

The Mythical Universe of Modern Astronomy

Dewey B. Larson, August 13, 1982¹

For the past two years, I have been spending all of the time that I could make available for the purpose of the preparation of additional volumes of the revised edition of my first book, *The Structure of the Physical Universe*. As I think most of you know, the first volume of that revised edition has already been published with a separate title of *Nothing But Motion*, and I am now working on the next two volumes, concentrating mainly on volume III, which will probably be completed and published ahead of volume II. That may seem like the wrong way of going about it, and perhaps it is, but there are good reasons for it, which I won't go into now.

Volume III [*Universe of Motion*] is the astronomical volume. In that I am taking the physical laws and principles developed in volumes I and II, and applying them to the astronomical situation. The results that I have obtained in so doing are quite different from what you find in the astronomical literature—so much so, in fact, that you might almost wonder if we are talking about the same thing. And I am quite sure that those who read the book will want to ask a question that goes something like this: If your results are correct, how in the world did the astronomers arrive at such totally different conclusions? Since that question is going to be asked, I think that I should answer it right in the book itself and I am planning on putting in a chapter for that purpose. What I propose to do this evening is to give you a general idea of the contents of that chapter.

What the astronomers have done is essentially the same thing that I've done. That is, they have taken the physical laws and principles to which they subscribe and have applied them to the astronomical situation. The difference is that I have had the benefit of a general theory, one in which all conclusions in all fields are derived from the same set of basic premises. So that when I make the assumption that the laws and principles that I am using are correct—that's something all of us have to do in order to establish the logical foundations of our results—I can do the whole thing with one assumption. The astronomers can't do that, because conventional physical theory has no general physical structure. As described by one prominent physicist, Dr. Richard Feynman, in a quotation that I have given many times before, "The laws of physics are a multitude of parts and pieces that do not fit together very well." So when the astronomers assume the validity of the laws and principles that they are using, they have to make an assumption as to the validity of each one individually, and they have to make a multitude of assumptions, thousands of them. Almost all of those laws and principles are, in fact, valid. I would estimate that not more than one in a hundred or even one in several hundred has anything significantly wrong with it. And on that basis the astronomers have at their disposal a system of laws and principles that is at least ninety-nine percent valid; so it might be assumed, then, that the results that they obtain ought to be at least somewhere in the neighborhood of ninety-nine percent correct. But that's not the way that things work. On the contrary, it can easily happen that if the basic premises are only ninety-nine percent correct, the results may well be ninety-nine percent wrong.

That's the principle on which much of our science fiction is based, particularly the better grade of science fiction. And to illustrate how it operates, I want to discuss briefly a science fiction story of that kind. The one I've chosen for the purpose is Isaac Asimov's story of the remarkable properties of the substance that he calls Thyotimeline. As he tells the story, a group of investigators are working on a

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project the objective of which was to produce a substance with a very short solution time, that is, one that would go into solution very rapidly. And they succeeded very decidedly. They produced substances with shorter and shorter solution time until eventually they were able to synthesize a substance with a negative solution time, one that went into solution somewhat before it was placed in the solvent.

Now, I imagine you can readily understand that that led to some very interesting practical applications. For example, it enabled the construction of an instrument to measure willpower. Obviously, the material would not go into solution as long as there was any doubt about whether it would or would not be placed in the solvent. So that the maximum possible theoretical negative solution time could only be developed by a person with strong willpower, one whose determination was such that once he had decided upon putting the material in the solvent, he would be sure to carry out the operation. On the other hand an individual who's hesitant or undecided would only be able to develop a fraction of the possible negative solution time. So that by a proper calibration of the instrument the measurement of negative solution time could be interpreted in terms of willpower.

Now you can see that that instrument would have a wide application. For instance, it was not only a valuable tool for measuring willpower, but it also enabled a quick and accurate diagnosis of schizophrenia. A person with a split personality would naturally have two different levels of willpower. So that when he was tested with the instrument, there would be a period of time during which one portion of the material would go into solution, while the other portion remained undissolved. Now that was not only a valuable diagnostic tool: it also enabled the investigators to discover some different types of the affliction that were previously unknown to the psychiatrists. For instance, there was horizontal schizophrenia. In that type, one layer of the material dissolved, while another layer remained undissolved. And then there was vertical schizophrenia, in which the same difference was noted between right and left halves of the container. And then there was mixed schizophrenia, in which the undissolved material was scattered at random throughout the solvent.

