclaimed, "Are you crazy, Doc? Are you trying to tell me I've got to quit show biz?"
57. Keynes, *The Marriage of Heaven and Hell*, 154.
58. Edd_ington, op. cit. note 1, 75.
59. Gilchrist, *Life of William Blake* (Macmillan, 1880) Vol. 1, 371-2.
60. Keynes, *A Vision of the Last Judgment*, 617.
61. They all do.

62. Please see Frye, op. cit. note 14, at 26 where Frye says that the world of Blake's vision is one of three worlds (sight, vision, memory). "These are not three different worlds . . . ; they are the egocentric, the ordinary and the visionary way of looking at the same world." My point is that Blake did not draw this distinction: in his world of vision you can actually corporeally touch that which you perceive.
63. Overstedt, William Blake's Conception of Nature (Unpublished, 1968) 1, n. 3.
64. Blake made it clear that he was writing what was told to him. For example, Keynes, Jerusalem 5:23; Milton 2 :1-20.
65. Bloom, op. cit. note 16.
66. Keynes, The First Book of Urizen, 20:33-41.
67. Keynes, The Marriage of Heaven and Hell, 154.
68. Anyone who disagrees should memorize Auerbach, Mimesis (Doubleday Anchor, 1957).
69. I forget what ambitious considerations led me to put a footnote here.
70. I can't find my notes to identify the place where I got this remark. I think that the concerned reader can find it in the Encyclopedia Britannica article on Monism.
71. Letter cited note 43.
72. Keynes, A Vision of the Last Judgment 614.
73. Keynes, A Vision of the Last Judgment 617.
73. By a stroke of good luck this accidentally iterated footnote refers to the same thing as its conumerary.
74. Keynes, Vala or The Four Zoas, Night the Fgurth, p. 304, line 273.
75. Keynes, Vala or The Four Zoas, Night the Fourth, p. 304, lines 269-274.

76. Ibid.
77. I have protected the reader further by relegating this material to a study of Berkeley himself or of mathematics. In Newman, *The World of Mathematics* (Simon and Schuster, 1956) Vol. 1, 286-93 there is a comment by Berkeley and a comment on Berkeley, and the concerned reader may see how the concept of limit came to solve the problem of evanescent terms that appeared in Newton's fluxions.
78. Gamow, *The Creation of the Universe* (Viking, 1952) Chapter 2.
79. It would be rather pretentious to cite anything here.
80. Keynes, *The First Book of Urizen* 4:45...:8, 5:3-8, 28-9, 33, 38-42 :
2. Rage, fury, intense indignation,
In cataracts of fire, blood, & gall,
In whirlwinds of sulphurous smoke,
And enormous forms of energy. .
 3. Sund'ring, dark 'ning, thund 'ring,
Rent away with a terrible crash,
Eternity roll'd wide apart,
Wide asunder rolling;
Mountainous all around
Departing, departing, departing.
 7. And a roof vast, petrific around
On all sides he fram'd, like a womb.
. . . • & like a black globe... .
 8. And Los, round the dark globe of Urizen,
Kept watch for Eternals to confine
The obscure separation alone;
For Eternity stood wide apart,
As the stars are apart from the earth.

My thanks to Miss Wisnie without whom this paper would have been *An Impossible Drag*.

81. Keynes, *The First Book of Urizen* 3:1-12.
82. Keynes, *Jerusalem* 4:22-32.

83. I was going to cite the missing David Erdman.
84. Webster's Seventh New Collegiate Dictionary (G. & C. Merriam, 1965) 631.
85. Newman, *op. cit.* note 77, Volume 2, 1317.
86. Keynes, Jerusalem 4:28.
87. Newman, *op. cit.* note 77, Volume 2, 1318.
88. Keynes, The First Book of Urizen, 4:10-13.
89. Keynes, The Book of Thel 127.
90. Keynes, London 216.
91. Keynes, Vala or The Four Zoas, Night the Fourth, line 270.
92. Keynes, The Marriage of Heaven and Hell 148-60.
93. *Ibid* at 149. The reconciliation of body and soul supposedly was clear to Blake but not to mankind generally. *Ibid* at 154.
94. *Ibid* at 149.
95. Keynes, The First Book of Urizen, plates 8 and 10.
96. Keynes, The Marriage of Heaven and Hell at 155.
97. Keynes, London 216.
98. Keynes, The Marriage of Heaven and Hell at 155-6.
99. Keynes, Milton 29:17-8.
100. Keynes, The Marriage of Heaven and Hell at 150. ..
101. *Ibid* at 154.
102. Please see note 103. Thank you.
103. Please see note 102. Thank you.
104. Keynes, The Marriage of Heaven and Hell at 154-5.

