You know, Bob, this is the first time I have ever interviewed the author of a two thousand page book.

Don't be nervous. I'm really quite harmless, if taken in moderation.

That's what your friends said. They also warned me not to get you started on Chinese poetry or we'd be here all night.

Ah, I must speak to them. Please continue.

Yes. You are the author of the largest deep-sky guidebook in existence, about one-and-a-half times the size of *War and Peace*. And probably one of the largest projects ever undertaken by a single person. I'm sure that many readers must be curious…

Right now you're probably asking yourself: What sort of creature could possibly compile and type a 2,000 page book, and stay stubbornly with such a hopeless project for many years? And remain even partly sane?

Yes. That's what I meant.

Obviously such a person must be either a warped genius or a first-rate crank. Right? And wouldn't you like to know?

They say that genius is akin to madness. Do you think that's true?

Obviously. But so is normality, whatever that means. We're all a lot crazier than we think. Though we show it in different ways. I'm a virtual hermit, for example, and never attend astronomical meetings.

Why is that?

I can't stand being crushed in the center of a seething mass of astronomers. It's like getting caught in a yak stampede in the New York subway.

Where do you get…

Such phrases? Same place Shakespeare got his. The human mind is a bottomless pool of images. You don't know what will come up until you start dredging. That's what poets do. My own brain is like the Smithsonian. Uncle Sam's attic, they call it.

I see. Tell me, did you actually start out with the deliberate intention of producing a 2,000 page book?

Good Lord, no. The whole thing started quite innocently, without malice aforethought. It's like being born, you know. At the time, you have no idea you're being shoved off a cliff.

When was this? The beginning of the book, I mean.

Oh, close to thirty years ago — in the early 1950's. I had a small refractor then, and a copy of *Norton's Star Atlas*. After I began to get familiar with the constellation patterns, I started on a 6-inch mirror, and later on an 8-inch. And it was about that time that I began to wonder about all those objects shown on *Norton's* — double stars and clusters and nebulae and galaxies — for which I had no data at all. All those things with Struve numbers and Herschel designations and other esoteric symbols. Where is all the information on these objects, I wondered. There should be some sort of guidebook that would list them all, with the main facts and data.

There is *Webb's Celestial Objects*, of course. But I can't think of anything else that detailed.

No. I had a copy of Webb, but of course in the 1950's it was getting deplorably out of date. The last real revision was in 1917! Then, about 1948 or so, the Skalnate Pleso *Atlas Coeli* came out. With a great catalog. But there again it was strictly a listing of data. No detailed descriptions. Or photographs.

So you started your own?

Yes, for some years I kept adding data to the thing. It was a loose-leaf notebook, so that it could expand indefinitely. Eventually it became a series of *six* loose-leaf notebooks. I kept stuffing facts and pictures into it from any source I could get my hands on.

At this time you had no intention of publishing the thing?

Oh no. It was a compilation for my own use. Plus a record of my own observations. And that was the situation up to one damp night in October 1957, when fate sneaked up behind me with that piece of lead pipe.

I see you read P.G. Wodehouse.

Yes, old thing. I had been using the 6-inch, you see, making some rough measurements on double stars in Cetus for the book. And just before quitting I thought I'd make a quick check on Mira, the classic long-period variable.

Now my 6-inch was *the* basic telescope reduced to the ultimate essentials. No drive. No finder. No setting circles. You point it and sweep. And while doing this I came across the field of 66 Ceti. And there, a degree west of the star, was a large fuzzy nebula with a faint star-like center. Now if you check *Norton's*, you'll see that there is no bright nebula a degree west of 66 Ceti.

Had you found a comet?

A new comet. Seventh magnitude, and going southwest about 13 degrees per day. Unusually close to the Earth, obviously.

That must have been your most exciting moment in astronomy.

Up to that time, yes! The discovery was made from my home in Prescott, Arizona, so it was a simple matter to call the Lowell Observatory in Flagstaff. The gentleman who answered the call was Dr. V.M. Slipher, though I didn't know it at the time. The existence of the comet was confirmed rather quickly — you could see it in a pair of binoculars.

I sent a telegram to Harvard the same night. A few days later the word came that the comet had been picked up independently, about twelve hours earlier, by Paul Wild in Switzerland. Still later we got a third much-delayed announcement from the Russian astronomer Latyshev. Eventually all three of us shared the honors. This was Comet 1957f. It never quite got to naked-eye brightness.

It was this discovery that led to your position on the staff at Lowell Observatory?

Eventually, yes. A few months later, when the Lowell proper motion sky survey was getting under way, I was offered employment on the project. The Lowell library was an absolute revelation, of course. And the collection plates made with the 13-inch astrograph. Here was the entire sky down to about 40° south, on huge glass plates measuring 14 x 17 inches — nearly 3,000 of them, going to the seventeenth magnitude.

Could you put that into layman's language?

Seventeenth magnitude? Well, that's about 25,000 times too faint to be seen with the naked eye.

These were the plates used the survey you mentioned? And just what is a proper motion survey?

Well, if you compare sky photos taken years apart, you find that some of the stars have changed position slightly. These are the fairly close stars, of course.

How close?

Oh, four or five light years, on out to a hundred or so. All the stars are moving, of course, since the entire galaxy is rotating. But only a fairly nearby star will show much motion over two or three decades. So you can pick them out that way. It's sort of a census of the nearby portion of the galaxy.

And you searched the entire northern sky this way?

We started out with the intention of doing the entire northern hemisphere, at least, down to the plate limit, and recording all stars with motions more than about 0.3 seconds of arc per year. The

plates were compared bit by bit in the blink-comparator, with an interval of about thirty years between the two exposures. The blink machine has a projection screen, you see, and you first see the image from one photograph, and then from the other. The images are shown alternately. Any star that has moved significantly appears as a dot jumping back and forth. It attracts your attention immediately.

And you chalk up another discovery.

Yes, it gets to be a production-line sort of thing. The older photographs had been made chiefly by Clyde Tombaugh and his associates during the Pluto search.

And you took the new photographs to match?

Yes, we took them region by region as the survey progressed. Three of us worked on the project. The final catalog for the northern hemisphere listed close to 9,000 stars, more than half of which were new discoveries. Along with these, of course, we also re-discovered all the known stars of large motion.

Including Barnard's Star?

Oh yes. That's still the largest proper motion known. It's only six light years away, of course. Yes, we used to keep that set of plates handy to demonstrate the blink technique for visitors. Barnard's Star jumped nearly three-quarters of an inch on the blink screen. Rather hard to miss.

You found no new motions to equal that?

Nowhere near it. The largest new motions were just a little under three seconds of arc per year. As a by-product of the survey, we also identified something like 1,700 faint blue stars and white dwarf suspects. These are the super-dense, degenerate stars, you know. They weigh tons to the cubic inch. We found enough to keep the astrophysicists busy for years.

And some additional comets?

Four during the Lowell survey, plus one discovery with my own 8-inch reflector. A total of six. The real goody of the collection was Comet Burnham 1959k, which showed a periodic swing in the direction of its tail. That got me a lot of humorous newspaper publicity. "Things must be pretty happy in outer space," wrote one columnist, "for, way out there, there's a comet wagging its tail! Maybe it's coquetting with the Dog Star."

Do you still hunt for new comets? With a few more you could break the record.

Oh yes, I still comet hunt. Though I don't think that another new comet would thrill me that much anymore. Not unless it was one like Ikeya-Seki, the brilliant comet of 1965.

You have other ambitions now.

I think I would like to discover a large meteorite. Especially a pallasite. To me a pallasite is one of the most fascinating objects in the world. And not a single on has been found in Arizona so far.

A pallasite? That's a type of stony-iron, isn't it?

Olivine crystals in a nickel-iron matrix. It looks like a piece of Martian peanut-brittle. I'd like to have a slab big enough to make a coffee table.

That must be a nearly unique ambition. A coffee table from outer space. And six comets. That must put you in second or third place in the U.S.?

I think so. You'll have to get the Guinness people interested in comet records for their book. Then we'll all know.

Do they have an entry for the largest astronomical handbook?

(Laughing) Not that I can remember. But I don't think there are many people around who have written a book of over 2,000 pages.

No, that should set some sort of record, I would think.

For audacity, at least. It takes a certain amount of crust to produce something that is almost certain to get you more criticism than praise.

Have you received a great deal of criticism?

To be truthful, not nearly as much as I expected. There are certain people, of course, who have been raised on the tradition of the Infallibility of the Written Word. If you publish an error, you're disgraced for life.

Anything of that size is bound to contain occasional errors.

Yes. Even if I were absolutely infallible, there would still be errors inherited from standard catalogs and reference sources. And I can tell you that these are far from rare.

Not to mention the problem of proofreading 2,000 pages of data. It leaves you goggle-eyed, with symptoms not unlike those of minimal brain dysfunction. If you have a short article, of course, you

can take it to an astronomer friend and say: “Check through this, would you, when you have the time?” Try that with a ten-pound manuscript.

No thanks. Tell us, has the book won any awards of any sort?

Not yet. But it probably won’t. It doesn’t fall into any of the prescribed categories, you see. It isn’t a Ph.D. thesis; it isn’t research; it isn’t a noble attempt to interpret science for the general public. . .

That’s always a problem with something more or less unique. Someone should start a society in your honor and nominate you for the first award. There is a Webb Society, isn’t there?

Yes, in England. They recently published several volumes in a series of observing guides.

But no Burnham Society yet?

I’m afraid not. I think it works something like getting your picture on a U.S. postage stamp, you know. You have to be dead for about fifty years first. I can hardly wait.

Yes. Tell us, when did you reach the point where you thought seriously about publishing the Handbook?

It came on gradually, like a cold in the head. Oh, it was about 1963 or so. During my first five years at Lowell the book had more than tripled in size. I was using Webb’s too, of course, and I began to think: Now this is really absurd. Here’s something that was first published in 1859, and over a century later it’s still being offered to the modern observer as the most complete deep-sky handbook available, even though the text was last revised in 1917. Now surely this must set some sort of record in the annals of long-time lethargy.

Is there a category for that in Guinness?

(Laughing) I’m afraid not. A pity. Astronomers would win first place with no competition.

But a new edition of Webb did appear about that time, I think. In 1963 or so?

Yes, a reprint of Webb was issued, and one reviewer — I think it was Leif Robinson — pointed out that no real attempt had been made to update obsolete facts and interpretations, and what we really needed was a new deep-sky guidebook written for the 20th century observer.

And you answered the call.

Well, I tried to, only to find out that nobody seemed to be very interested. The unusual size of the thing was the chief objection. I estimated then that the total would run to about 1,400 pages. And that was considered completely impossible. I tried a few of the large astronomical publishers. Some

thought that there really wasn't much of a demand for anything like it. Others said that there was no way to finance such a thing.

One publisher said that they would have to hire someone full time for a couple of years just to check and edit the material. That would be a requirement, they said, if they were to publish. At a cost which would make the project impossible, of course.

That must have been very discouraging.

That was the high point of the conversation. After that, things started to go downhill.

You actually tried being your own publisher for a while, didn't you?

Yes, but don't remind me of that. The memory of those days still causes me to leap forth from my pillow with a loud cry. I have this nightmare, you see, where I'm trying to publish the *Britannica* from my kitchen table…

Sorry. In a recent article on the Webb Society guidebooks, the reviewer found it surprising that so few works of the type are available in English.

It is surprising, yes, because the astronomical world offers virtually nothing in the way of support, incentive, or rewards. It was Don Marquis, I think, who said that publishing a volume of poetry was like dropping a rose-petal down the Grand Canyon and waiting for the echo. He could have been talking about a project like mine.

While you were waiting for that echo, did you consider the academic publishers?

Of course. Academic publishers have a major problem. Their books are so immensely overpriced that only a few academic libraries can afford to buy copies. At the typical per-page rate, mine would run to something like two hundred dollars for the set. That would put it far beyond the reach of the eager amateur for whom it is intended. I couldn't afford to buy a copy myself.

The financial angle was always the reason for the rejection of the book?

Well, let me put it this way. A very large book, directed toward a fairly limited audience, is not the sort of thing that publishers are going to go wild over. It is not "economically feasible." And of course you're told that the times are hard and money is tight. And no one wants to take the risk. . .

Money is always tight, isn't it?

I have never known a time when it was loose. It seems that the times are *always* hard. The modern world has become a permanent crisis. But for some odd reason it is always the scientific, educational, and cultural activities which are ruthlessly cut back when money is tight.