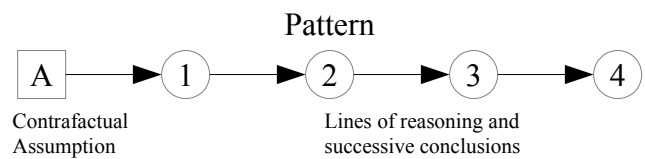
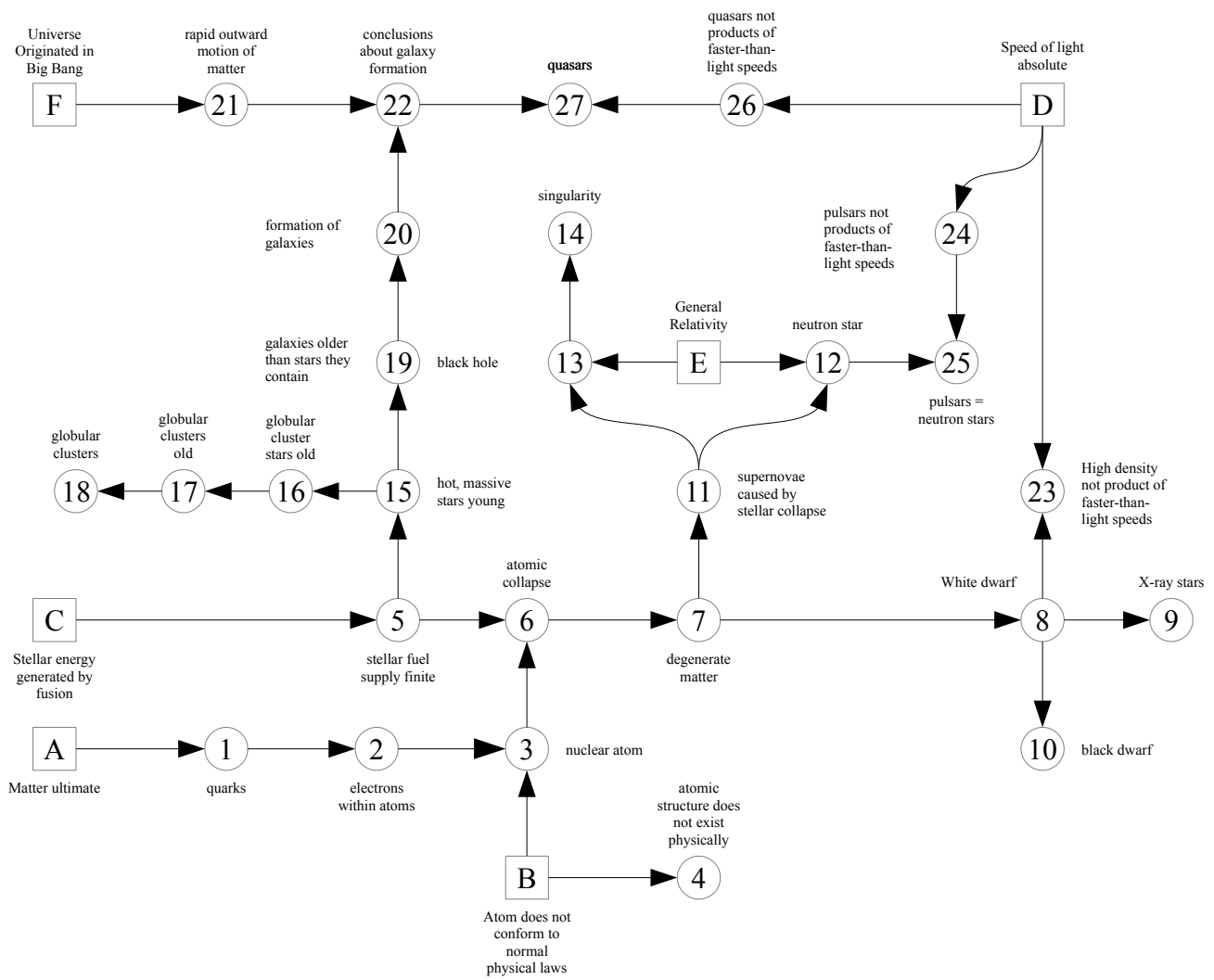
Now, Asimov goes on to describe a considerable number of other applications of a similar nature; but these that I have given you are all that we need for present purposes, because what we're interested in is the structure of the story. As Asimov himself explains in his discussion of the story, there is only one assumption contrary to fact introduced into that story. Everything else is strictly according to Hoyle, and the lines of reasoning are sound. So that what we have here is the kind of thing that I have been talking about, a situation in which ninety-nine percent of all what goes into the story is correct, but the whole thing turns out to be nothing but entertaining nonsense, and it culminates in such absurdities as vertical schizophrenia.