105. I was going to cite Erdman on the question of whether Blake ever witnessed an actual casting operation.
106. Keynes,, The Marriage of Heaven and Hell at 155.
107. Keynes,, The First Book of Urizen 4:24-30.
108. Keynes, The Marriage of Heaven and Hell at 150. Milton was specifically misled into seeing Jesus as a Ratio: Keynes, Milton, plates 1 and 2.
109. Keynes, Milton, 1:8.
110. Frye, op. cit. note 14 at 73.
111. Bloom, op. cit. note 16 at 210.
112. Murry, op. cit. note 15, Chapter 8.
113. Damon, op. cit. note 17, at 120-2.
114. Grolier Encyclopedia (Grolier Society, 1947) Vol. 5, Gnosticism, p. 236.
115. Please see Davies, The Theology of William Blake (Archon, 1966) 82-5.
116. Frye, op. cit. note 14 at 38. The reader should please consider Swedenborg's doctrine of "influx." Please see Davies, op. cit. note 115 at 39-40. And Blake used the term "eon" in reference to Jerusalem. "He set his face against Jerusalem to destroy the Eon of Albion." Keynes, Milton, 11:1. "Seeking for rest and finding none! and hidden far within;/His Eon weeping in the cold and desolated Earth." Keynes, Jerusalem 19:15-6. "And his dark Eon, that once fair crystal form divinely clear../Within his ribs producing serpents whose souls are flames of fire." Keynes, Jerusalem 40:41-2. Damon, op. cit. note 17, at 127 says that this usage "was probably suggested by the Gnostic term 'aeon,' an Emanation from the Supreme Being." Both Frye and Damon make the mistake of regarding Blake's use of eon as being mere Gnostic terminology. They are misled because Blake was not a Gnostic, but he used the Gnostic metaphor to serve his own purposes.
117. Keynes, Jerusalem 4:16-21.

118. Ibid at 4:1-2.
119. Ibid at 4:2.
120. Ibid at 4:33.
121. Ibid at 4:28.
122. Keynes, Introduction 210.
123. Keynes, Earth's Answer 211.
124. Keynes, The Book of Ahania 2:30-43
125. Ibid at 5:39-43.
126. Bloom, op. cit. note 16 at 195.
127. Keynes. The Marriage of Heaven and Hell 154.
128. Ibid.
130. Keynes 415.
131. Essentially Blake's theodicy relies on the Fall of man as preceding his sinfulness. and this notion underlies the concept of states of sin and righteousness. Please see, for example, Keynes, Jerusalem plate 25.
132. Ibid at lines 15-16.
133. Keynes, Milton plates 41 and 42.
134. Keynes, Milton, 41:1-28.
135. Ibid at 41:4.
136. Ibid.
137. Ibid.
138. Ibid 3:37-9.
139. Ibid 24:51-67.

140. Blake has numerous differentiated meanings for the primary directions. For one that is especially important please see Keynes, Jerusalem 14:29-30 where "East is Inwards, & the West is Outwards every way. " The significance of this representation can be glimpsed in Keynes, The Marriage of Heaven and Hell in the Memorable Fancy confrontation between Blake and the Angel, pages 155-7. Essentially the Angel gets Blake to look eastward, meaning inward, and Blake gets the Angel to look westward, meaning outward.
141. Keynes, The Marriage of Heaven and Hell at 155.
142. Keynes, The Book of Ahania 4:17-26.
143. Frye, op. cit. note 14 at 207-235. Please see also Bloom, op. cit., Chapter 8.
144. Keynes, America, plates 11 and 12.
145. Murry, op. cit. note 15, Chapter 16.
146. Keynes, Milton plates 40 and 41.
147. Brown, Life Against Death (Vintage, 1959) 31.
148. Minute Particulars are more essential to Blake's cosmography than are some of the other terms amongst which I lumped them in the text. I will spare the reader. I will not discuss them. Please see Keynes, Jerusalem, 91:21-31.
149. Keynes, The Little Girl Lost, 112-3.
150. Keynes, The Little Girl Found, 113-5.
151. Keynes, The Book of Thel 5:16-7.
152. Keynes, America, 195-206.
153. Keynes, An Island in the Moon, 44-63.
154. Keynes, The French Revolution, 134-148.
155. Keynes, Jerusalem, 620-747.
156. I forget who it was who was explicitly interested in Blake's pruned content.

- 157. On request I will identify a textbook which describes psychosomatic flatulence and other interesting psychosomatic phenomena. If necessary, I will write the textbook myself.
- 158. I was going to cite Erdman.
- 159. Keynes, *Auguries of Innocence*, 431.
- 160. Keynes, *The Marriage of Heaven and Hell*, 152.

TUESDAY MORNING, 23 APRIL 1968

FREDERICK HOOVER AT 9:00 A.M.