Museums are in trouble. Schools and colleges are in trouble. The space program is in trouble. Symphony orchestras are in trouble. Basic research is in trouble. Yet there always seems to be plenty of money to build a new shopping center or a new chain of motels, a missile system, or a gambling casino.

I don't see anyone cutting back on the production of junk, schlock, tripe and garbage. The nation's commercial presses grind out incredible trash by the megaton. How much does the American public spend each year on third-rate movies, cheap magazines, fringe-cult pseudo-science, junk food, and astrology? Last year the money spent on tobacco in this country came to ten million dollars a *day*. If we have that much money to burn, I don't think we're exactly short of cash.

The people say it's their money, they earned it, and it's their right to spend it as they choose.

Yes, of course. And manufacturers say that they have to give the public what it wants. And of course the public vastly prefers astrology and pseudo-science over astronomy and general knowledge. We can blame the public, or the educational system, or the commercial racketeers who exploit human ignorance. But in the last analysis, the scientists themselves must shoulder much of the blame. Obviously, they have done a fearfully inadequate job of informing the public about science.

You're asking for something which is not exactly easy.

No, it isn't. Scientists get very bad press. Isaac Asimov, in one of those entertaining "My Turn" editorials in *Newsweek* once said that there is a cult of ignorance in the United States, and always has been. There is a strain of anti-intellectualism winding its way through our political and cultural life, as he put it. And science gets the blame, rather unfairly, for the misuse of technology. So anyone who shows any sign of brains, wit, or talent is denounced as an egghead.

Are you an egghead?

I think of myself simply as a human being, though the evidence is still not entirely conclusive.

You think, though, that scientists could improve their image somewhat by taking a different approach?

Well, this is going to sound like rank heresy…

Go ahead.

Let's consider just one current trend: the spectacular revival of belief in astrology. Now, very few scientists have bothered to do anything much about this at all. In the first place they don't have the funds to combat such a lucrative industry. And in the second place they think the whole thing is beneath their dignity, and really too silly to bother with.

You would disagree?

Of course it's silly. But the fact that something is silly doesn't mean that it should be ignored. Hitler was silly. The Inquisition was stupid. The great religious wars and persecutions, I would argue, were thoroughly absurd. But they were also very terrible. The beliefs themselves may be silly or harmless, but a resurgence of medieval-type thinking is no laughing matter. Do you remember that Akron, Ohio, survey?

What was that?

Shortly after the Apollo 11 moon-landing, an Akron newspaper conducted a survey of public opinion on the achievement. About 50 percent of those interviewed felt that the moon voyage wasn't really that important, scientifically or otherwise, but at least it proved that we were ahead of the Russians. About 25 percent thought the whole thing somehow blasphemous or displeasing to God. And fully 9 percent refused to believe that it actually happened. The Dark Ages have lasted a little longer than we thought.

Most scientists would probably agree with you there.

Yes, I would hope so. But when actually facing such a phenomenon as widespread public acceptance of astrology, what does a scientist actually do?

Foams at the mouth a little?

Yes, But that's about it. His sole response is to point out that there is no scientific evidence for such beliefs. Now the astrologer can afford to laugh at such feeble protests from the ivory dome, since the average American has not been raised in a culture that attaches any great importance to scientific evidence. There is no scientific evidence for most of the other things that people believe either. And besides that, the astrologer is raking in the money by the bucketful, while the astronomer is muddling by on a very modest salary, and wondering what on earth he will do if they cut off his grant.

Was that an example of Burnham's cantankerous sarcasm I was warned about?

(Laughing) Some of it. A relatively mild attack. I get much worse ones when I hear about an astrologer being awarded over two million dollars for the paperback rights to an astrology book.

This happened shortly after a respected scientist assured me that no astronomical group could afford to finance such a project as the *Celestial Handbook*, and that I could either produce it myself or forget it.

You're making this up, aren't you?

Not at all. In 1978 Fawcett Books paid $2.25 million for the paperback rights to *Linda Goodman's Love Signs*, a book of 1,186 pages that was originally published by Harper & Row at $15 per copy. This year there is an astrology cookbook out which is really simmering on the front burner, and also a new bestseller on horoscopes for dogs, which is expected to be a howling success.

Oh Bob, that's *terrible*.

Yes, I thought so. I forgot to mention that there's a company that has programmed a computer to print out horoscopes, at $20 a whack. They're grossing something like $15,000 a month. Now I'd like to receive something like that for the *Handbook*. Or that two million, perhaps. Not in one unwieldy lump, please. Monthly checks would be fine.

We'll remember that. I get the impression that your opinion of astrologers couldn't be printed in a family newspaper.

I feel about astrology pretty much the same way as I feel about most other occult or pseudo-scientific ideas. The central thesis may be credible itself. We can't rule out the possibility that the planets do have some effect on human life. But certainly not in the way that the astrologers claim. All their rules seem completely arbitrary. They ignore the actual constellations, for example, and deal with something called the "signs of the zodiac," a totally artificial concept that man has invented. They attribute influences to the various planets without telling us how any of this was determined. Their claims are beyond the possibility of checking. Jupiter is supposed to influence financial matters, and Uranus is the governing planet of the aviation industry. Neptune rules the railroads. If these ideas are anything more than sheer make-believe, I would like to see the evidence. What sort of experiment could you possibly make to demonstrate the influence of Neptune on the railroads?

They'll probably think of something.

I don't doubt it. And if they come up with the slightest possible correlation, they'll announce that astrology has been "proved." They are claiming that astrology has been "proved" now by the finding that a "Gemini" person has a noticeably different personality from a "Scorpio" person. What they are really saying is that the average person born in June has a different type of personality structure than one born in November. Let's suppose that this could be convincingly demonstrated. Where does this leave us? What have the stars and planets to do with all this? The difference is

much more likely to be due to environmental effects right here on Earth. Temperature and humidity, for example.

I think most scientists could go along with that.

Yes. But it doesn't offer much support for the claims of astrologers, does it? Now I think I can claim to be reasonably unprejudiced. For one thing, I am totally unconcerned about upholding any sort of "academic reputation." I don't care in the least what the scientific "establishment" thinks about unorthodox ideas. Scientists have been wrong in the past, and will certainly be wrong again. I hold a strictly "Sherlock Holmes" attitude about the universe; every theory must stand or fall by the weight of the evidence. I forget who it was — Fred Hoyle, perhaps — who said that if a theory is to be of any use, it must be vulnerable. In other words, there must be some way to check the evidence.

That's what science is all about, isn't it?

Yes, in theory. There is certainly no place for dogma or bigotry in science, or even for any sort of absolute authoritarianism. The Universe itself — Nature, as we call it — is the only authority. But there is a serious problem with the whole question of "evidence." All human beings are fallible, not only as observers, but as analyzers of data. We are all capable of misinterpreting the evidence, often to support a pre-conceived viewpoint. And it isn't only fringe-cult people and theologians who do this. Scientists are not immune, being human after all. Even more disturbing is the fact that we observe "evidence" which doesn't exist at all; the "canal-network" on Mars, for example.

That was a question of an optical illusion.

Yes. But how many of our other cherished beliefs are based on some illusion? Consider the world's great religious traditions. How much of this is really based on solid hard-core data? How much of this would be considered acceptable evidence in a court of law?

Probably not much. But people don't look at it that way.

No, they don't. Unquestioning belief is an important factor in many religious traditions. To a scientist this seems downright silly. But scientists themselves are often not much better. I recall hearing one psychology professor state that he could not accept the supposed laboratory evidence for ESP, no matter how good the statistical proof seemed to be. And why not? Because there was no acceptable *physical explanation* for such a phenomenon. In other words, ignore the evidence because it doesn't fit our pre-conceived view of reality. Now that attitude doesn't strike me as "scientific."

I get the impression that your personal feelings about astronomy don't exactly match the expected academic outlook.

Well, I recall the time I was asked to write an astronomical article for the hometown newspaper. I used the phrase “the intriguing mysteries of the universe.” For that I was criticized by a respected professional astronomer. He said it gave the wrong impression of research. There are no mysteries in the universe, he assured me. Only data that hasn’t been analyzed yet.

You wouldn’t agree with that.

Such an attitude is about as far from mine as it’s possible to get. I would argue that we know very little at all so far, and that virtually *everything* is still a mystery. Let me give you a quote from Thomas Edison…

Go ahead.

He said: “We don’t know one millionth of one percent about anything.” I could give you a few more quotes, but never mind. Let me put it in my own way. Here we are, living on a tiny satellite of one average sort of star, like billions of others. All these stars make up a huge aggregation — a great “star-city” called the Galaxy — like billions of others. Now, suppose you constructed a scale model of the Galaxy — just our own Galaxy — and you made this model so huge that it covered all of North America. How big would our Solar System be on that scale? *You could fit it into a coffee mug.*

That’s pretty overwhelming.

Yes. and it makes the claims of both theologians and scientific materialists look pretty silly. A scientist may seem justified in dismissing much of the world’s established religions as puerile folk-lore. But no one has shown that the viewpoint of the scientific materialists is really much better. To say that “matter” is the basic reality is to say nothing at all. “Matter” is just a word. A scientist will tell you that all material objects are composed of atoms, which are composed of electrically charged particles called protons and neutrons and electrons, and these are composed of something called “quarks.” If you ask, what is an electron, actually, there is no answer, except that it is clearly not some hard little physical object like a microscopic ball-bearing. All these sub-atomic particles seem to be basically non-material. An electron is not a *thing*, it seems to be something in the nature of a tiny energy vortex. So what is matter, really?

We don’t know yet.

No, we don’t know yet. We don’t know what electrons and protons are, and we don’t know how we manage to be conscious and intelligent. So we really know almost nothing. We are just beginning to find out how to *learn*. And I would say flatly that there are mysteries all around us which are not going to be explained by any amount of analysis of factual data.

You’re speaking of so-called paranormal phenomena?

No, not at all — though possibly some of these things do deserve more serious consideration from scientists. I'm speaking of things that are part of our normal familiar world, right here in plain sight…

Give us an example.

Hamlet. The face of Abraham Lincoln. Bach's *Toccata and Fugue in D Minor*. And I would add the Grand Canyon.

You would call a great symphony a mystery?

Yes. What would you call it? A remarkable acoustic phenomenon?

Well, most scientists would say that the Grand Canyon is simply a remarkable geological phenomenon.

Yes, of course it is. In the same way that a human being is 150 pounds of animated protoplasm. The definitions are not incorrect. They are simply astonishingly incomplete. This explains much of the public apathy toward science.

The strictly scientific approach seems limited to the mechanical aspects of the world — things that can be weighed and measured and reduced to definite principles that can be expressed either verbally or mathematically. Science, many people will say, doesn't seem able to deal with most of the things that really matter in human life.

Last year a Harvard professor said something about science reaching the point of diminishing returns. I gather you'd agree with that.

Well, setting aside the question of technical prowess for the moment, I think the average person would see it that way. Instead of making everything clearer, science is giving us a universe which becomes more and more bewildering and unintelligible. To most people the universe made more sense when the Earth was thought to be a flat disc, and a very personal deity was running the whole show from his throne up there somewhere, just a mile or two above the ground.

There are probably some people who still see it that way.

I'm sure there are. There is a flourishing Flat-Earth Society in London, and another was established in California last year. Or so I heard.

Let's go back a bit to your *Handbook*. Do you think that your somewhat unorthodox viewpoint made it difficult for you to obtain support for the project?

Undoubtedly. There are professional astronomers, it pains me to say, who see the universe solely in terms of "research." They don't recognize the existence of any such animal as the serious amateur. There are only real astronomers, they say, who are doing serious research; and then there's everybody else, but they don't matter.

When I pointed out that Webb's book was at least half a century out of date, the response was an apathetic shrug. Who cares? — the days of Smyth and Webb are gone. Astronomy is now Big Science. Nobody ever looks at a star except to set the automatic guider for the spectrophotometer. A real astronomer may do research for years and scarcely ever see the actual night sky.

And your reply to that?

I said that if astronomy had really come to that, I would seriously suggest that all the great telescopes be locked up for a few decades so that the rest of us might have our stars back again.

You are primarily an observer.

Yes. I don't see the universe chiefly as a huge heap of raw data waiting to be fed into a computer. Collecting factual data is fine. I do it too. But the heart and core of astronomy, to me, is the direct experience of the universe. All the factual information in the world is no substitute for that.

Such a statement brands you as an amateur, some would say. And a romantic as well.