I have illustrated that structure of the story in the diagram that has been passed out. You will note that the one contrafactual assumption is identified by letters, and then the lines of reasoning lead out to the successive conclusions.

The astronomer's structure of the universe is exactly the same kind of structure, except that they introduce many assumptions contrary to fact, and their universe, the structure of their universe is therefore much more complex. When I talk about structure in that connection, what I am actually talking about, of course, is the framework of the structure. The astronomical universe includes many entities and processes, such as stars, planets, galaxies, and so on, that have to enter into any version of the structure. But those entities and processes are like the side panels and ornamentation on a building. They're just hung on to whatever framework may exist. And it's the framework that determines the character of the structure. It's that framework that I have indicated here.

I have shown the assumptions contrary to fact by letters, just as in the lower diagram, and from them

the lines of reasoning, generally sound, lead out to the numbered conclusions, with arrows showing the direction of the reasoning. Where the numbered conclusions refer to entities or processes that are totally non-existent, I've also shown the names. Those numbered conclusions that are not accompanied by names refer to entities or processes that actually do exist, but that differ in some significant way from the description that we get from the astronomers. For example, over on the right of the diagram, conclusion number nine refers to what are known as X-ray stars: they are discrete sources of X-ray emission in the galaxy. Those are actually binary star systems as the astronomers say they are. But one member of each binary system is a quite different object from the one that's portrayed by the astronomers, and the process by which the X-rays are emitted is totally different.



There's one more feature of the diagram as a whole to which I want to call your attention before I start tracing the lines of development. And that is the cumulative effect of more of these assumptions contrary to fact. If you look over on the upper left of the diagram, you will see that the numbered conclusions there are subject to the effects of only one of these contrafactual assumptions, and as a result none of those is listed as totally non-existent. Actually, some of those conclusions are wild enough in themselves, as we'll see when we come to look at them individually, but the real dillies are over on the other side of the diagram, where the effects of three, four, or five of these contrafactual assumptions converge.

The first of the assumptions contrary to fact to which I want to call your attention, the one marked A on the diagram, is the assumption that the basic entities of the universe are elementary units of matter. That assumption seemed very reasonable when it was first made. But we now know definitely and positively that it's wrong, because we now know that there are processes whereby matter can be converted to non-matter and vice versa. And obviously, that means that matter cannot be basic. For example, radiation is not a form of matter, and matter is not a form of radiation. But matter can be converted to radiation. Consequently, it necessarily follows that both matter and radiation must be forms of some underlying entity, some common denominator, we may say. That's not a question of opinion or judgment; that's a necessary consequence of the observed facts. The relevance of that point in this present connection is that it sets a limit on the extent to which units of matter can be subdivided into simpler units of matter. For example, if we start with a rock and examine its structure, we find that it is composed of identifiable material sub-units that we call molecules. But if we continue that process, we eventually come to a material unit that is clearly not elementary, but for which we cannot find any sub-units.

The logical conclusion then is that we have arrived at the point that we know exists, the point where the material unit is not composed of material sub-units, but is composed of the common denominator, whatever that may be. That's the logical conclusion. But the physicists and the astronomers cannot accept that logical conclusion, because they are committed to assumption A which says that the basic units are units of matter. Consequently they have to go out and invent the units that they cannot find. That is the essence, the basis of the quark hypothesis, number one on the diagram. Many prominent scientists have recognized the fallacies in the quark hypothesis. Werner Heisenberg, for instance, was very critical of it. And he also recognized the necessity for a common denominator between matter and non-matter. He suggested that it might be energy; but he admitted that he couldn't see how energy could meet the requirements.

In a universe of motion the common denominator is, of course, motion. But strangely enough, these scientists who have been so able to see the shortcomings of the quark hypothesis have not usually seen that exactly the same considerations apply to the particles that are supposed to be constructed of quarks—the hypothetical constituents of the atom. No one has been able to find them either. Of course the situation has been confused to some extent in this case by the practice of calling those hypothetical constituents by the names of observed particles. But, as I pointed out in my talk at the conference last year, that practice is totally unscientific.

Identity cannot be established by similarity in names. It has to be established by identity of the descriptions. In scientific terms, two entities are identical in nature if all of their properties coincide. If the bird that we see quacks like a duck and swims like a duck, and so on all the way down the line, then it's a duck. If it crows like a rooster and can't swim, then it's not a duck. It doesn't make any difference how many people insist on calling it a duck, or how nice it would be for somebody's theories if it were a duck—it still isn't a duck.