(H. GOVE presiding)

Nuclear Spectroscopy $6 < A < 16$

DG1. The $\text{Li}^7(\text{He}^3, t)\text{Be}^7$ and $\text{Li}^7(\text{He}^3, t_1)\text{Be}^7$ Reactions from 8.0 to 10.0 MeV. R. V. MANCUSO,* A. R. KRUMHOLTZ, and A. WOLICKI, *Argonne National Laboratory*. A particle identification system consisting of 3 dE/dx - E counter telescopes used in conjunction with an on line computer has been used to study the $\text{Li}^7(\text{He}^3, t)\text{Be}^7$ reaction to the ground and 0.431-MeV states in Be^7 . Excitation functions have been measured from 8.0 to 10.0 MeV in 100-keV steps at laboratory angles of 30° and 80° . In general, all yields vary smoothly with energy; the main features are broad maxima at 8.7 MeV in the 30° yields for both groups. Angular distributions have been measured at 8.7 and 9.7 MeV between 20° and 165° laboratory angles. The t_0 angular distribution contains strong peaks of approximately equal intensity at forward and backward angles at both 8.7 and 9.7 MeV. For t_0 at 9.7 MeV the ratio of the yield at 3° to the yield at 36° (c.m.) is 4.5:1, while at 8.7 MeV the ratio of the yield at 3° to the yield at 29° (c.m.) is 2.6:1. The t_1 yield at both energies is approximately one half the t_0 yield at all angles except in the region of the t_0 forward peak where the yield is only one fourth the t_0 yield.

*National Academy of Sciences - National Research Council Postdoctoral Research Associate - NRL.

DG2. Lifetime of the First Excited State in Li^7 . M. J. THROOP, *University of Iowa*, G. C. MORRISON, *Argonne National Laboratory*, and D. H. YOUXGBLOOD, *Texas A & M University*. The attenuated-Doppler-shift technique has been utilized to measure the lifetime of the 980-keV state in Li^7 populated in the reaction $\text{D}(\text{Li}^7, p)\text{Li}^8$ induced by the Li^7 beam from the University of Iowa Van de Graaff. The beam energy, after passage through a thin nickel window, was 7.3 MeV. The method employed was that described recently. With a 20-cc Ge(Li) detector at 90° to the beam, the mean energy difference between the fully-shifted (O_2 gas target, 2.5 cm Hg) and the attenuated (ZrD target, 113 $\mu\text{g}/\text{cm}^2$) gamma ray was found to be 300 ± 100 eV. Only about 100 eV of this difference can be attributed to the difference in energy loss in the 2 targets. The measured and calculated full shifts agree, the value being 36.0 keV. Because of the high initial recoil velocity ($\approx 1.2 \times 10^9$ cm./sec), only electronic stopping need be considered as contributory to the slowing down of Li^7 . A preliminary analysis based on the Li^7 stopping curves, derived from those for Li^6 , gives a lifetime $\tau = 6 \times 10^{-15}$ sec.

^tWork performed in part under the auspices of the U.S. Atomic Energy Commission.
I. A. E. Blau, D. H. Youngblood, G. C. Morrison, and R. E. Segel, *Phys. Rev.* 158, 893 (1967).

DG3. Doppler Shift Attenuation Measurements in ^9Be . H. LANCIAN (introduced by L. J. Lidofsky), F. S. ROSENTHAL, J. BEYEA, M. NESSIN, and L. J. LIQOESH, *Yale University*. Gamma spectra following the $^9\text{Be}(d,p)^9\text{Be}$ reaction have been measured with a Ge(Li) detector in coincidence with protons. The geometry was such that the energy spread of the gamma lines due to kinematical effects was less than 3 keV. The gamma line corresponding to the cascade transition from the 5.96-MeV state is clearly broader than the line corresponding to the cross-over transition from this state. The fact that the lower energy line is broader than the high-energy line must be attributed to the effect

of a Doppler shift attenuation. We conclude that the 2 gamma rays are emitted from 2 states with different lifetimes. These results confirm the existence of a doublet in ^9Be at an energy of 5.96 MeV and show that the state that decays predominantly by the cascade has a longer lifetime than the one decaying directly to the ground state. The data are also being analyzed to extract the lifetimes of the 3.37- and 6.26-MeV states.

*Work partially supported by the U.S. Atomic Energy Commission.

DG4. Energy Levels of N^{14} and F^{11} from the $\text{C}^{12}(\text{He}^3, p)\text{N}^{14}$ and the $^0\text{He}^3(p, \text{F}^{11})$ Reaction. M. W. GREEE, *University of Iowa*. A differentially pumped target chamber was used to provide thin O_2 and CO_2 targets. A 300- μ detector inside the gas chamber (collimated to view a small region of the line source) was used to obtain proton spectra at 4 He^3 bombarding energies: 5.898, 6.004, 6.099, and 6.200 MeV. CO_2 gas was used only at 5.898 MeV. The typical FWHM for ^3He protons was 20 keV. Corrections made were: (1) He^3 energy loss along the line source, (2) proton energy loss from the collimated reaction volume to the detector, and (3) proton energy loss due to the Au layer on the detector face. The 4096 channel ADC was calibrated using the well-known excitation energies in F^{11} of 0.937, 1.701, 2.101, 2.524, and 3.839 MeV. The results for F^{11} (above 4.0 MeV) are: 4.120, 4.232, 4.362, 4.403, 4.659, 4.739, 4.852, and 4.955 MeV and for N^{14} are: 3.943, 4.913, 5.101, 5.693, 5.834, (6.247 ± 0.01) , and 6.450 MeV. The probable uncertainty is ± 5 keV. The 4th excited state of F^{11} was measured to be 1.120 ± 0.005 MeV.