Yes, I wouldn't argue that. By professional standards, I am not much of a scientist. On the other hand, I would say flatly it is a serious error to present astronomy to the public strictly as a *science*.

Since the average man is not a scientist, and has only a limited understanding of science, his first response is to be turned off by that approach. All that kind of stuff can be left to the professor, he will say; he doesn't have to bother *his* head about it.

A century ago, Emerson lamented that a man in the street does not know a star in the sky. He could still be lamenting today. When everything becomes Big Science, what is there left for the average man? How many Americans would bother to visit Yosemite or the Grand Canyon if these things were presented to the public strictly as geological phenomena, and therefore of interest only to professional geologists? Astronomy should be presented primarily as exploration, adventure, and discovery. The scientific aspects can come later.

I see what you mean. You're what used to be a called a *naturalist,* I believe.

Yes. The species is nearly extinct, I think. Thoreau and John Muir are among my heroes. It was Thoreau who said it enraged him to buy a book on frogs and find nothing in it except an analysis of bone and muscle structure. Well, I would say that it enrages me to find a book on astronomy which

confines itself to strictly physical and numerical data. That's like trying to describe a great work of art and limiting the description to a chemical analysis of the pigments.

Some would say that there isn't much of an analogy there.

I know. That's where they would be wrong. I would reply that the universe cannot be comprehended through strictly scientific techniques. We are dealing with something that resembles a great symphony or great poem vastly more than it resembles a huge machine.

That's almost a religious statement.

Yes, it is.

But most of your friends describe you as strictly agnostic.

By formal standards I am agnostic. I don't subscribe to any organized creed; I have never felt the slightest need to adopt any sort of definite theology or set system of beliefs. Alan Watts has said it for me: "That would be like trying to wrap up and label the sky." I hope to see all such things eventually disappear as mankind emerges from its infancy. We don't know enough yet to say what it's all about.

We are all children. But if we cannot be wise, we can at least be honest. I accept the existence of what I call the all-pervading intelligence of the universe. The Orientals call it the *Tao*. To me, that is too obvious to need scientific proof. That's my religion — that and the Grand Canyon. And Yosemite. And the surf coming in with the tide. And NGC-6611.

And if you had to put all this into some sort of definite statement as a reply to more conventional ideas?

I would say this: There is no ultimate truth about life or the universe which can be expressed in words. Whatever it is, it has to be experienced directly. Words are symbols, never to be confused with the thing itself. The most that any set of symbols can do is to point the way. Your task is to walk down the road, not to worship the signpost.

But do you think that most people see the universe as a mystery?

The average man probably doesn't. He has some sort of standard-brand faith which gives him all the answers. The attitude of the scientist is a little harder to understand. He seems amazingly unaware of the greatest mystery of all — the fact that we are conscious and aware, and can feel and reflect and think. Now there are biologists who will explain that there is really no mystery here. Consciousness is explained as the result of the extremely complex electrical circuitry of the brain.

Which tells me nothing at all. One might as well say that a painting by Monet is a masterpiece because of the way the pigments are arranged on the canvas.

The atoms that make up our bodies and our brains are no different from the atoms that make up a boulder or a cloud or a log of wood. But arrange them in the right way and you have a living, conscious entity. In fact, you have not only such curious and wondrous things as elephants, meadowlarks, and sequoia trees, but Beethoven, Shakespeare, Lincoln, and Einstein as well. Now surely this must tell me something about the nature of the universe. Obviously, the potential for intelligence is *there*. Which is enough to convince me that the universe is *not* a huge, meaningless aggregation of dead matter being shoved around by blind mechanical and chemical forces.

But isn't that exactly how many scientific materialists claim to see it?

Well, they claim to. But I detect a curious bit of unconscious hypocrisy here. If you think of the cosmos that way, you have no choice but to think of yourselves that way too. And I don't know any scientist who will admit that. Not even the most stubborn materialist thinks of himself as a mindless machine. Isn't it amazing, Professor Jones, that this totally dumb, blind, stupid universe has accidentally produced something so remarkably rational, thoughtful, and intelligent as yourself? A really remarkable achievement for the blind monkey at the typewriter, isn't it?

You don't believe in the blind monkey at the typewriter.

I'm afraid not. Many scientists would criticize me for hovering on the brink of anthropomorphism, but I don't quite see why a strictly materialistic outlook is supposed to be so noble either. Aside from the fact that it's really impossible as a philosophy of life. You can't build a decent society on it. People need something much more than that, obviously. And much more than just a long listing of scientific facts too.

Man is "incurably religious"?

Yes. That's beyond argument, I think.

But if you reject the blind monkey at the typewriter, what's the alternative? Aren't you giving us the old classical "argument from design" again?

Well no, I'm not. Such arguments have been repeated about a thousand times. And discredited about a thousand times. The conventional argument is the old *watch and watch-maker* analogy. The universe is so astonishingly complex and works so perfectly that it can't be explained by chance. So it must have been deliberately designed by some all-wise creator. Well, the universe doesn't really resemble a watch. And of course the universe works perfectly, because the only kind of universe

that can exist at all is one that works. If it didn't work it wouldn't exist, and we wouldn't be here to be asking the questions.

That's a good point.

Yes. The conventional logic really gets us nowhere, because the same arguments would apply to the creator as well. If it makes any sense to ask who created the universe, it makes just as much sense to ask who created God. In fact, most Orientals would tell you that two questions are identical. The universe is not some sort of artifact that was "created." It does not resemble a huge piece of clockwork. Or a collection of ceramics designed by some Master-potter. Who was it who called this the "Crack-pot model of the universe"? Human beings like to trap themselves in semantic bafflegab. We hear it all the time. "Nature is the creation of God." Well, that's clever verbal gobbledygook. One might as well say, "The blazing of the light caused a burst of illumination." The sentence is arranged to make it seem that we are talking about several different things, so then we can argue about which of these things was the "cause" of the others. "Nature" and "creation" and "God" are three different names for the same thing: the Universe, the world, or what we call "existence."

That's the oriental view, isn't it? Most western theologians would reject that as pantheism.

Well, I don't really care what you call it. Let's not get stuck on verbal labels.

People who argue from evidence of design usually have to resort to some kind of statistical arguments, don't they?

Yes, of course. What are the *chances*, they ask, of something so complex as a protein molecule being formed through some random, mechanical process? Pretty slim, apparently. But the materialist can bounce right back with a logical counter-argument. The universe is unimaginably huge; there are trillions of experiments going on all the time; so just about *anything* that's possible is going to happen eventually, somewhere, sometime. Yes, it certainly seems remarkable that everything is just right for intelligent life to exist on this earth. But if everything *wasn't* exactly right, we wouldn't be here. We'd be somewhere else. Or something reasonably like us.

So statistical arguments don't mean much.

Not the way they're usually presented. Make a mental experiment for a minute. Imagine a square mile of land, marked off into one-inch squares, like a giant checkerboard. That would give you about four billion little squares.

I'll check your arithmetic later. OK. Four billion little squares, let's say.

Now take four billion little bingo tokens, all numbered in order. Shake them up in a big box, and hand them out one by one, at random, to be placed on the four billion squares. You'll get a certain distribution which is assumed to be totally random; token number 10,362 is on square 4,981 and so on.

OK. Now what?

Record the results. Shake up all the tokens again, and repeat the whole experiment. *What would be the chances of getting exactly the same distribution a second time? Or a third time?*

Pretty close to zero.

Yes. In fact the statistical people would tell us that you wouldn't get the same results again even after several billion years of trying. So by the usual logic, we now conclude that the original distribution must have been divinely ordained because the odds against it happening by chance are simply astronomical.

That's flawed logic, though, isn't it? Just going by the laws of chance, *any* other distribution would have been just as unlikely, too.

Exactly. That's the problem with these statistical arguments. Trillions of events are occurring all the time, so it shouldn't surprise us if any one event should seem extremely unlikely. Yes it is. But the alternate possibilities would be equally unlikely. *However…*

Now you're going to come up with something else.

Yes. Let's change the experiment just a little. Instead of the numbers on the tokens, we mark them with the letters of the alphabet. Shake up the whole mess, and put them out one by one, at random, on those four billion squares. What do we do now if we find that the whole thing now spells out, word for word, the complete text of *King Lear*, plus Dante's *Inferno*, plus all the poems of Keats and Shelley, in order?

That's not going to happen.

Looking at it logically, no. Not even after trillions of years. But if it did?

Well, we'd say that some intelligence is acting on the whole set-up. That it couldn't be due to random chance.

Exactly. But the Universe itself *has* come up with all these things. So where does this logic lead us?

But the plays of Shakespeare weren't produced by the Universe. They were written by Shakespeare.

Yes, of course. And the poems of Shelley were composed by Shelley. But human beings did not design themselves. Shakespeare did not deliberately design his brain, nor did Beethoven consciously *plan* to build a mind that could create musical masterpieces. All of this *somehow* comes out of the Universe itself. You can say that we do it, but it is really done *through* us.

But that goes back to the argument from design, doesn't it?

No, it doesn't. I am not arguing about whether these things happened by design or by chance. However it was, these things *have happened*; the Universe *quite clearly has come up with intelligence and consciousness.* You can argue that it was by chance, but that doesn't change anything. The fact that it was possible *at all* is the important point; this fact alone must tell us something of supreme importance about the very fabric of the Universe.

OK, I see what you're driving at. But wouldn't most scientists still say that the development of intelligent life *could* be just some…unimportant by-product of the whole gigantic show…

Including the brainy scientist who is making that remark? Yes, of course. But why is it considered more *scientific* to hold such a view? Is it more logical to believe in meaningless, random chance, rather than in intelligence in the Universe? Why should it be?

Probably because the organized religions have made the whole idea so…

Cranky? Primitive? Yes. Well, that's the old "guilt-by-association" syndrome again. A lot of scientists won't touch ESP research for the same reason. They don't want to be identified with cranks. But this situation is chiefly limited to the western cultures. Consider the difference in artistic traditions, for example. Suppose an American or European collector offers to show you a "religious" picture. You know what you will see. A Madonna. A nativity scene. A crucifixion. The martyrdom of some saint, perhaps. Always a *conventionally* religious theme. Now, let a cultivated Chinese gentleman show you *his* religious picture. High peaks looming though mist. A gnarled pine tree on a windy cliff. A mountain chasm at dawn. Yes, there *may* be a hermit or a holy man somewhere in all this, but you have to really hunt for him. Where's the religion? Well, the oriental is experiencing the presence of the intelligence of the universe. In the world of nature.

You used that phrase before. But you don't think of this "intelligence of the universe" as any sort of personal deity? Einstein didn't, and I don't think that most scientists do.

No. You might as well as me to believe literally in the Easter Bunny. Or Santa Claus. Whatever the word "God" means to me, it does not mean that. Harlow Shapley once said that the deity concept should perhaps be abandoned because of its confused meaning. No, I don't think of the universe as some sort of ultimate monarchy being ruled by a cosmic king on a throne, handing out written directives to his subordinates like a commanding general.

And I am not being irreligious when I say this. I once heard a liberal minister lament that the average American seems unable to go beyond a concept of God suitable for a six-year-old child. I don't think he would find any reason to alter his opinion today. Religious leaders everywhere seem determined to go back to a crude, literal fundamentalism, the sort of thing that has been making standard-brand religion look silly for the last two centuries.

I imagine that you take a pretty dim view of the current swing back to old-time fundamentalism.

It can be an extremely irritating experience to talk to one of these people, because all their arguments go around and around in a closed circle, like a snake swallowing his tail. First of all, they tell us that the entire physical world is somehow corrupt or "fallen," and therefore cannot be trusted. Human reasoning is also fallible and limited, and therefore cannot be trusted. Science, which depends on human analysis of physical evidence, therefore cannot be trusted. So the whole concept of reliable knowledge hasn't got a leg to stand on. All this is summed up in that impressive phrase: "The wisdom of man is foolishness to God."

Well, you can't really argue with that, can you?

Of course not. We are all fallible human beings, so we are all capable of making errors. But this doesn't apply only to scientists and pragmatic philosophers. It applies to theologians as well. Yes of course the wisdom of man may be foolishness to God. It doesn't seem to occur to these people that all the theologies of the world may also be foolishness to God. If we can't put much trust in scientific thinking, then we can't put much trust in religious thinking either. The validity of all these things depends upon human observation, human testimony, human interpretation, human reasoning. Whatever discredits scientific thinking discredits religious thinking as well.