The same identical principle applies to these particles. The observed neutron, for instance, is an unstable particle: it has a life of less than fifteen minutes. And it's gregarious: it has a strong tendency to combine with almost anything that comes along. The hypothetical neutron constituent of the atom, on the other hand, has to be stable. And it has to maintain its identity even in places where the tendency toward combination is very strong. The pure fact is that they are two totally different particles. Of course, the theorists tell us, the neutron is an accommodating thing, and if we put it in the atom, it will accommodate their theories by becoming stable and by discontinuing this awkward habit of combining with other things. But that's pure nonsense. That's in the same category as saying that if we throw the rooster in the water he will quack and start swimming.

The situation with respect to the other hypothetical particles in the atom is no different. In fact Herbert Dingle tells us that we can't even imagine a particle with all of the properties that are required of the hypothetical electron constituent. But with these imaginary particles (number two on the diagram) the theorists have constructed an imaginary atom (number three).

But even with all of the leeway that they have had for making assumptions as to the properties of these particles of which they wanted to build an atom, they could not construct a plausible theory without making another assumption contrary to fact, the one marked B on the diagram. That is the assumption that the atom does not conform to the normal laws of physics. That's a drastic assumption, and because of that drastic assumption the people who put this structure together in the first place, have had to make the admission that their atom is not a real particle—that's number four on the diagram. As Heisenberg puts it, "It is in a way only a symbol." Irwin Schrödinger tells us, "If the question is asked, do the electrons actually exist on these orbits within the atom, the answer has to be a decisive no." And Heisenberg specifically cautions us that we must not think that the physicists' atom is a material particle in space and time that exists objectively in the same sense that stones and trees exist. Then what sense does it exist in? Well, he tries to explain that, and he says this: "The atom of modern physics can only be symbolized by a partial differential equation in an abstract multi-dimensional space." Now when we translate that from the professional jargon of the physicist to the vernacular, we find that it says exactly the same thing that I have been saying. The physicists' atom is an imaginary atom constructed of imaginary particles. And in this connection I want to point out that these people that I have been quoting are not scientific heretics like the present speaker. They are eminent members of the group that puts this thing together in the first place. When the present-day physicist wants to apply quantum theory to his problems, it is Schrödinger's wave equation that he tries to solve. Now when he gets into difficulties, it's Heisenberg's principle of uncertainty that he calls on to get him out of those troubles.

In order to go any farther along this line of development that I have started tracing, the astronomers have had to make still another assumption contrary to fact: like the first two, this one was borrowed from the physicists. It's their assumption as to the nature of the process whereby energy is generated in the stars. The physicists' attitude on this subject has never changed. They have contended from the very first that whatever the most energetic process known to them might be, that must be the stellar energy generation process, regardless of how much evidence might exist in any other field of science. The fact that they have had to change their ideas as to the nature of that process twice already, the last time under very embarrassing circumstances, has not changed their attitude in the least. Today there is ample astronomical evidence that their present assumption (assumption C) is wrong, just as there was ample geological evidence in the nineteenth century to show that their then current assumption was wrong. But the physicists are no more willing to listen to the astronomical evidence today than they were willing to listen to the geological evidence during the long and acrimonious dispute with the geologists

in the nineteenth century. And since the astronomers are not willing to put up with the kind of fight that the geologists did, they have ignored or rejected the evidence from their own field, and have accommodated their evolutionary theories to the physicists' assumption C. I will have some more to say about the astronomical evidence when we come back to this side of the diagram and start up the line toward conclusion fifteen. But for the moment I want to continue along the original line of development.

The first conclusion that is derived from assumption C is the conclusion that the supply of energy in the stars will eventually be exhausted—that's conclusion five. The astronomers have then taken that conclusion five and put it together with conclusion three, the conclusion as to the nature of the atomic structure, and they have arrived at the further conclusion that the result will be a collapse of the atom.