I. J. W. Olness and E. K. Warburton, *Phys. Rev.* 156, 1145 (1967).

DG5. Proton-Induced Charged Particle Reactions on N^{14} at < 6 MeV. H. H. FORSTER, E. BAR-ABRAHAM, C. C. CHANG, J. H. HOKIDKMK, C. C. KI-I, *University of Southern California*. J. M. CAIEROX, J. B. EPSTEIN, and P. TOULIAS, *University of California, Los Angeles*. The 46-MeV proton beam of the UCLA sector focusing cyclotron has been used to investigate charged particle reactions on N^{14} . The angular variations of the differential cross sections were observed for elastically scattered protons and for several groups of d , t , He^3 , and He^4 particles. The target consisted of pure N^{14} gas at a pressure of 30 cm Hg; the reaction products were separated by a π -E counter telescope, consisting of totally depleted surface barrier (AE) and Li drifted silicon (E) detectors. The elastic scattering data were analyzed using an optical model search code and the parameters obtained were used in DWBA calculations in the analysis of the (p, d) , (p, t) , (p, He^3) , and (p, α) angular distributions. The parameters corresponding to best fits to the experimental results, and the spectroscopic factors obtained for the different reactions will be presented. In addition, low lying levels in N^{14} from the $\text{N}^{14}(p, t)\text{N}^{12}$ reaction will be discussed.

*Work supported in part by the U.S. Atomic Energy Commission, Contract AT(O-t-3)-136 and T(O-t-3)-137 P.A. 1.
on leave of absence from Institut "R. Bosko, ic, Zagreb, Yugoslavia.

DG6. Levels of O^{16} Seen from the Reaction $\text{uC}(\text{He}, n)\text{uO}$. HILTON F. HILTON, DERLITER (introduced by William A. Loch-

EXHIBIT A

stet), WILLIAM A. LOCHSTETTER, *University of Illinois at Urbana-Champaign*. Targets of carbonyl enriched to 5% ^{13}C were bombarded with a pulsed He beam of energies from 0.5 to 6.0 MeV. The resulting neutrons were analyzed by a time-of-flight system with a 3.17-m flight path. Levels were observed with energies of 0.00, 8.98, 9.66, and 5.2 MeV. A plastic scintillator viewed by a photomultiplier served as the counter which could be rotated through laboratory angles from 0° to 160° . Angular distributions were observed and normalized by means of the spectrum from a stationary neutron counter similar to the movable detector.

Work supported in part by the National Aeronautics and Space Administration and the National Science Foundation.

007. Form Factors for Two Nucleon Transfer Reactions. R. L. JAFFE (introduced by G. T. Ganey) and W. J. GERACE, *Princeton University*. Calculations of form factors for 2-particle pickup and stripping reactions as formulated by Glendenning¹ require the relative s-state component of the nuclear wavefunction of the transferred particles. Previous calculations vary as to the proper choice of a 0-order well with which to bind the particles to the nucleus.² To resolve the ambiguity we include residual interactions between the transferred nucleons so as to reproduce both single-particle and 2-particle separation energies. A Woods-Saxon well which generates observed single-particle binding energies provides a basis of 2-particle states among which an analytic s-state interaction is diagonalized with the requirement that the additional binding produced in this manner be equal to the observed pairing energy. The sensitivity of this model to the various parameters involved is being studied. The model is applied to reactions resulting in doubly magic nuclei and has been extended to include deformed states.

Work supported in part by the U.S. Atomic Energy Commission and the Higgins Scientific Trust Fund.

¹X. K. Glendenning, *Phys. Rev.* 137, B102 (1961).

²R. M. Drisko and F. Rybicki, *Phys. Rev. Letters* 16, 275 (1966).

¹B. F. Bayman and A. Kallio, *Phys. Rev.* 156, 1121 (1967).