Religious leaders claim to have a divine revelation which cannot be questioned.

Yes. But if neither reason nor science nor evidence nor human testimony can be trusted, how can you possibly know you have a divine revelation? Since you admit you are fallible human being, how can you be sure that you would recognize a divine revelation if you saw one? That's a pretty arrogant claim to make, isn't it?

Religious authorities will say that the whole history of the last two thousand years proves the truth of their claims.

Oh sure. The Inquisition, for example? The witchcraft mania? Centuries of cruel persecutions and intolerance and bigotry? How does it happen that this divinely revealed faith has by far the worst history of any of the great religions of the world, and has everywhere been the major cause of barbarism, strife and war? The whole history of Christian Europe reads like one long nightmare. Well, let's suppose that none of these things had ever happened. Let's close our eyes and pretend

that the history of religion in the western world was all perfect sweetness and light, as many simple folk fondly imagine. The validity of their claims would still depend upon human reasoning. All theological statements are human statements; all theological writings are human writings; all religious concepts were developed by human beings. Obviously. There are people who imagine that they have something more, since their whole creed depends upon that idea. And where do they go to prove this? Right back to human reasoning! You can find entire books — hundreds of them — devoted to proving some theological doctrine or other. Using step by step human logic.

What kind of arguments would you give one of these people who claim to have an infallible revelation?

The first response to *any* sort of claim must be: How do you know this?

They'd start quoting scripture at you.

Well, any human being can claim anything. It's up to the believer to prove his claim. Certainly all written manuscripts are the work of human beings; they were written by people, edited by people, compiled and translated by people. No book has ever fallen out of the sky with a postmark announcing "Printed in Heaven." This extreme reliance on the printed word is an irritating feature of western religion. I agree with Alan Watts when he said that worshipping a book was as much idolatry as worshipping an image of bronze or stone.

Yet you said that people really do need some sort of religious outlook, beyond what science can supply in the way of facts.

Yes, I did say that. But to me, religion has nothing to do with formal creeds or systems of belief. Religion to me is almost entirely a matter of developing or systems of belief. Religion to me is almost entirely a matter of developing what I would call "sacramental consciousness." There are people who are not at all religious in the conventional sense, but have this "cosmic awareness," so to speak, to an amazing degree. Consider some of the great Chinese poets. No one would classify Tu Fu as a religious writer. Yet Kenneth Rexroth has said that Tu Fu's response to the human situation is the only kind of religion likely to outlast this century. "Reverence for life" it has been called.

But do you think that something like that is enough for most people?

Evidently not. But if we really have to go much farther than that, we had better try to keep our heads. And please don't tell me that "faith" is the answer. If it's a question of "faith," you could believe just about anything. You could accept the religion of the ancient Egyptians or the Aztecs as readily as anything else. Faith is of no help in trying to decide between various claims. If I am not allowed to think and reason and judge, then the whole situation is really hopeless. What possible basis is there for a decision?

Most people will say that they accept the creed which seems most reasonable to them.

So we're right back to human judgment again. Attend the church of your choice. But I don't see much evidence of real choice in any of this. The geographical distribution of religions is enough to disprove that. One country is 93 percent Catholic; just across the border another country is 97 percent Protestant. Cross the ocean and you find a third country that is 98 percent Muslim. What has free choice got to do with this? Obviously the whole thing is a matter of early social conditioning. People inherit their creeds in the same way that they inherit their last names. Only a few people seriously question the traditions which surround them from their earliest years.

The established religions themselves tend to reinforce all this.

Yes of course. Is there any religion that invites doubt, skepticism, or a freely inquiring mind? The scientist is free to say to his colleagues: "Gentlemen, new findings have made it necessary to revise some of our ideas." Have you ever heard a minister make such an announcement to his flock? The average believer shows about as much independence of thought as a programmed computer.

And if you really had to make a choice between established faiths…

Oh, I'd be a Zen Buddhist probably. Or a Taoist, I suppose. Yes. They don't split the world into a material half and a spiritual half and then require you to take sides in this imaginary war. They don't fill you up with guilt, fear and shame, and then try to convince you that only *their* particular creed offers any way out of this impossible situation. They don't require you to put your brain into cold storage, or reject scientific findings that don't seem to agree with the ideas of the ancient prophets. They don't demand unquestioning acceptance of dogmas that evidently haven't the slightest chance of being true. And above all, they don't require you to accept rigid verbal definitions of ultimate truths that are obviously beyond any verbal definition anyway. Let me give you another quote…

Go ahead.

This one is from Krishnamutri, accepted by many as one of the great spiritual teachers of our time. "I maintain that truth is a pathless land, and you cannot approach it by any path whatsoever." In other words, verbal creeds are not only useless; they become positive barriers raised up against the possibility of attainment. It is the old question of "trapping your mind in a net of words," as the Zen teacher would call it. Practically all the great religious disputes of the western world were squabbles of that sort. The great theologians were aroused to fever-heat by purely verbal disagreements over precise definitions of invented concepts. It all seems marvelously insane now.

Scientists sometimes aren't much better.

No scientist is quite as bad as that. And at least they are more *humane* about it. They don't march out to murder each other over scientific questions. A scientist who holds somewhat unorthodox ideas may find himself cold-shouldered by the establishment, but at least he isn't hauled up before an Inquisition and sentenced to death.

You spoke of something you called "sacramental consciousness" as being the real core of religion. Aren't you aware that many religious leaders have said pretty much the same thing? And that its loss is the chief source of all the anxiety of the modern world?

Yes, I know that. On this point I am in agreement with the theologians. But there is room for pretty lively disagreement about the cause of this situation, and what can be done about it. Lin Yutang wrote that the modern world has gone to pieces as a direct result of scientific materialism invading our thinking. Our human values and our moral values have disappeared, he said, and all we have left are carefully tabulated facts. Our whole conception of the nature of man has been falsified and debased; the bottom has been knocked out of the human universe —

But you don't exactly agree with that?

Well, I don't exactly disagree with what he's saying. But that's only a part of the problem. And it is a little unfair to blame science for all of this. Western-style theology has made an enormous contribution to this seething mess by dividing reality right down the middle, and then setting the two parts into conflict with each other. We are all trained to see the world as a battlefield; the mind versus the body, the spiritual versus the material, good against evil, the sacred against the secular, man against nature, the holy against the profane…In western thinking the sacred is not only set apart somehow from the physical world, but is identified solely with the supernatural. The oriental thinkers have always known that these distinctions are false. But in the western world only a few unusual personalities like Bertrand Russell have seen this. And western science has grown up in this artificially divided world, despite its rejection of the underlying philosophy.

Most of us still think of religion in terms of Sunday-school platitudes?

Well, you might say so. Yes. Our whole view of the world is centered around the notion of the good soul fighting the evils of a material world. And the odd idea that evil is something that can be stamped out by force. So the religious child in the western cultures is conditioned to think of himself as a brave soldier marching off to defend righteousness in a holy crusade. To the oriental mind all this seems amusingly futile. Evil is not something that can be fought against or stamped out, the man of Zen will tell you. Evil is the result of gross ignorance, and the really important thing is to develop wisdom. Yes of course there are real evils in the world, and yes of course we must combat them. Do we really have to argue that? If a malarial mosquito is about to bite you, naturally you swat

it. Obviously. But do you really have to develop a Man-versus-Mosquito theology as the central theme of your whole outlook on life? Why should conventional religions be so infantile as that?

What do you say to people who think that science is somehow at war with religion?

Well, it's another example of that artificial division of reality, isn't it? I've heard some really curious arguments about this question. At least once a year I can expect to read some marvelously soothing analysis of the problem in the Sunday supplement. And it always goes something like this: There is really no conflict because scientists deal with the material world, while religion deals with spiritual matters. I don't know if such a comforting platitude really fools anybody. In the first place it's impossible to divide up the world in that way. "Material" things and "spiritual" things cannot be so neatly pigeon-holed. And in the second place, science does not deal exclusively with "physical" reality, nor does religion deal exclusively with "spiritual" or "moral" questions. Scientists and theologians are asking the same basic questions: How did the universe come to be the way it is? What does it all *mean*? And why are we here? So we are all talking about the same world, but we are speaking different languages. That's why there can be a real conflict. This is particularly true in the western world, because so many religious leaders insist on interpreting metaphorical or allegorical concepts *literally*. For some odd reason they also insist on taking ancient folklore as literal historical truth. When the scientist coldly replies that there is no real evidence at all for the historical truth of such stories, *then* you have a real conflict. All this seems downright imbecilic to the hard-headed scientist, since the symbolic or allegorical content of much ancient scripture is so glaringly obvious.

Still, there are other standards of truth besides strictly scientific ones.

Of course. Historian Herbert J. Muller put it something like this: Scientific standards of truth are not the only possible standards, *but* they *are* the necessary standards for claims to literal, factual, historical truth. So, many of the claims of the standard-brand faiths seem clearly contrary to fact. Not only that, but they defy the principles upon which reliable knowledge rests.

The modern creationists are in this situation right now. But I don't think I'll ask your opinion of them.

No. You'd know pretty well what I'd say! Well, it's the old question of the confusion of the map with the territory, the symbol with the reality. Literal-minded people are the curse of the world. Will Durant said that a supreme and unchallengeable faith was a deadly enemy to the human mind. Rigid verbal creeds are really impossible. They close the mind to any new evidence, or to any new vision of the world.

I remember a statement something like that in your introduction to the *Handbook*.

Yes. We great writers love to quote each other. It makes us seem so learned and well read.

Yes. Your readers have probably noticed little bits of philosophy and other non-astronomical material here and there in the *Handbook*. You seem to have a strong interest in ancient cultures and world literature and art…

Yes. It may seem a curious thing, but I find that the most direct way to approach any ancient culture is through its art. It is a direct language, so to speak. Something beyond the use of words.

Your friends tell me you do a little painting yourself.

Yes. Landscapes, mostly, in a style rather resembling the works of Robert Wood. The quiet forest scene is my specialty. Winston Churchill wrote that painting was the finest diversion in the world; there is nothing else that can absorb one so completely. I can be painting at about 10 p.m. and I'll say: Just a little bit more on this corner here and I'll call it a night — and the next time I look at the clock it's 2:30 in the morning.

And then you grab the telescope and rush outdoors…

Sometimes I do. If I'm lucky it will be raining and I can go to bed.

How would you describe your painting style?

Interpretive realism with impressionistic overtones.

Do all artists talk like that?

Only when you get them backed into a corner. A painting is not verbal communication. A work of art has to speak for itself. That's why a completely photographic realism doesn't interest me very much. It leaves nothing to the imagination. If you can see every nail-head on the barn door, it may make you admire the artist's technical skill, but it really adds very little to the thing as a work of art. The artist is giving you nothing of himself; you might as well be talking to a camera. A good painting should express far more than a direct photograph of the scene would do. Otherwise you might as well trot out that camera and settle for a good Kodachrome.

Your sympathies are with the impressionists.

Monet is just the greatest. Especially his works at Giverny. Renoir and Turner I also enjoy every much. Among modern artists, Richard Earl Thompson is at the top of my list. And Wilson Hurley and Clark Hulings. They all perform miracles with the effects of light. Which is the chief thing I look for in a painting. They make you *see*.

You feel about art the way you feel about astronomy.

The value of all these things lie in what they call expanded awareness. Heightened consciousness as the mystics call it. To take up painting can be an absolutely startling revelation. For the first time in your life you have to really look at the world. You begin to learn who to see. And you realize you've been blind for years. Astronomy should do the same for you, of course.

Some critics would call that viewpoint incurably romantic.

Perhaps. But why not? The term "romantic" is always used in a derogatory sense. Like the word "sentiment." For some odd reason we are all being conditioned to look at the world in a very business-like, unfeeling, no-nonsense way. I would argue that art is inextricably linked up with human feeling and emotion. There are artists — and composers too — who are trying to divorce the two. I think they're crazy. This explains much of the gap between the artist and the general public. I think it was Stravinsky who was once asked if he thought there was really a generation gap. And he replied something like this: If what I hear on the radio and see in the newspapers is any indication, there is a gap about the size of the Grand Canyon separating me from just about *everyone*.

Many scientists and artists must feel the same way. But don't you think that the achievements of the space program are helping to close that gap?

The gap between the scientist and the general public? Well, perhaps. To some extent. And the popularity of science fiction may be a good thing too.

And films like *Star Wars*?