I said earlier that the lines of reasoning represented by the lines on the diagram are generally sound; the reason for putting in that qualifying word "generally" is that I have some reservations in some cases, and this line of reasoning leading to conclusion six is one of them. One of the results of the application of thermal energy to a material aggregate is to introduce additional space between the atoms or between the molecules of the aggregate. And if we eliminate that thermal motion by exhaustion of the fuel supply, it's logical to assume that that exhaustion of the fuel supply also eliminates some further space in the interior of the atom that the thermal motion had nothing to do with in the first place. The justification for that kind of an assumption is very hard to see. Of course, some of the theorists tell us that when the support given by the thermal pressure is eliminated, the aggregate collapses of its own weight. But that is equivalent to assuming that material is heavier when it's cold than it is when it is hot. And there again, that's an assumption that's very difficult to swallow. In the real world the atoms at the bottom of the pile are subject to the weight of all the overlying layers, regardless of whether they are hot or cold.

In one of the books from which I and my contemporaries learned to read, there is a story about a man who is going home with a heavy sack of flour. (In those days, I might say, we bought flour in hundred-pound sacks, not in these little bits of things that they sell in the supermarkets). This man was afraid that the heavy weight would be too much for the horse that he was riding, so in order to relieve the weight on the horse he picked the flour up and held it in his arms on the way home.

Now when we were children we laughed at that story. But now we're presented with exactly the same proposition by the astronomers, in a little different language, and we're expected to keep straight faces. But, after all, I suppose we'll have to remember that what you or I may think about this situation is not relevant in the present connection. What we're trying to do is to examine how the astronomers have arrived at these conclusions, and this is their conclusion, number six, and they have concluded, then, that the material of the star collapses into a weird condition that they call "degenerate matter," in which all of the hypothetical space in the hypothetical atom has been eliminated and these hypothetical constituents are in a close-packed condition.

Since this degeneracy starts from a condition in which the material is cold, and therefore solid, it would seem natural to assume that the degenerate matter should be some sort of a super-solid. But no, that's not what they tell us. In some strange way it re-acquires some of the properties of a gas. Particularly, it acquires a substitute for the thermal motion that it can no longer have. So that then instead of cold matter, we have an aggregate of hot degenerate matter—that's conclusion number seven—and they have identified that aggregate of hot degenerate matter with the white dwarf star—conclusion number eight.

I have already mentioned number nine, which is the X-ray star. You will also note that the white dwarf,

number eight on the diagram, is connected with item number twenty-three: but that's an incoming line. That refers to the effect of contrafactual assumption D on the white dwarf. Now this assumption D has an effect that is quite different in its nature from the effects of the other contrafactual assumptions that I am discussing. So it will be convenient to defer the effect shown by number twenty-three until we are ready to talk about the situation in the conclusions along the top of the diagram.

So let's move on then to conclusion number ten. The ersatz heat of the white dwarf is supposed to be radiated away in the same way as real heat, although nobody's explained why that should be true. And since that's radiated away, the white dwarf is presumed to gradually cool off, and eventually to become a black dwarf, a cold lifeless object that plays no further part in physical activity. These black dwarfs are purely hypothetical. There is no evidence whatever of the existence of any such thing. And there is no definite evidence that the evolution of the white dwarf is in the black dwarf direction. on the contrary, there is a great deal of evidence showing that some stars, and perhaps all of them, end their lives in gigantic explosions.

The astronomers have had to recognize that evidence, of course, and they've compromised: they've decided that the small stars collapse quietly, and end their lives as black dwarfs, and the big stars explode. And they have identified that explosion with the observed phenomenon now as the supernova. That's number eleven on the diagram. The effect of a gigantic explosion of that kind is to pulverize the material of the star and to eject it out into space in the form of a rapidly expanding cloud of dust and gas. But the astronomers have concluded, and they have some evidence to support that conclusion, that a residue remains at the scene of the explosion. And they have identified that residue as degenerate matter. But they have decided that because of the force of the explosion this matter is more degenerate than the degenerate matter of the white dwarfs. And in some strange way that sounds like magic to me, all of the hypothetical constituents of that degenerate matter are converted to neutrons. So that what we have left is a star composed entirely of neutrons—a neutron star, number twelve in the diagram.

On the basis of some mathematical conclusions the astronomers have further concluded that there is a limit to the size of a neutron star, and they have decided that when the residue exceeds that size, the contraction under the influence of gravitation goes on until the surface gravity of the aggregate is so strong that no radiation at all can escape. What then exists, they say, is a black hole, conclusion number thirteen. Some theorists are not even willing to stop there. They contend that the contraction under the influence of gravity goes on and on until there's nothing left from the whole star but a single point—a singularity, in scientific jargon (that's conclusion fourteen).