DG8. Differential Cross Sections in $\text{N}^{14}(\text{d}, \text{n})\text{O}^{15}$. ROGERS C. RITTER and J. E. PATTERSON, *University of Virginia*. Absolute differential cross sections have been measured for the $\text{N}^{14}(\text{d}, \text{n})\text{O}^{15}$ reaction using both pulsed-beam and *r-y* time-of-flight systems. A 3-m flight path was used for the pulsed-beam spectra and a 1.5-m flight path was used typically for the *r-y* experiments. A gas target was used which was sufficiently thin that other components sensed as the main limitation to the time resolution of the system (about 3 nsec for 2 MeV neutrons). Deuteron bombarding energies were 3.0, 4.0, and 5.0 MeV. Quantitative analysis was possible for neutron groups corresponding to the following states in O^{15} : 0, 5.241, 6.180, 6.192, 6.857, 7.276, and 8.550 MeV. Preliminary analysis of the angular distributions leads to values of the relative s-wave pickup transfer probabilities which agree with previous results obtained with a thick target. However the 5.2-11 MeV state, which was not studied in the previous work,¹ has an unusual angular distribution which we have not yet been able to fit with stripping theory.

Work supported by the National Science Foundation.

¹J. R. Rasmussen and B. E. F. Francefeld, *Phys. Rev.* 159, 92 (1967).

DG9. Study of $\text{C}^{12}(\text{n}, \text{n}')\text{C}^{12}$ at 14.1 MeV. E. H. BERKOWITZ,* A. W. BAHROUCH, R. V. IACUSO, T. S. L. BARD, and B. K. BARBER, *U. S. Army Nuclear Defense Laboratory*. A new analysis procedure developed for 4-particle final states has been employed to analyze the $\text{C}^{12}(11.3, \text{n}')\text{C}^{12}$ reaction of $\text{E}_n = 14.1$ MeV in a kinematically "complete"

experiment. The method is based upon a 2-parameter plot; technique for individual events parameterized by event determined Q values for 2-particle and daughter 3-particle intermediate states. Branching ratios for decay of several C^{12} and B^9 states are obtained. Sensitivity of the method of nonsequential processes will be discussed.

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Present address: U. S. Naval Research Laboratory, Washington, D. C.

Present address: Los Alamos Scientific Laboratory, Los Alamos, N. M.

DGIO. Excitation of ^{15}O via He Bombardment of ^{12}C . H. R. WELLER (introduced by R. A. Blue), *University of Florida and Duke University*. Angular distributions and excitation energies have been measured for the $^{12}\text{C}(\text{He}, \text{n})^{15}\text{O}$ and $^{12}\text{C}(\text{He}, \text{p})^{15}\text{O}$ reactions between 5.0- and 8.0-MeV He energies. Strong resonance structures have been observed in the vicinity of 17.0 MeV in ^{15}O . An optical-model-plus-resonance analysis of the elastic scattering data indicates that a potential similar to that used at higher energies¹ can describe much of our data if 2 resonances are introduced. An examination of the structures observed in the α channel suggests that the states are formed by an excited ^{14}C core coupled to an alpha particle. The 7 apparent levels fit into this scheme. On the basis of our elastic analysis and previous work by Schapira,² it appears that the alpha particle is in a relative $L = 1$ state. Further implications of this model will be discussed.

¹E. A. Kellogg, Ph.D. thesis, University of Pennsylvania, 1965.

²J. P. Schapira, R. S. Eliot, S. O. Swenson, and D. J. Jacobs, *X-ray Phys.* 80, 565 (1966).

DG11. States in N^{14} from the $\text{N}^{14}(\text{d}, \text{p})\text{N}^{15}$ Reaction. G. W. PHILLIPS, J. P. ALLEN, and W. W. JACOBS, *University of Washington, Seattle*. States from 5.3 to 9.2 MeV in N^{15} were studied using the reaction $\text{N}^{14}(\text{d}, \text{p})\text{N}^{15}$ at deuteron energies of 7, 8, and 9 MeV. Particles were detected using a AE, E detector telescope and multiplier to identify the protons. Proton angular distributions were obtained at angles of about 15° to 60° in 2.5° steps, and comparison is made to DWBA predictions. Of particular interest is the unresolved 9.16-MeV doublet and the 9.22-MeV level. The angular distributions for these levels appear to contain mixed *f* values and may have some compound nuclear contribution. The possibility of mixed parity in the unresolved 9.16-MeV doublet allows the admixture of both even and odd *f* values in the angular distribution. However, for the 9.22-MeV level, the *f* values must be either even or odd, and the angular distribution is best fit by a mixture of $l = 1$ and 3. This information, combined with previous results,¹ gives a tentative spin-parity assignment of $3/2^-$ to the 9.22-MeV level.

Work supported in part by the U.S. Atomic Energy Commission.
Present address: NASA Johnson Spacecraft Center, Houston.

¹G. W. Phillips, F. C. Young, and J. B. Marion, *Phys. Rev.* 159, 391 (1967).

DG12. Elastic Electron Scattering from Nitrogen-15.