Well is *Star Wars* evidence of widespread interest in astronomy? I would hardly say that. Such epic productions are immensely popular because they are great fun and great fantasy. True, the story is played out against an outer space background, but it's *fantasy* outer space. Real space travel is not going to be anything like that. And the public knows this…

Do you think so?

Yes. Just consider the enormous market for space toys, games, *Star Wars* novelties, posters, etc. Now try to find any comparable commercial exploitation of the Apollo astronauts and the actual moon-landing. "We don't carry that," the dealer will snort at you. "Stuff doesn't sell." On the other hand, Edgar Rice Burroughs very definitely does sell. It's the fantasy the public seems to want, not the actual reality.

The fantasy seems more exciting?

Evidently. I doubt very much that any real space traveler is ever going to find himself rescuing gorgeous bikini-clad maidens from appalling six-armed Martian horrors.

You don't think so?

Wearing a bikini on Mars, I can assure you, would be almost instantly fatal. No, I don't think that the popularity of science fantasy is much of an indication of a genuine public interest in science. Rather than having more imaginative fiction, I would prefer to see more works which attempt to raise the public understanding of real science, and of the world around us.

Is that a plug for your *Handbook*?

Well…perhaps. But you see my meaning. I would rather see more people out actually looking at the stars, than simply sitting in their armchairs, reading about the mind-boggling discoveries being made with monster telescopes and space probes. This "gee-whiz" approach is always a little irritating to me, because it reinforces the impression that astronomy is only for the technically sophisticated expert. The stars belong to us too.

Your *Handbook* demonstrates that philosophy very clearly, I think. A number of readers have commented on the amount of space you devote to ancient mythology, Chinese poetry, oriental folklore, Roman coins — things like that. If you had omitted all this, do you think you might have reduced the book to a more practical size?

Not by very much. None of this adds that much to the page count. And I think it gives the work a certain sort of unique personality.

I would agree with that. Do you think the book will remain a unique achievement?

There is no real reason why it should be. There are a fair number of people around who are capable of producing such a thing. A few of them have actually tried. . .

What happened?

Well, the majority of these good folk have long since succumbed to the effects of cumulative concussion after several decades spent beating their heads against a solid wall of apathy. The few survivors have gone on to more rewarding things, like fringe-cult pseudo-science or astrology.

You had those two sentences all ready and waiting, didn't you?

(Laughing) Yes, I'm afraid so. You know, after hearing the same questions so many times you begin to have word-perfect answers prepared. In the last couple of decades I've been interrogated and catechized by everyone from kindergarten school groups to U.S. presidential candidate Barry Goldwater.

That was after your first comet discovery, I understand.

Yes. The Senator was quite intrigued to learn that someone with a home-built telescope had beaten the professionals to a "major astronomical discovery," as he put it. But he was really fascinated by my account of the optical test of my telescope mirror. Here I was, measuring the curve on the mirror to an accuracy of a few hundred-thousandths of an inch, with equipment made from an old tin can and a razor blade.

And what sort of questions did you get from the elementary school groups?

There are two I would get repeatedly. First: Would you like to go to the Moon? Yes, if I was sure I could come back. Second: Have you ever seen a flying saucer?

Bob, I think I'd like to ask you that same question.

I think I have spent about as many hours under the stars as any observer living today. And I have never seen anything remotely resembling the photographs in UFO books and saucer magazines. Orbiting satellites — yes. Rocket launchings from Vandenberg — yes. Skyhook balloons. Meteors. Refueling tankers. High-flying flocks of birds. But nothing that couldn't be rather easily identified as a known object.

So I am extremely skeptical of persons who claim to have UFO experiences repeatedly. And virtually all the contactee stories are quite literally unbelievable. Aside from the fact that there is never the slightest bit of really convincing evidence to study afterwards. Still, I feel that it's unwise to be too dogmatic. There is nothing inherently impossible in the central idea.

Space travelers may occasionally visit the Earth.

Yes. We really don't know how many inhabited worlds there may be. We don't even have the data to make an intelligent guess. So our minds must remain wide open to the possibility. The earth is immensely old. In several billion years it is quite possible that extra-terrestrial visitors have been here, at some time.

So you could accept the Von Daniken hypothesis?

I could accept the central idea, as a *possibility*. But I feel he attempts to do too much with the notion, to explain all sorts of "mysteries" which may not be based upon genuine data at all. Yes, space visitors may have been here. At some time. But is it really necessary to drag in this hypothesis to explain such things as the Great Pyramid, Stonehenge, the ruins of Tiahunaco and Baalbek, or the strange carvings on a 7th Century tomb in pre-Columbian Mexico? Is it really necessary to interpret every weird wall carving or grotesque clay figurine as an ancient astronaut? None of this seems very convincing to archaeologists. Surely an extra-terrestrial expedition should leave better evidence than some odd carvings on rocks or curious structures of stone.

Something like a radio set in an ancient tomb? Yes, that would prove something, wouldn't it? But what are your views about the whole saucer enigma?

Well, is there a real enigma at all? Are we really dealing with actual physical objects, or are most of these things some sort of illusion or mass hallucination? Saucers appear and disappear like ghosts. They make impossible maneuvers, like instant ninety degree turns. They come in a bewildering variety of shapes and sizes. And there are *far* too many of them. Several thousand a month are being reported, world-wide. The number of sightings reported from the U.S. alone now totals well over a million. Now this gets to be completely unrealistic. I can't believe that space travelers are coming here constantly, by the thousands, and still managing to avoid all the radar defense networks, the satellite tracking stations, and the telescopes of professional astronomers.

You would say that most of them must be misinterpretations of known objects.

A great many must be honest errors. But there is a strong incentive for deliberate hoaxers, since the UFO business has become not only a new space-age religion, but also a booming and profitable industry like astrology.

I gather you don't think much of the growing commercialism of the modern world.

Well, most Americans would staunchly defend something they call the American Way of Life, on the grounds that it has given them the highest standard of living in the world.

Yes.

And if that was the only point to be considered, there wouldn't be much to argue about. But all this has been achieved by looting the entire planet, by using vastly more than our fair share of everything. The Mafia could defend organized crime on much the same basis. A successful gangster can afford a very high standard of living indeed. It is a little odd that only the positive achievements are considered. A high standard of living excuses everything. What about the other side of the picture? What have we lost in the process? And where is all this taking us?

Ecologists have given us some answers.

Yes, but they are answers which our political and industrial leaders find unacceptable. Politicians are committed to preserving the status quo. The western way of doing things is somehow sacred and must not be questioned.

Don't rock the boat?

Yes. Even when the boat starts to sink. Ecologists have been telling us for years that Uncle Sam is seriously ill, but he refuses to make any real changes in his life style. A few band-aids here and there, perhaps…

You blame the politicians?

Not entirely. They're ordinary humans, stuck in the same tar barrel as the rest of us. Would you like to hear an Irish joke at this point?

Ah sure, and why not?

'Tis said that when auld St. Patrick drove the snakes out of Ireland, most of them emigrated to America and went into politics.

Ah, a sorry view of politicians you have there.

The average politician would not recognize a new idea if one leaped out and bit him in the leg. The loftiest pronouncement you ever hear from one of these thinkers is that we must return to the noble traditions which have made us great — in other words, all the obsolete things that have always failed so miserably in the past. These good folk seem stuck with the odd idea that once upon a time, say about the year 1904, we had a social and economic system that really worked, and all this was eventually spoiled by fuzzy-minded liberals, left wing sympathizers, and New-Deal democrats. A curious misinterpretation of history, I would say. I really don't see the age of the robber-barons as quite that admirable. And this isn't 1904, anyway. Though we still have the best politicians that money can buy, as Will Rogers said. No, obviously, if anything we had tried before had really worked, we would not be in the mess we are in now. Yes, of course, everything works, *for a while*. Until the difficulties start to pile up. I would argue that there is nothing we can go back to.

Secretary Watt said in one of his speeches that Americans everywhere are going back to the fundamentals.

Yes, but the one major fundamental of all he didn't mention. We are stuck with an economic system which requires constant growth to survive. Unless it expands constantly the whole thing starts to fall apart. So we have a set-up which is basically impossible. You simply can't have a system which maintains itself by endless growth, development and expansion, and constantly increasing the exploitation of everything. That point is beyond argument. Such a set-up is already doomed.

Most Americans would say it's served us pretty well, at least up to now.

That's like claiming you're immortal because you're alive now. The Earth is a globe. All resources are limited. There is only so much of everything. You can go only so far before you start altering the

natural systems which make life possible on this planet. Endless growth is an absurdity. And the expansion into outer space is not going to solve this problem, despite the wistful dreams of the high-tech people. There is no technological solution to a problem which results from a basically impossible set-up.

Would you call yourself an environmentalist?

Since I live on this planet, yes. Any human being who expects to survive here must be seriously concerned about a world which grows steadily more poisonous. Anyone today should be able to see the results of a philosophy that "nature" is something to be conquered and beaten into submission.

Many Americans would say you are against progress.

"Progress" is a klunk-word. Like "efficiency." It means nothing by itself. Progress toward what? Toward making the whole world look like Los Angeles? Efficiency in doing stupid things? I am all for genuine progress, for anything that genuinely benefits humanity. I would say that all the real pleasures of life are quite simple. A tremendous amount of slick gadgetry does not add that much to the joy of being alive in an incredibly fascinating world. Often it does just the opposite. Are we really better off with neon signs, smog, traffic jams, nuclear bombs, transistor radios, billboards, and TV commercials? I would be much happier without any of these things.

What have you got against transistor radios?

The tone is simply atrocious. It's a crime to teach children that music really sounds like that.

But they sell.

Yes, they sell.

Aren't you ignoring the very real benefits that technological progress has given us?

Not at all. The advances in science and medicine and electronics and space studies are simply astonishing. I would be the last one to deny their benefits to humanity. But there is an enormous price to pay, IF we allow high technology to be our master rather than our servant. "Progress" doesn't mean much if we keep using our god-like powers to create a whole swarm of new problems that didn't even exist forty years ago.

But you can't blame the technologists for all this.

No, I don't mean to imply that. We have a very peculiar situation. Let me put it this way: We are living in an age when scientists and technologists are forging ahead ruthlessly with dazzling speed, while all the politicians, social philosophers, theologians, and economists are stumbling along miles back

somewhere in the rear. All these colossal powers are being turned over to intellectual pygmies. And the modern world in all its absurdities is the result. We're a bunch of idiot children playing with dynamite.

Still, you wouldn't want to go back to the cave, would you?

That's really a very irritating criticism. Especially since I've heard it about a thousand times. No, I don't want to go back to the cave. Is it really logical to argue that we must let technology run wild and uncontrolled or else we will all be heading back to the cave? A nuclear war may be the thing that will ultimately send us back to the cave. Surely we can all agree that technological developments should be used carefully and wisely for the benefit of mankind? Can't we agree that we should think very carefully about the possible effects of what we are planning to do?

Industrial leaders say that it takes too long to make such studies. We have to keep moving ahead.

Well, that's Big Business talking. That's not science. Keep the juggernaut rolling. Keep moving ahead. Yes. But which way is *ahead*? Are we really benefitting that much from all this constant change, constant expansion, constant development? Is the world really better because everything gets steadily bigger, faster, noisier, dirtier, uncontrollable, and more incomprehensible?

You obviously don't think that technology is going to solve all our problems.

A purely technical problem can be solved by advances in technology. An improvement in aircraft design. Better color TV. An efficient plumbing system. An efficient political or social system is an entirely different matter. Yes, we have wiped out smallpox. Great. We no longer fear the Black Death. Wonderful. And our space probes are heading out past Saturn. Wow. Prolonged applause. But, at the same time all our human problems are increasing. Crime is going up, mental illness is going up, the probability of nuclear war is going up, the divorce rate is going up, juvenile delinquency is going up, the suicide rate is going up — and not particularly among bewildered older people, which might at least be understandable, but among the *young*. Among the very people who should be our great hope for a brilliant future. Now surely there is something drastically wrong here.

But you admitted that you don't blame runaway technology for most of this.

No, I don't. But I do blame what they call "tunnel vision" — the simplistic notion that some amazing new gimmick from the high-tech lab is going to solve every problem. And I resent being dismissed as an unrealistic dreamer because I don't see technological advances as quite that all-important. That's the old George III syndrome again: "I desire what is good; therefore everyone who does not agree with me is a traitor." Well, George, you are not the ultimate authority on what is "good." The Spanish exploitation of the New World seemed like a pretty good thing to the conquistadores; it

didn't seem nearly as good to the American Indian. There is always room for quite a lot of argument about these things.