As you can see from the diagram, all of these bizarre conclusions as to the products of the supernova explosion are subject to the effects of all four of the assumptions contrary to fact that I've already mentioned. And in addition they're subject to one more, which I've identified by the letter E on the diagram. This assumption involves some very basic issues, and I won't be able to explain it in detail in the time that I have this evening, but I can say that in essence what it amounts to is an assumption that the astronomers understand the mechanism of gravitation, which obviously they don't. Again I want to call on Dr. Feynman. He says, "No one has given us the machinery of gravitation; all we have is the mathematical form." Now Dr. Feynman is evidently not familiar with the theory of the universe of motion, because we have given the machinery; but his statement is correct in application to the conventional physics that the astronomers are using.

Now here is a little gem for your collection. "Of all the conceptions of the human mind, perhaps the most fantastic is the black hole. Like the unicorn and the gargoyle, the black hole seems much more at home in science fiction or in ancient myth than in the real universe." If you were not told otherwise,

you would probably think that that came from me or from some other hard-boiled skeptic. But no, those are the words of Kip Thorne, one of the most enthusiastic advocates of the black hole hypothesis. Of course, he contends that black holes must exist anyway, no matter how fantastic they are. And after making that statement, he goes on to say this: "The laws of modern physics virtually demand that black holes exist." That's absolutely correct.

The whole point of my presentation then is that all of these absurdities, the black holes and the rest of them, are required by the current laws of physics and the current interpretations of those laws by the astronomers. And that is because those laws and those interpretations have not been purged of the effects of these assumptions contrary to fact that I have been talking about. The black hole is not science fiction; it's fictional science. The difference is that the science fiction writer knows and admits that he is using assumptions contrary to fact. The practitioner of fictional science either doesn't know or is not willing to admit that he is doing exactly the same thing. The black hole is the astronomical equivalent of vertical schizophrenia.

Moving back now to the other side of the diagram, we note that one of the results of conclusion number five, the conclusion as to the exhaustion of the fuel supply, is that the hot massive stars must be young because they are using their fuel at such a prodigious rate that the exhaustion must come relatively soon, astronomically speaking. This is an inherently improbable conclusion, and a great many astronomers have recognized that. Bart J. Bok, for instance, tells us this: "It is no small matter to accept as proven the conclusion that some of our most conspicuous supergiants, like Rigel, were formed so very recently on the cosmic scale of time measurement." And indeed this is no small matter. What Bok evidently realized is that the product is inconsistent with the process. Natural building processes are slow and gradual. The rapid processes, the catastrophic processes, are destructive. Some new combinations may emerge from those processes, but they're no more than incidental. The general effect of those processes is to tear down, not to build up.

It's generally agreed that the raw material from which the stars are formed must be diffuse matter in the form of dust and gas clouds, and if stars are currently forming, those must be cold clouds. The only known force that is capable of drawing the particles of those clouds together to form stars is gravitation. And because of the immense distances involved the force of gravitation is very weak, and it takes a long long time to operate. The formation of a star is therefore a long, slow process. And the initial product, because it is formed from a cold material, is a cool star, not a hot one. In order to form a hot massive star, another long slow process is required. So that the hot massive star cannot be young, it's an old star. There is plenty of astronomical evidence to support that finding. Most of it comes from observation of the star clusters. Since we find that conclusion fifteen is an erroneous result of an assumption contrary to fact, the same considerations also apply to conclusion number sixteen, and they show that the astronomers have their age sequence upside down. Now they will protest that they have evidence to support that age sequence. But if you examine that evidence, you will find that most of it is evidence only of the existence of a sequence and it has nothing to do with a direction. And those items which do refer to the direction of the sequence contradict the astronomers' conclusions. The most conclusive of that kind of evidence comes from the small clusters that are located in the galaxy, rather than around it. Those clusters, the galactic, or open clusters, can be divided generally into two groups. In one group the constituent stars resemble those of the globular clusters. In the other group they are more like the general run of stars in the galactic arms, such as those in the solar neighborhood. These clusters of both groups are all expanding at measurable rates, and their star density, the number of stars per unit volume, is therefore decreasing. Since there's no reason that we know of why the initial conditions should be any different, it follows that the clusters with the greater average density are the

younger, and those with the smaller average density are the older.

Here, then, we have something that is very rare in astronomy—an opportunity to determine the direction of evolution from direct observation. Now according to studies that have been made, the astronomer Otto Struve tells us, the average density of the group composed of the stars of the globular cluster type is the greater. This is therefore identified as the younger group, which is the opposite of the conclusions reached by the astronomers.