E. B. DALRYMPLE, I. G. CROISSIAUX, and B. SCHWEITZ, *Stanford University and Institut de Recherches Nucleaires*.

Angular distributions of the elastic scattering cross section for nitrogen-15 have been measured at 250 and 400 MeV. Absolute cross sections were measured. A liquid target composed of heavy ammonia (NH_3) was used. The measurement extended beyond the first diffraction minimum. For comparison, a similar angular distribution was also measured for nitrogen-14 at 400 MeV. Using the harmonic oscillator function, a 1 parameter fit to the nitrogen-15

data gives an rms radius of $(2.68 \pm 0.05)F$ at 25.1 MeV and $(2.63 \pm 0.05)F$ at 400 MeV. The rms radius of ^{14}N at 400 MeV was found to be $(2.58 \pm 0.05)F$.

Work supported by the U.S. Office of Naval Research. Contract #ONR 214-GI-1 and the Institut de Recherches Nucléaires, Strasbourg, France.

Present address: High Energy Physics Laboratory, Stanford University, Stanford, Calif.

Present address: Institut de Recherches Nucléaires, Strasbourg, France.

¹E. B. Dillity and J. G. Croissiaux, *Rev. Sci. Instr.* 38, 646 (1961).

DG13. $^{14}C(^3He, p)^{14}N$ and $^{14}C(^3He, d)^{15}N$ Reactions. R. L. DAUGLE, A. I. DITZNER, L. NITZBERG, J. L. DUGGAN, *Oak Ridge Associated Universities*, and P. D. ANGLER, *Oak Ridge National Laboratory*. Angular distributions have been measured for the $^{14}C(^3He, p)^{14}N$ and $^{14}C(^3He, d)^{15}N$ reactions. These measurements were made for incident 3He energies of 4, 5, 7, and 9 MeV. For the $^{14}C(^3He, p)^{14}N$ reaction, protons from the following states in ^{14}N were observed: ground, 3.34 MeV (4th), 3.51 MeV (5th), and 3.96 MeV (6th). Plane wave stripping calculations have been made in an attempt to describe the observed angular distributions. In general, the angular distributions show good stripping patterns. The data allow the following spin and parity assignments to be made for levels in ^{14}N : ground (2, 1, 0⁻), 3.34 MeV (1, 0⁻), 3.51 MeV (3, 2, 1) and 3.96 MeV (3, 2, 1⁰). For the $^{14}C(^3He, d)^{15}N$ reaction only the ground-state deuteron group was measured. This angular distribution shows an $L = 1$ stripping pattern, which allows a spin and parity assignment of (3/2, 1/2⁻) to the ground state of ^{15}N . DWBA calculations are being made and will be presented if completed. Absolute cross sections were measured.

Work at the University of Georgia supported in part by a grant from the National Science Foundation.

Oak Ridge Associated Universities and Oak Ridge National Laboratory are operated under contract with the U.S. Atomic Energy Commission.

DG14. Investigation of 0^{15} Continuum States with the $N(^4He, p)0^{16}$ Reaction. J. R. COFFORT, J. E. E. BAGLIN, and J. N. THOMPSON, *Yale University*. The $N(^4He, p)0^{16}$ reaction was used to investigate the 0^{15} excitation region between 15.5 and 22.5 MeV with about 30-keV resolution. A thin melamine target was bombarded with 13.0 MeV 4He ions from the MIT-OXR Van de Graaff accelerator. The protons were momentum analyzed at 24 angles in the MIT multigap spectrograph and recorded in nuclear emulsion plates. A kinematic analysis of the data revealed the presence of at least 9 spectroscopically populated states in 0^{15} . A level at 17.14 MeV is about 80 keV wide, but the others are about 40 keV wide. The strongest level is at 18.02 MeV and is quite narrow. The prominent states seen in photonuclear reactions at 13, 19.5, and 22.6 MeV are not observed here. The characteristics of our states, and their correlations with previously observed 0^{15} states will be discussed. Some levels can be associated with levels seen in the analogous $N(^4He, p)N^{15}$ reaction.

Work supported in part by the U.S. Atomic Energy Commission. I. P. V. Hewka, C. H. Holbrow, and R. Middleton, *U.S. Phys. Rev.* 561 (1966).

DG15. Ground-State Wavefunction of 0^{15} . K. H. PCRSER, W. P. ALFOHD, D. CLIFFORD, J. W. FULBRIGHT, H. E. GOVE, and M. S. KLUCK, *University of Rochester-Differential*

cross sections have been measured for the reaction $0^{15}(d, n)$ to the ground and first 3 excited states of 0^{15} using 20-MeV deuterons, with the purpose of establishing the amount of $(2p-2n)$ admixtures in the ground-state wavefunction of 0^{15} . DWBA analysis was carried out for the transitions using the code JULIE; the measured 0^{15} values being adjusted so that the measured strength to the 0^{15} state at 6.15 MeV was 4. Assuming a wavefunction for 0^{15}

$$f_{11} = \alpha(p^{12}) + \beta(p^{15}s^2) + \gamma(p^{16}d^2) + \text{others.}$$

The renormalized spectroscopic factors then indicate that the following upper limits may be set:

$$f_{11} \leq 0.3 \quad \gamma \leq 0.48.$$

This result indicates that the wavefunction for 0^{16} may be written as

$$|111\rangle = 0.821 |0p-0h\rangle + 0.56 |2P-2z\rangle$$

with 0.56 as an upper limit on the amplitude of 2P-2z configuration.