You're on the side of the Indians.

Well, I'm on the side of the biologists. Human and ethical considerations must come first. Otherwise our pursuit of progress and efficiency is going to give us a civilization resembling Hitler's Germany, where everything runs with admirable smoothness — including the trains carrying rebels to the concentration camps. I agree with René Dubos when he said that many of the imagined future utopias are quite literally impossible, because they would deprive man of all the stimuli that human beings need to remain human. Any advance in technology can be used for good or evil. It depends on who is in control, and how these powers will be used. A computerized society *could* be a blessing (thought I doubt it) or it could be a curse.

You can always pull out the plug.

Well no, you can't, because the computer will be in the hands of people who are not going to pull out the plug. They're using that computer to control you, and keep you in line. Yes, that sounds pretty paranoid, I know…

You're implying that the powers of technology will always be misused in a society like ours. That our political and economic system guarantees it?

Yes, I'm saying something like that. Let's consider the economic aspects for just a minute, since this is a major factor in the unwise exploitation of resources. We are becoming an almost totally commercialistic society. Nothing is ever done for its own sake, but only for the fast buck it will bring in. Whatever else the set-up does, it encourages greed, fraud, and deception, not to mention outright crime. We are all being conditioned to think of human life as a business venture which must show a profit. Such a system practically guarantees that all the precious resources of the Earth will be exploited at a furious rate for foolish and trivial purposes. It has also given us a society in which there is almost no correlation between commercial success and real ability, or even real achievement. Success today is synonymous with efficient hucksterism. Fame is the result of efficient promotional campaigns carried out by public relations people. Important writers, composers, and scientists manage to survive somehow on a very modest income, while all the really fabulous rewards go to the promoters of commercial trash.

Don't you think you're exaggerating a little?

Possibly. But it has always seemed to me that the furiously competitive way of life has to be defended by strangely Darwinian arguments. And strangely inappropriate ones as well. If you set millions of people frantically competing against each other, obviously the most intelligent and

resourceful will come out on top, right? Survival of the fittest, they call it. Well, in nature it does seem to work something like that. The stronger and more intelligent animals would appear to have a better chance at competing for food, or mates, and then passing their superior qualities down to their offspring. But human economic competition isn't at all like that.

No one has shown that success in business is due to any sort of genetic superiority. There is a fair amount of evidence to indicate that exactly the opposite is true.

You're talking about geniuses who don't make the grade?

Partly. I'm talking about the strange lack of correlation between high performance in school and success later in life. More than one sociologist has called attention to this. Cynics will reply that formal education is being drowned in irrelevancies, that schools have forgotten the first function of education — to offer basic instruction in the arts of living. Well, you can't argue that, I guess. But the schools are at a great disadvantage in a society which doesn't attach much importance to a genuine education…

You're talking about that anti-egghead tradition again.

Yes. The important thing in the modern world is to "get ahead." Which boils down almost exclusively to "making money." So we are all hypnotized by the great ideal of "making money." And being turned into a herd of infantilized compulsive consumers in the process, as Theodore Roszak put it. We have a society where everything from erotica to the White House is for sale; where there are no values except commercial values; where everything from bubble gum up to presidential candidates must be packaged, wrapped up, promoted, plugged, advertised, and sold to the public like bars of soap. All the huge rewards go to the wheeler-dealer who finds something lucrative to exploit, and exploits it to the limit. Never mind if it's something trivial or silly like the pet-rock craze, or pure loony-bin schlock like horoscopes for dogs, or even something clearly harmful, like tobacco. As long as the stuff sells you're making the money, and you're a valuable member of society. You're keeping the economy going.

You wouldn't mind being a "success" like that, though, would you?

Probably not. But if this is really "survival of the fittest," the whole concept seems to have been turned upside-down. Under such a set-up it is usually the third-rate trash which stands the best chance of surviving. Genuinely worthwhile things stand a good chance of being weeded out. Who wants to promote a significant new symphony when you can make a thousand times more money on something like *Rudolph the Red-Nosed Reindeer*? The entire life income of Beethoven would not pay the royalties on *Mairzy Doats*. By modern commercial standards, such people as Poe and Melville and Van Gogh were total failures. While some current grade B-minus hack-work brings in the money

by the ton. Well, the businessman has no choice. He has to produce for the mass market because that's where the money is. So the rewards offered in our society for something like the *Celestial Handbook* are virtually zilch…

Aha! Now we're getting personal.

Yes, of course. While some self-proclaimed mystic is making a fortune on a book on astrology for your cat. Or some similar bit of commercial goofiness. This is survival of the fittest?

You're talking about two different meanings of the concept — the economical and the biological.

All right, then. Let's get biological. Has anyone shown that the successful businessman is somehow genetically superior to the slum-dwelling "failure?" Suppose this could be convincingly demonstrated. The argument still falls flat on its face, since success in business has nothing to do with success in reproducing the race. Wealthy businessmen do not have more children than other people. Exactly the opposite is true, and always has been. So what evidence can there be for the claim that fierce economic competition is acting to improve mankind?

I don't think anyone can seriously claim that it will improve mankind *genetically*. The usual claim is that it encourages material progress…

And raises the standard of living. Yes, I know. But unless you can actually improve *human beings*, the whole concept of material progress loses most of its meaning. I forget who it was who defined modern progress as "teaching the cannibals to use a fork and spoon." Yes, we have millions of big cars, and TV sets, and rockets to the moon. But are we actually better human beings than the men of Caesar's time, or the Greeks in the days of Socrates?

Most historians would say no.

Then it is a little hard to see what all of this frantic activity is actually accomplishing. It isn't just a question of what all this does to our world. What is it doing to us? Consider just one small facet of the modern world — the TV industry. I am told that the average American child spends four to five hours a day watching the tube. Even if the programs were excellent — which in about 90 percent of the case they are not — I would find this alarming. Children should not be spending their time listening to programmed entertainment, or watching flickering images on a screen. They should be out experiencing the real world. They should be listening to the wind in the trees. They should be out looking at the stars.

You don't have a very high opinion of the entertainment industry.

I don't care for music which is quite capable of causing permanent ear damage. Or stuff that goes *whompety-whomp-whomp*, *klunk-klunk-wham!* and hits 7.3 on the Richter scale on every third beat. The elderly British gentleman expressed my views perfectly when he was asked to submit a testimonial to a new gramophone company. Gentlemen: I have tested your machine. It adds a new terror to life and makes death a long-felt want…

Don't you think that some of the problems brought on by modern industrial growth may be solved by man's journey into space? Are you a supporter of the space program?

I am a strong supporter of the space program for the purposes of exploration, adventure, and discovery. I am considerably less enthusiastic about the concept of permanent space colonies as a home for the human race. I feel that the space enthusiasts are promising far more than the concept can possibly deliver. Certainly this will be true if we go into space carrying with us a whole culture based on guilt, fear, exploitation and greed.

Don't you think much of this will disappear as man overcomes the limitations of this planet and moves out to infinite horizons?

Well, a great many people seem to think so. Ray Bradbury, for example. He says he would love to come back every hundred years or so and watch us. He's a romantic, of course. My own views are a little more skeptical. The problem, as I see it, is that the horizons are really not that infinite. There may be a fair number of inhabitable worlds in space, though I suspect that truly earth-like planets are going to be much rarer than we think. There is also, obviously, an endless supply of energy and raw material. I don't question that. By any human standards, space is certainly infinite. *So* infinite, in fact, that it is virtually certain that most of it is going to remain forever beyond our reach. If you're dying of thirst in the middle of the Gobi Desert, it doesn't help much to be told that there's plenty of water in Lake Michigan. Yes, I know, this brands me as an old stick-in-the-mud and a planetary chauvinist…

Technologists may find ways to transcend these limitations.

They may. I've had technologists assure me that anything that is not physically impossible is going to be done.

And your reply to that?

I hope we have better sense than that. In any major undertaking, the primary consideration should always be: Will this really benefit mankind greatly, or will it simply create a whole pack of new problems that we could just as well be without?

But you can't always look that far ahead.

No, you can't. That's part of the problem. We are always moving ahead partly in the dark. But technology is not magic. There are definite limitations dictated by the very nature of space and time. The high-tech people are certainly promising great things. We are going to mine the asteroids, we are going to build huge space colonies in Earth orbit, we are going to ship our surplus millions off to Mars or the Moon, we are going to send gigantic space-arks out to other star systems and colonize the Galaxy…

You sound a little skeptical.

Well, if we are talking about mankind's future thousands of years from now, I would hesitate to make any definite statement about what *may* be possible. If we are talking about the near future, then I would say bluntly that none of these things seem very likely. I don't doubt that we will eventually journey to all the other planets of the Solar System — or at least to their satellites. But the colonization of other star systems, or even other galaxies, seems to me wildly unrealistic, because of the distances involved. A journey which is going to take centuries or millennia cannot be called exploration or travel in the usual sense. The people who go won't live to reach their destination. The folks back home won't live to hear the results. Even their nations and cultures may not survive that long.

Do you feel the same about interstellar communication?

We may eventually exchange messages with inhabitants of nearby star systems; Tau Ceti, for example, if it has inhabited planets. But anything vastly more remote than that doesn't look very practical. It isn't communication if the answer to your message won't arrive until a few centuries after your entire civilization has become extinct.

Scientists may find ways to transcend these limitations. Space warps or some such concept. They may find ways to extend human life. Or they may develop quick freezing or suspended animation for long journeys.

They may. No one has shown yet that these things are even possible. And until they do, it is pointless to attempt a realistic plan for an interstellar voyage. If the distance factor cannot be conquered then the whole concept remains in the category of fantasy dreams.

Science fiction writers often see their dreams turn into facts.

Yes. But this doesn't mean that *every* dream is going to become a fact. There is still such a thing as the Physical Impossibility. Some of my colleagues keep telling me that "anything is possible." Well, no, that's not quite true. There are some things that simply are *not* possible. You can't fly to the moon by flapping your arms. You can't teach a snake to tap-dance. You know, there is a charming naiveté about some of these wildly optimistic expectations. Right after the Apollo moon landing, I

remember hearing one senator — mercifully, I won't give his name — exult that "we are now the masters of the universe. We can go anywhere we choose." Apparently no one ever explained to him that the moon is practically in our backyard, and that the nearest star is a *hundred million times* farther away.

So you don't believe that man will ever achieve the conquest of space?

That phrase is really one of the silliest ever invented. Here are two ants — perched on a leaf in the middle of the Amazon, and after enormous effort and incredible expense they finally manage to get across to the next leaf. So they claim they've "conquered the forest."

I see what you mean. But you're lucky that Columbus didn't feel that way.

Yes, I know. This "Columbus analogy" gets thrown at me constantly. But it really isn't a very apt comparison. Heading out into the unknown Atlantic in 1492 was a pretty bold venture, admittedly. But it didn't require the development of a whole billion-dollar technology. All the equipment needed was already in existence, and no overwhelming expense was involved. From the viewpoint of Spain, the cost was really negligible compared to the possible benefits.

And you don't think that's true of the space program?

Well, no one can say yet. But the costs are so enormous that it's difficult to justify a really major effort — like a giant permanent space-city, or the launching of a space-ark out toward Barnard's Star. We can't even know ahead if there's a suitable planet to land on.

We could, if we picked up their radio transmission.

Yes, but in that case the planet is inhabited already. What do we do then, start a space-war? I really don't care for this *conquistador* analogy. It's the old idea of "manifest destiny" all over again. Only this time it's the whole universe that's going to be conquered and subdued and exploited for our use. Well, I'm not too worried. It's very unlikely that it's ever going to happen. The distance scale seems to impose a definite and permanent quarantine.

You don't think that interstellar travel is possible?

It may be *possible*. If the time-factor doesn't matter. Yes, we can go to Barnard's Star, if you want to spend about 50,000 years making the trip. It's difficult to see what sort of power source could cut down the time significantly.

You haven't done your homework. Don't you read *OMNI*?

(Laughing) Yes, I read *OMNI*. Yes, of course, I constantly see all those marvelous plans for star-craft. Light propulsion systems. Ion-beam powered engines. Matter-annihilation systems. *Anti-matter* annihilation systems. Hypervelocity drives. Space-warp leapers. Magnetic scoops which collect stray atoms in space and then use them as fuel. That one wouldn't work, I'm afraid. You'd lose as much energy as you gain. Well, it's all very entertaining. These things work beautifully in the pages of your comic book. How many of them would actually work in space? Well, if it's a matter of accelerating your craft up to nearly the speed of light, you have a basically insoluble problem. The fuel requirements become impossibly large. No matter what sort of propulsion system you're using, even if it's total conversion of mass into energy. You find you have to convert a mass the size of North America, or worse. So we'll have to settle for something a little more reasonable. But in that case your journey is going to take centuries, at the very least.