Now this is not the only astronomical evidence that shows that they have their sequence upside down, there are quite a number of other items that I won't be able to discuss tonight because we just simply haven't enough time. But there is one item among them to which I do want to call your attention, because it has a particular significance. This item has to do with the age and origin of the globular clusters. If the stars of those clusters are old, as contended by the astronomers (conclusion number sixteen) then the clusters themselves are presumably old—that's conclusion seventeen. And the astronomers have therefore decided that they must have been products of the original process of galaxy formation, and are part of the galactic structure—that's conclusion eighteen. This view encounters some very serious difficulties. One of the most obvious of them is that the clusters do not participate to any significant degree in the galactic rotation, and that is very hard to explain if they are part of the galactic structure. But since conclusion eighteen is a logical result of this line of reasoning, stemming from assumption C, to which the astronomers are committed, they have continued to hold on to this conclusion in spite of all the difficulties, hoping that they will ultimately go away.

But alongside this orthodox evolutionary view of the astronomers, there has in recent years grown up a new concept that contradicts the whole setup. And since that new concept is accepted quite widely in the astronomical profession, that profession is now in the awkward position where they, or at least a substantial segment of their profession, accept two contradictory explanations for the same thing. This new concept is the concept of galactic cannibalism. Quoting the astronomer Wallace Tucker: "The majority of galactic clusters are dominated by a single massive elliptical galaxy. Apparently these monster galaxies have eaten dozens of their smaller companions." Now obviously, if the giant galaxies can swallow the spirals in their vicinity, the big spirals like ours have the capability of swallowing dwarf galaxies and globular clusters. And in the light of that information, the presence of large numbers of globular clusters surrounding every one of the major galaxies takes on a new significance. In the light of that information it's evident that those globular clusters are not part of the galaxy—they're external objects that are being drawn in where they can be conveniently swallowed.

Now in that connection it's worth noting that the motions of those clusters that are so difficult to explain on the basis of the astronomers' conclusions, fit in very nicely with the cannibalism hypothesis. Again I want to quote the astronomer Otto Struve. He says they move "much as freely-falling bodies attracted by the galactic center." Of course, on the basis of this new concept, that's just exactly what they are.

Returning now to conclusion fifteen, another one of the consequences of the astronomers' age sequence (conclusions fifteen and sixteen) is that stars must be currently forming in the galaxies, because there are a great many of these hot massive stars in the galaxies, particularly in the galactic arms, and according to the astronomers' viewpoint, those must have been formed fairly recently, and close to their present locations. That confronts the astronomers with a very difficult problem. As I mentioned earlier, the force of gravitation is capable under appropriate circumstances of pulling the particles of the dust and gas clouds together to form stars. The difficulty arises because those appropriate circumstances do not exist in the galaxies.

In order to enable the force of gravitation to do the job unassisted, the dust and gas clouds in the galaxies would either have to be very much larger or very much denser than anything that now exists in the galaxies. So that the astronomers, in order to maintain their theories, have had to try to find some auxiliary process that could work in conjunction with gravitation to produce these results. And they have examined quite a number of processes that they thought might work, but so far they have been unable to produce anything that could stand up to critical scrutiny.

So the result is, as described by an astronomer, Simon Mitten, “The process of star formation is almost a total mystery.” When we correct the evolutionary direction, and turn the sequence upside down, the problem disappears; because on that basis there are no stars in the galaxy that are young in absolute terms. It’s true that on that basis the stars of the globular clusters, or of the globular cluster type, are younger than the hot massive stars, but that doesn’t mean that they are young in absolute terms. It does not preclude their having been formed in some region where the appropriate circumstances for star formation do exist, and having been brought into the galaxy by the capture process.

But since the astronomers accept this conclusion that the stars are currently being formed in the galaxies, they have had to arrive at another conclusion, number nineteen, the conclusion that the galaxies are older than the stars that they contain. As it’s expressed in one textbook, “According to current conceptions in astrophysics, the galaxies were born first in the universe, and the stars within the galaxies were born afterward. The main reason for believing this to be true is the fact that stars can be seen forming in the galaxies at the present time out of gas and dust.” Of course, they can’t be seen forming, he merely means that the conditions are such that the theory says that that’s where they are forming. Now these ideas as to galaxy formation, conclusion twenty, are very vague. John B. Irwin describes them in this manner. “The Milky Way system, like other galaxies, is thought to have originated from a condensation or collapse of the intergalactic medium. The reason for the collapse is not known, and the details of the process are uncertain.” What Irwin is in fact telling us is that astronomers know all about the galactic formation process, except the general nature of the process and the details. L.H. John puts the situation into perspective in this statement: “The encyclopedias and popular astronomical books are full of plausible tales of condensation from vortices, turbulent gas clouds, and the like, but the sad truth is that we do not know how the galaxies came into being.” These are astronomers I am quoting, they are not scientific heretics.