Work supported by the National Science Foundation.

DG16. The $^{16}O(p, t)^{16}O$ Reaction. H. M. BLAIR, D. G. FLDING, H. W. FULBRIGHT, J. A. ROBBINS, L. NITZBERG, and H. S. PLENDL, *Florida State University*. The $^{16}O(p, t)^{16}O$ reaction has been investigated with a 20-MeV proton beam from the University of Rochester IP tandem accelerator. Tritons were detected by a sonic spark chamber positioned in the focal plane of the Engle split-pole spectrograph. Resolutions better than 1 mm were obtained at forward angles so that a clean separation of the 6.05 MeV (0^-) and 6.13 MeV (3^-) states in ^{16}O was obtained. Preliminary results indicate that the ratio of the 6.05 MeV (0^-) state to the ground state is in reasonable agreement with that calculated from the (particle-hole) amplitudes published by Brown and Green.² Our preliminary calculations also indicate that this agreement may be improved by including a $10CC$ core-excitation component in the ^{16}O ground state. The absolute cross section for all the states excited are in good agreement with those reported recently.³ Xu-clear structure calculations and DWBA fits will be presented for all the states of interest.

Work supported by the National Science Foundation.

H. M. Blair, Fulbright and J. A. Robbins, *Bull. Am. Phys. Soc.* 12, 120-1 (1961).

Z. G. E. Brown and A. I. Green, *Xucl. Phys.* 75, 101 (1956).

H. F. Lutz, J. J. Wesolowski, S. F. Eccles, and L. F. Hansen, *Xucl. Phys.* A101, 241 (1961).

DG17. Radiative Pion Capture in ^{12}C . H. UBERALL, *Catholic University*, and F. R. J. KELLY, *Sarnia Ordnance Laboratory*. Radiative pion capture represents a means of studying nuclear structure, by observing the neutrons emitted subsequently to the capture process, which stem from the decay of (mainly giant resonance) states excited during capture. The neutron energies may be determined by the time-of-flight method, using the gamma ray as a coincidence signal; in addition, the photon spectra themselves may be observed. We have obtained gamma and neutron spectra using the Kamimura-Ikeda-Arima model of the giant resonance in ^{12}C , and compared our results with those of the earlier model of Gillet, Lewis, deForest, and Alecka.

Work supported by a grant of the National Science Foundation.

EXHIBIT A

TUESDAY MORING, 23 APRIL 1968

ALEXADRIA ROOM AT 9:00 A.M.

(J. WERTSENER presiding)

Nuclear Theory

DH1. Spin-Orbit Doublet Separation in O^{17} Using Hard-Core Harmonic Oscillator Wavefunctions. W. K. NIBLEACK (introduced by B. P. Nigam, *State University of New York at Buffalo*) and B. P. NIGAM, *State University, Temple*. Calculations of the spin-orbit doublet separation in O^{17} are performed, assuming that, to a 1st approximation, the individual particle potential experienced by each nucleon in the nucleus is given by the harmonic oscillator potential. The nucleus O^{17} is considered as consisting of the nucleus O^{16} as a core plus a neutron outside. The K-matrix is evaluated from a 2-body potential in the approximation of taking interactions of the outside neutron with each of the 16 core nucleons and neglecting interactions between nucleons in the core. Numerical calculations are done using only the spin-orbit part of the Gammel-Thaler potential, treating it as a perturbation, however using hard-core harmonic oscillator wavefunctions as the unperturbed wavefunctions. A value of 5.95 MeV is obtained for the spin-orbit separation between the $J = 5/2$ and $J = 3/2$ states.

DH2. Concealed Configuration Binding in Shell-Model Calculations. • RAJ K. GUPTA and L. E. H. TRAINOR, *University of Toronto*. Recently the method of Cohen, Lawson, and Soper of comparing a shell-model study and an exact calculation for a 2-level model (d and s states) was extended to the s-d shell and to the nondegenerate case.² In contrast to the situation for d-j states, it was found that concealed configuration interactions cannot easily occur in the s-d shell. In order to test whether this contrast has its origin in the fact that the orbital quantum numbers of the 2 levels differ by 1 unit in 1 case and by 2 units in the other, we are examining the problem of neutrons filling the $P_{1,2}$ and $1d_{5/2}$ states. Results for both the degenerate and nondegenerate models will be presented.

Work supported by the National Research Council of Canada.
 S. Cohen, R. D. Lawson, and J. H. Soper, *Phys. Letters* 21, 306 (1966).
² L. E. H. Trainor and R. K. Gupta, *J. Nucl. Phys.* A108, 257 (1968).