Unless you short-cut by using a space-warp. Or a black hole.

You've been reading *OMNI* too, haven't you? Well, I'll have to let the physics people argue that. So far there isn't even a respectable scientific *theory* to explain how such things could be controlled or used by a spacecraft. And how do you go through a black hole without being squashed down to a microscopic grease spot in the process? Very carefully? Yes, I realize that my skepticism could look very silly in a few decades. I don't doubt that. But I seriously doubt that most of these things, even if they are possible, will be achieved in time to solve our present problems. Technological solutions frequently work the other way around. Each new solution creates six more problems. You have to run faster and faster just to stay in the same place.

I was wondering how you were going to work that in.

Now you know. I would say that our present problems exist there on Earth, and they're going to be faced here on Earth. Space travel isn't really going to offer any sudden, miraculous solutions. The whole question may be largely academic anyway, considering the present atmosphere of ruthless budget-cutting. Ask me again in about a thousand years.

You don't think that commercial exploitation of space resources will ever be practical? Mining the asteroids, for example?

Well, there is a huge gap between what is technically feasible and what is humanly workable. Asteroid mining is technically feasible. But at what cost? My friends at JPL tell me that it could not be done profitably with present techniques even if the asteroid was made of solid gold.

Technological advances will bring the cost down in time.

Yes, I know. That's what the space-boosters tell me. Massive technological breakthroughs will eventually solve all the problems, and the cost will go way, way down. I am skeptical. This happens in

a few rare cases, such as hand calculators, where the market is glutted with some product that can be mass produced cheaply in enormous quantities. But I don't see the price of ocean liners going down. Or jet planes. Or even the family car. If the price of anything so simple as a postage stamp keeps going up, up, up, then I doubt very much that the price of ultra-sophisticated technology is going to go down, down, down.

Time may prove you wrong, we hope. What about the idea of adapting other planets to our needs?

What they call terraforming? An interesting idea, but probably far beyond any present capabilities. If we are really going to become that omnipotent, I would like to see a little more evidence of it. There are still huge areas of the Earth which are virtually uninhabited, chiefly because of temperature extremes or lack of water. We have not been able to do much about making the Sahara or Central Australia inhabitable, so I don't see much point in buzzing off to build colonies on the Moon. Central Australia at least has air you can breathe. The Sahara may not have much water, but compared to the Moon it's practically a swamp. The Gobi Desert may not look very attractive, but compared to Mars it's a veritable garden of Eden. So why all this eagerness to whiz off somewhere else? If we haven't been able to colonize much of Nevada so far, then I don't think we're ready to start making over Mars.

But suppose technology eventually *does* reach that point?

All right, let's suppose that. In the next 35 years the population of the Earth will just about double. We terraform Mars and ship all these people — four billion of them — off to the Red Planet. And so there we are. In a mere 35 years Mars is as densely populated as the Earth. What now?

Other planets, I suppose.

Yes, though the idea of terraforming something like Jupiter seems pretty well beyond any reasonable possibilities. Even so, we might gain something like 200 years or so at the most. What then?

Bob, let's consider a simpler concept for just a minute — space colonies right here in the Solar System. Wouldn't such things help to relieve some of the Earth's problems — overpopulation for example?

Well, if you consider just the sheer numbers involved, I would say no. The population of the Earth is growing at a rate of close to 200,000 per day. That's a new city the size of Baltimore or Pittsburgh every eleven or twelve days. You would have to move people into space at that rate just to keep the population at its present level. Several thousand rocket launchings, today, and again tomorrow, and the next day, and the day after that — forever. It becomes completely absurd.

There is no foreseeable type of technology which will ever make such a thing possible. Not to mention the logistics of the situation — the paperwork and organization and red tape involved. And the space colonies themselves would have to expand their facilities at the same rate as well — forever. Can you imagine what sort of technology could do that; to provide constantly growing facilities for the needs of over a million more people every week?

You make it sound pretty hopeless. But there wouldn't be just one colony; there would be many of them.

Yes, if such an idea is found to be workable at all. I have a sneaking suspicion that a large, permanent space colony may not even be possible, or humanly workable.

Why do you say that?

Well, consider just the simplest problems, the materials and resources needed to keep the thing in operation. Technologists assume that once a large space colony is established, it could support itself by constant recycling of materials, like a balanced aquarium. Yes, of course, the Earth itself works like that. But on a radically different *time-scale*. A highly industrialized society produces mountains of garbage at a vastly greater rate than nature can deal with. A major city like New York or Tokyo produces over thirty million pounds of garbage every day. For Tokyo the actual figure is 40 million pounds per day. About 80,000 square miles of land must be kept under cultivation to feed the population of New York City. This is in addition to the minerals, fuel, and other resources which a major city devours in enormous quantities. No earthly city has solved the problem of supporting itself solely on what it can produce. Or the problem of constant recycling of all this waste. Or even of disposing of it properly. Virtually everything is brought in from somewhere else, and all the trash and garbage is hauled away and dumped somewhere else. In the U.S. today, less than 10 percent of hazardous industrial waste is disposed of properly. The standard practice is still what Jacques Cousteau called the Pilatus Syndrome: "Dump it and wash your hands."

Now, transfer all these problems to a space colony, and what have you got? You would either have to recycle all this material almost immediately, or else shoot it off into space and import an equal quantity each day to keep the whole process going. Neither alternative seems very practical. In fact the whole concept seems weirdly unrealistic. A small colony, for purposes of scientific research, is certainly feasible. But something like Manhattan-in-Space, occupied by several million people, seems to me to be grossly unworkable.

You may be too pessimistic. Suppose technologists *did* solve all the problems?

Well, we can suppose anything. But our experience here on Earth doesn't offer much encouragement. Just last year the city officials of Chicago cheerfully announced that it simply isn't

possible to keep Chicago in a state of repair. It isn't a question of raising the funds, either state or federal or private. The costs of maintaining the city adequately are simply beyond *anybody's* budget. No matter how you try to slice it. It's the old principle of diminishing returns again. The cost of doing something properly not only exceeds the benefits, but appears to be beyond anyone's financial capabilities. I strongly suspect that the "giant space-colony" concept is going to die of the same painful illness.

And you won't be too sorry about that. You don't agree with the futurists who say that man's destiny lies in space; that he will stagnate and degenerate if he remains here in his cradle?

It seems to me he will stagnate and degenerate much more rapidly in a space colony than he will here on Earth. And this "cradle analogy" is really very inappropriate. Yes, of course, no one expects a baby to remain in his cradle. There is a whole wonderful world out there waiting for him. Is there really a whole wonderful world out there waiting for space travelers? This might be true if there were a number of Earth-like planets fairly close to us. But none of the other worlds of the Solar System are inhabitable, not unless we build huge artificial environments in which to live. Yes, of course we could construct colonies on the Moon or Mars. But who wants to spend a lifetime imprisoned under a giant plastic dome on a dead world? Why should the baby want to leave his cradle if everything beyond it is barren, bleak, hostile, and totally unsuited for human habitation?

With a space colony you could create your own environment.

Yes, but a terribly limited one, obviously. Well, some of these things look fairly attractive on paper, I'll admit. The best ones resemble a combination of Disneyland and the cover painting from Gee-Whiz Planet Stories for April 1937. But such a thing at best is only a feeble imitation of a real world. It's a highly sophisticated hamster cage. Here's an area labeled "manufacturing and storage," and one labeled "living and working," and another called "recreation." I don't see any region labeled "instant garbage recycling," so I doubt that this particular colony would work. You know, I get a case of the cold mulligrubs when I see one of these things, especially when it comes with the claim that mankind can now abandon the Earth and "progress" on to a totally synthetic environment. Even more irritating is the claim that this, in fact, constitutes an important forward step in human evolution.

Technologists seem quite confident of their ability to construct large Earth-like environments.

Man needs vastly more than an Earth-like environment. He needs a real world. This is what the high-tech people fail to see. A space colony offers one thing — it's a base for scientific research. That's important, but that doesn't mean it could be made into a suitable permanent home for millions of people. Technically minded people can be amazingly dense on this point. They seem to think that human beings have no real needs other than purely material ones. Here's a scientist who

says that man will soon exhaust the possibilities of this world and must move on somewhere else. He is beeping through his space helmet. You couldn't exhaust the possibilities of this world in a thousand lifetimes. An area the size of Arizona or Ireland could keep you busy for generations. You could spend your life at Yosemite and not experience more than a fraction of what it has to offer.

You're speaking again as a naturalist.

I'm speaking as a human being. I feel that the whole concept, whether or not it could be made technically workable, constitutes a giant step backwards. Rather than expand human consciousness it would stultify it. A space colony is not a world; it's a totally artificial construction, a giant building. Yes, of course, you *could* live your life inside the Empire State Building and never go out at all. You can purchase everything you actually *need* right there. But what kind of a *life would that be?*

A space colony could be more attractive than that. It could be realistically landscaped…

Yes, of course, With trees and grass, and even a fake mountain thoughtfully supplied by the Parks and Recreation Department. Well, the problem of traffic jams would be solved, at least. Obviously there would be no need for private autos on a world only a mile or two in diameter. There would also be an end to the dangers of earthquakes, volcanoes, and mosquitoes.

Now you're being more optimistic.

Yes. And in return for this, what are we offered? A fake mini-world designed by technologists who limit much of their thinking to the hardware and the mechanics involved. No one has devoted much time to the most important consideration: what would it be like to live in one of these imitation worlds? Permanently? No real mountains or forests. No real rivers or oceans. No real seasons, clouds, sunsets, spring rains or winter snows. Not even a real cycle of day and night. No Yosemite, no Grand Canyon, no Iguazu Falls. No surf rolling in on the coast, no moonrise over the sea. No peaks to climb or caves to explore or wilderness to experience. A totally man-managed ecology. You can't even look for arrowheads or fossils or ancient ruins, or search for lost treasure. Nowhere to go, and nothing to do but keep the colony running. You would be spending your life in a very efficient, very sophisticated, and immensely expensive motel.

You attach great importance to contact with the natural world.

Yes, I do. I feel that after a few generations of living in a space colony, the inhabitants wouldn't even be human. I feel that a completely artificial world is an impossible concept as a home for millions of people. It might be suitable as a prison for condemned criminals.

Space enthusiasts obviously don't see it that way. What do you reply to the argument that man could be conditioned to accept the new environment, and would therefore be perfectly happy in it?

Arghhh! That's the engineering mentality again. Yes of course man can be conditioned to accept all sorts of absurdities. At the cost of making him less sensitive, less aware, less intelligent. That's progress? I suppose it is, if we're willing to settle for a world full of robots. Samuel Johnson was perfectly happy in London. Or so he claimed: "When a man is tired of London, he is tired of life; for there is in London all that life can afford." I can imagine Thoreau's reply to a statement like that. Apparently it never occurred to the good Doctor to imagine that the wilderness of nature might have anything to offer to man. Whatever London has, it does not have anything like the High Sierras or the great North Woods. London is fine, as long as you're not a prisoner in it. There's quite a bit more to the real world than that.

Do technologists ever give you the argument that whatever exists must be natural, so an artificial environment is just as natural as anything else?

Arghhh again! There are certain people who take a strange pleasure in spouting idiocies because it makes them seem so clever. Every few days I hear some new bit of academic fazz-bazz, such as the claim that trees and cows produce more air pollution than automobiles do. Oh sure. That stuff hanging over Los Angeles is cow-exhaust, I suppose. Yes, I often hear a weird pseudo-argument that goes something like this: Man is a product of nature, therefore anything that man does is natural, therefore an automobile is just as natural as a sequoia tree, therefore breathing smog is just as natural as breathing air, and therefore there's nothing to worry about. Right? Well, this may seem cutely clever, but it's an example of the sort of thinking that rather quickly degenerates into linguistic sophistry. What we have here is a striking case of the "semantic fast shuffle," where a word means one thing going into a sentence and something else coming out…

Where did you get that phrase?