The reason for the difficulty the astronomers are having can be easily understood if it is recognized that their conclusions about the galaxies, number twenty-two on the diagram, are derived not only from this conclusion twenty, which is the result of the line of reasoning that we have been following, but also from a conclusion twenty-one that directly contradicts conclusion number twenty. This conclusion twenty-one is derived from another assumption contrary to fact. That’s the astronomers’ assumption that the universe, or at least the present stage of the universe, originated in a gigantic explosion, the Big Bang as it is called. If they applied the same reasoning that they used in determining their ideas as to the consequences of the supernova explosion, then the explosion that they call the Big Bang would have ejected one part of the material of the universe out into space at high speeds, in the form of an expanding cloud, while another part of the material would have been left at the scene of the explosion in the form of a gigantic black hole. But they are already having serious difficulties in finding some reason why the universe is so isotropic. And if they put a black hole out in the middle somewhere, that would compound the difficulties. So they conveniently ignore what they decided over on the other side of the diagram and on this side of the diagram they decide that the entire contents of the universe, as one textbook puts it, “All of the matter and all the radiation in the universe” is ejected out into space in the form of an expanding cloud.

Now the problem comes then to explain how these particles could have been moving outward at high speeds ever since the Big Bang as required by conclusion twenty-one, and at the same time aggregating into galaxies, as required by conclusion twenty. If you stop to think about that for a little bit you'll understand why the astronomers are having such difficulty, and why their ideas about the formation of galaxies are as vague as these statements have shown them to be.

We've now arrived at the point where we need to take contrafactual assumption D into consideration. As I said earlier, the effects of that conclusion are exerted in a manner that is somewhat different from those of the others. Those other conclusions that I have mentioned tear down the barriers that separate fact from fiction and they permit the astronomers to extend their theories into regions that do not actually exist. The effect of conclusion D, on the other hand, is to set up barriers that prevent them from extending their theories into areas that actually do exist, and they force them to invent various kinds of substitutes.

The effects of this conclusion D, which is Einstein's conclusion that the speed of light is an absolute speed limit, are expressed in the form of three prohibitions—number twenty-three, number twenty-four, and number twenty-six on the diagram. Number twenty-three decrees: "Thou shalt not think of speeds greater than that of light in connection with the high density of the white dwarfs and the products of the supernova explosions." It is this prohibition that forces the astronomers into the strange contortions of thought that result in black holes and singularities.

Number twenty-four similarly dictates, "Thou shalt no think of speeds greater than that of light in connection with the intermittent radiation from the pulsars." The pulsars are number twenty-five on the diagram. And you note that the pulsars get a double dose: they're subject to the prohibitions both twenty-three and twenty-four. The result of this double prohibition can be seen in the present state of knowledge in the field. According to Dr. F.G. Smith, one of the leading investigators in the area, "the manner in which the pulsars are produced is not understood, and little is known about the mechanism of the radiation." That's the result of being prohibited from entering the field of high speeds.

Item twenty-six is another edict, "Thou shalt not think of speeds greater than that of light in connection with the quasars." And since almost all of the observable features of the quasars are a result of speeds greater than that of light, the result is that the astronomers are almost completely baffled by the quasars. There is no better fundamental understanding of the quasars now than there was when they were first discovered, twenty years ago. There has been a great deal of empirical information gathered, but there is no understanding of that information. The general tendency in astronomical circles is to blame the physicists. As expressed by one prominent astronomer, Gerrit Vershuur, "the existence of quasars strongly suggests that we are dealing with phenomena which present-day physics is at a loss to explain." Now that's true. But the astronomers can't evade all responsibility. They did not have to accept all of these contrafactual assumptions that the physicists have made.

When the first pulsar was discovered, the regularity of the pulses suggested that they might be artificially created, and for a time it was fashionable to refer to them as messages from little green men. When more pulsars were found, it was realized that the pulsars must be natural objects, and the little green men were dropped. That may have been a mistake. This universe that the astronomers have worked so hard to construct is not of much use to us except for entertainment, because we are so constituted that we cannot deal physically with things that are not physical. We have to have things which, as Heisenberg says, exist in the same sense that trees and stones exist. But this universe that they have built would be a very appropriate home for the little green men, perhaps even degenerate little green men.