DH3. Truncation of Nuclear Shell Model Bases. T. SEBE and J. NACHA, *Chalk River Nuclear Laboratories*. A method is proposed for truncating shell-model bases by 1st transforming the Hamiltonian matrix to tridiagonal form¹ and then diagonalizing the tridiagonal matrix using the method of Nachtmann.² A new basis is determined by the choice of the initial vector in this process. The method consists of cutting off the tridiagonalization process after a pre-set number of eigenvalues has been determined within the required accuracy. If the initial vector is chosen from some suitable physical consideration (e.g., from submodels) then the size of the tridiagonal matrix to obtain the necessary accuracy can be small. In this way, (1) a great deal of computing time is saved, and (2) a good error estimate can be made. It is clear that, given the initial vector, the tridiagonal matrix can be constructed directly, i.e., knowledge of the full Hamiltonian matrix is not necessary. The reduction in number of basis states will surely help to reinterpret nuclear structure in terms of submodels. Examples will be shown for a few particles in the 2s-1d shell.

C. M. ZOS, *J. Res. Natl. Bur. Std.* 5, 215 (1934).
 J. Nachtmann, *Bull. Am. Phys. Soc.* 12, H9 (1967).

DH4. Deformed Harmonic Oscillator Shell Model. R. Y. CUSSON, *Chalk River Nuclear Laboratories*. The simple

shell-model 1-body Hamiltonian $H = -\frac{\hbar^2}{2m} \nabla^2 + \sum_{k=1}^2 \frac{1}{2} m \omega_k^2 r_k^2$, where $\psi_{i_1, i_2, \dots, i_n} = (i_1, i_2, \dots, i_n)$, $\omega_k = (41 \text{ MeV}/A^{1/3})$, has the property that the values of ω_k which minimize the total energy for a given configuration also produce a quadrupole deformation which is the same as the shape of the potential. Plots of equilibrium deformation versus A ($4 \leq A \leq 40$) are presented. The regions $8 < A < 12$, $20 < A < 28$, $28 < A < 36$ are found to be nonaxial. Excellent qualitative agreement with the observed values of the total binding energy per nucleon is obtained throughout the p and s shell even to the extent of reproducing the breaks at the even-even nuclei. An effective gap is shown to develop in the single-particle energies. The properties of the model are discussed in the context of the Hartree-Fock formalism. The overlap amplitudes between the present many-body states and the corresponding ones in the SU(3) scheme are presented versus A .

DH5. Representation Mixing in the Nuclear SU_3 Model. M. HARVEY and T. SEBE, *Chalk River Nuclear Laboratories*. The classification of shell-model states according to Sf_3 is based on the assumed dominance of a quadrupole-quadrupole (QQ) force in the residual interaction. A study has been made of the representation mixing caused by simple "foreign" operators (e.g., spin orbit, pairing). In many cases it is found that the dominant mixing is from states belonging to representations of SO_3 which have a similar value for $(L+2, L)$: these states can however have different orbital symmetries. This result is often true even when the "foreign" operator dominates the interaction. Our analysis shows that the admixture of representations may be interpreted physically as a softening of the nucleus primarily in a direction in orbital space. The effect of this mixing on electromagnetic transition rates will be shown.

DH6. Shell-Model Calculations of $B(E2)$ Values in s-d Shell Nuclei from $A = 18-22$. J. B. BRIDGEMAN, E. C. HALBERT, and B. H. WILDETHAL, *Oak Ridge National Laboratory*. The energy levels and wavefunctions of nuclei with masses between 18 and 22 have been calculated within the framework of a shell model with a realistic residual interaction. The active particles are distributed in the d, s and d_{3/2} orbits. We have computed $B(E2)$ values for transitions between low-lying states in all these nuclei. An effective charge of 0.5 is added to the actual charges of the neutron and proton. The absolute $B(E2)$ values for strong transitions from the 1st excited states to the ground states, as determined from experiment, are very well reproduced by the calculation. Similar agreement is found for the relative strengths of transitions between members of the ground-state rotational band. We discuss these same transitions in terms of a rotational model based on single-particle Nilsson orbits. The similarities of the results of the 2 calculations, and their agreement with experiment, indicate a close relationship between the shell-model and rotational picture of low-lying levels in the light s-d shell nuclei.

Supported by the U.S. Atomic Energy Commission under contract with Union Carbide Corp. J. B. Bridgeman, U.S. Atomic Energy Commission Postdoctoral Fellow under appointment from Oak Ridge Association Universities.
¹ T. S. Kuo, *J. Nucl. Phys.* A103, 1 (1967).

DH7. A Study of ^{28}Si Using the Projected Hartree-Fock Wavefunctions. • S. N. TEWARI (introduced by H. J. W. NIX) and D. V. GRILLOT, *University of Oregon*. The energy