I'll have to give Robert Claiborne credit for that. It's from his essay, "Future Schlock." The trick here is the sudden switch in the meaning of the word "natural." Something may be quite "natural" in a physical or chemical sense, but totally "unnatural" in a biological sense. Turpentine is a "natural" substance, but you can't put it into your aquarium and expect your fish to swim in it. A totally dark, damp cave may be completely "natural' but you wouldn't argue that it's perfectly natural to raise growing children in it. I expect to be told next that since you can build a canoe from the bark of a tree, you should be able to do the same with the bark of a dog. Bark is bark, isn't it? Well no, it isn't. And you can't argue that a plastic tree is just as natural as a real one. In the first place it isn't really a tree. It's a fake.

But then much of modern civilization would have to be classed as unnatural.

I'm afraid so. That's exactly the problem. Despite all our technical progress we don't seem to be getting much closer to the ideal which should be No. 1: A world fit to live in. Some sociologists think

that within the next century, if present trends continue, we will have a world fit only for machines to live in.

You think that the undesirable side-effects often outweigh the benefits.

Obviously they often do. And there's no such thing as a "side-effect." Whatever happens is an effect. Here's some scientist telling us that man will soon conquer old age, and we will all live to be 200 or 300 years old, or even that we will achieve actual immortality. Wonderful. He doesn't mention the "side-effects" of such a development — that we will soon be standing up to our ears in a solid mass of people. Who can seriously claim that we are ready to face such a "scientific advance" as that, when we can't even solve the problems of Mexico City? Just what is this sort of progress supposed to accomplish, anyway? Are we doing such things just to support the claim that we are the greatest country in the world?

You don't think we are the greatest country in the world?

I'm not sure what such a claim means. There are different kinds of greatness; there are different standards of excellence. Who was greater, Beethoven or Newton? Well, it depends on what sort of achievements you're talking about. In material comforts we are probably somewhere up near the top. But that's not the only criterion to be considered. At any rate, such a claim makes us look a little silly in the eyes of vastly older cultures such as the Chinese, who have a history going back over 3,000 years. No "great" person goes around constantly bragging about the fact. Such a policy makes us look like boastful adolescents. "It's a little early to say, isn't it?" my Chinese friends would reply. "Your society is barely starting to emerge from its childhood. Let us see what you have come to be in about a thousand years."

OK, we'll wait for about a thousand years. But you don't seem to be too optimistic about the future.

If we can get through the next half century without exterminating the human race, then I'll be fairly optimistic about the future after that.

A few years ago one of the editors at OMNI said something about the idea of man traveling among the stars, that it would be the most wondrous, Utopian future he could imagine.

Well, that certainly sounds boldly adventurous and far-seeing. Until you begin to really think about it. It reminds me of Lincoln's story about the man who accompanied his wife to the opera, and as they were taking their seats he said to her: "Interpret for me the libretto, lest I dilate with the wrong emotion." So, how do I interpret this libretto? Would traveling among the stars be truly utopian? Not if it's going to take us centuries to get anywhere. Not if the chances of finding truly Earth-like planets are almost hopeless. Will the time ever come when a voyage to Arcturus will be a quick

routine trip like flying to Paris for a week? I really doubt it. Drifting through space for endless ages is not my idea of Utopia.

But that's what we're doing right now.

Yes it is, but we're doing it on a *world* which is big enough to give us just about anything we could want, provided we use it wisely.

You haven't heard the argument that man needs new challenges to inspire him, and new horizons for the explorers of the future? Men like Magellan and Columbus and Drake…

And Dr. Livingstone, I presume. OK, I don't question that. If you really have to climb a mountain because it is *there*, I don't argue about it. But I really doubt that such exploits greatly benefit mankind, or offer the promise of any sort of utopia.

You have a different idea of Utopia.

Well, yes. None of the conventional ideas of Heaven seem very appealing to me either. You'd have to design different utopias for different people.

And what would yours be like?

That's a tricky question, isn't it? Are we talking about what is reasonably possible, or what we would do if we had the powers of gods? Well…I'd want lots of natural beauty, at the very least. Mountains and forest, rivers and waterfalls, plenty of trees and flowers and animals…a really lush green world. Like a Maxfield Parrish painting. Lots of beautiful, thoughtful, good-natured people, people who are simply human in the best sense of the word, people who are kindly and reasonable rather than high-principled and righteous. People who see life as something to be lived, not a constant rat-race in pursuit of some abstraction, or a furious contest that has to be won at all costs. Reasonable abundance for all. Neither fabulous wealth nor grinding poverty. Economics as if people mattered, someone called it. Production and distribution regulated by human need. Religion based simply on knowledge and reverence, with no complicated theologies. Morality based on genuine love and understanding rather than on guilt, shame, and fear. Lots of leisure time for thought and contemplation. More quiet and serenity. A satisfying world for man here and now. We can't live in the future, anyway.

A sort of lazy man's paradise?

Well…that's really just a little unfair. I don't consider myself lazy. And I have a 2,000 page book in print to prove it. But I think we would all be much happier in a less frantic, less aggressive society. I'd like to see a somewhat *mellower* world. And I do resent having to spend my life doing someone

else's work merely to survive. I don't think that human labor should be considered a commodity to be bought and sold on the market. Someone buys my labor only if he can use it for his own profit; otherwise I am considered worthless. That's exploitation, no matter how you try to defend it. People are supposed to be grateful to an employer for giving them a job. Actually it should be the other way around. The employer should be grateful to the people who do the work; *they* are the ones who actually create the wealth. What good would the employer and his money be, if no one could be found to actually do the work?

The money guarantees that somebody *will* be found.

Sure, but that's letting yourself be hypnotized by this identification of money with wealth. "Money" is a way of counting and measuring wealth; it's an abstraction that man has invented. A dollar is not a real thing; it's a unit of measurement like a degree of longitude. To talk about the value of a dollar is like talking about the value of an inch. When a businessman does a "cost-benefit-analysis" he thinks entirely in terms of money; the *other* costs and benefits aren't even considered. You can't measure everything on a money scale. In my ideal world, the immense powers of technology would be used, as much as possible, to free every human being from the necessity of selling himself into part-time slavery merely to avoid starvation. Despite all our talk about "labor-saving devices," one of the major uses of technology is to create new jobs! I don't see much chance of any of this changing significantly without overhauling the whole setup.

And that's probably not going to happen.

Probably not. Not unless we have a total collapse of the whole system. And I doubt anything short of a nuclear war could accomplish that.

Well, they say you can always throw the rascals out.

Not when they'll be immediately replaced by another set of rascals with precisely the same old ideas. It doesn't matter *who's* in office; they all think alike; they're all members of the corporate, managerial office-bound segment of society. All these people constitute — the phrase is Roszak's, I think — the "lead-bottomed ballast of the status quo." It would never occur to any of these people that there might be radically different ways to run things; even the thought would be rejected as "un-American." And the general public isn't much better, unfortunately. We are all victims of the carrot-on-the-stick syndrome. Or should I call it the Hamlet Syndrome? Rather bear those ills we have than fly to others we know not of.

Well, you can understand that. The average American would say he's never had it so good.

Uh, huh. In this century so far we've had two world wars, one major depression and constant minor ones, the Korean crisis, the Cuban crisis, the Vietnam mess, and a permanent Cold War which

threatens at any moment to erupt into the ultimate holocaust. Tennessee Williams said that if people behaved the way nations do, they would all be put in straight-jackets. Back about the time I was born, Lloyd George was saying that the world was starting to resemble a lunatic asylum run by lunatics. But of course all these disasters are minor side-effects. The really important thing is that everybody has a big car, which he hasn't paid for yet, and a color TV, and a power mower out on his front lawn.

Now you *are* being cynical.

Oh sure. There must be something wrong with me because I don't understand why a professional prize-fighter makes more money in one night than I do in five years of scientific research. Demented priorities, someone called it. And you're telling me that *this* is the sort of civilization we're going to be spreading throughout the Galaxy? What do you think we have to offer to some alien culture which could very well be thousands of years ahead of us?

Well, they might find it interesting to study a really primitive society. Their anthropologists could write books about us.

As a horrible example? Yes, well, they say nobody is *completely* useless. The failure of the human experiment could at least serve as a warning to others.

But don't you think that human culture is a self-correcting process; that we do eventually learn from our mistakes, so everything isn't really so hopeless as you imply?

In my cheerier moments I'm inclined to think so. But present trends are not at all encouraging. In spite of all the talk about overpopulation, the increase is still something like 2 percent per year, which works out to a doubling-time of 35 years. In spite of all the talk about world peace, we're still obsessed with the "school bully" idea that we have to be stronger than anybody else to avoid being attacked. That seems logical, as long as it's possible to remain on top. But of course we can't. Any degree of preparedness that we achieve can be equaled or surpassed by our enemies. So there's no solution with a policy like that. It merely guarantees a constant crisis. The one real solution would be some kind of a workable world order, accompanied by total worldwide disarmament. No deadly weapons anywhere, so no one has to worry about sudden aggression. We all agree to stop all this obscene nonsense, and work together to make the world a better place for man.

Government leaders would reject that as totally unrealistic, you starry-eyed dreamer.

Yes, of course. Business leaders wouldn't go for it either, since the sale of armaments is a multi-billion dollar industry. And the military leaders…well, they're working on strategies right now to "win" an atomic war. I suppose *that's* realistic? Are we really sure we *want* peace? War and constant preparation for war seems to serve a very important function in the modern world.

Suppose *real*, genuine peace broke out tomorrow. No more danger from any of our supposed enemies. That would be pretty terrible news for some people, wouldn't it? What would all the generals and the munitions makers do?

Don't worry about it. It's not going to happen.

No, I'm sure they'll see to that. And I doubt that much real progress is going to be made in environmental matters either. In spite of everything the ecologists have written during the last three decades, we still seem to be stuck with the idea that industrial progress comes first. We have to get the economy back to "normal" and keep technology forging ahead. This is going to solve everything. Well, I don't see it working out like that. And we are not going to become independent of the natural world. Not ever.

Let's get back to outer space again. If a space colony would isolate man from much of the natural world, it would at least bring him closer to the stars. Don't you think that it would at least encourage astronomy?

Probably not. Did you ever try to look through an eyepiece while wearing a space helmet? You would have your choice of either that, or observing through thick glass or plastic windows. How good a view of the real night sky would you ever get? And did you ever think how rapidly the stars go by when the whole colony has to make one turn every few minutes to maintain artificial gravity? You would never have the direct, immediate experience of walking out at night under the stars.

An orbiting observatory could be designed to solve such problems.

Yes, but that again would be for the technician and the scientific expert. There wouldn't be anything much in the way of amateur astronomy. Or anything else for the average man. And to add one final grouch…

Go ahead.

I really don't see much scope in any of this for individual adventure and achievement, and what we call free enterprise. Free enterprise for who? Huge national governments? Giant multi-megabuck corporations? No one else can afford to make the staggering investments involved. The starry-eyed space-kid sees himself blasting off to seek his fortune out among the asteroids, like a bold pioneer riding off into the sunset. But it wouldn't be at all like that in reality. He would more nearly resemble a displaced person waiting in line to be processed and shipped off to a refugee camp. Processed…that's a horrible word, isn't it? It makes you think of slabs of beef on a factory conveyor belt…

Do you think it would really be like that?

Considering the steady loss of personal freedom in the modern world, I really doubt that there would be much allowed in the exploitation of space resources, where the whole operation would be controlled by corporation executives or authorized military personnel. For the same reason, I don't see the likelihood of much personal freedom in a space colony, where virtually everything has to be artificially controlled. The whole thing, in fact, would have a strong attraction for the bureaucratic type of mind, people who love to invent rigid rules and enforce inexorable policies. Now I'll admit that there is some pretty weighty opinion to the contrary. Ray Bradbury pointed out that there isn't a single mention of space travel in *1984* as an alternative to "Big Brother," and this proves how myopic George Orwell and his fellow-intellectuals were in the 1940's. Well, I'm not sure that Bradbury is making a significant point. Just how would you engineer an escape into outer space without Big Brother knowing about it? And in a *1984* type world, how much freedom would you expect from the authorities who operate space colonies? There is a definite potential here for a rigid, authoritarian tyranny, worse than anything on earth.

There could be a number of space colonies, each with a different style culture. You could take your choice. You'd have that much freedom, at least.

Uh-huh. I've heard that. A German-style colony, with lots of sauerkraut, I suppose, and a Japanese one with everybody wearing kimonos and sipping *sake*. Yes. It's Disneyland all over again. At best these would be cute little museum dioramas. A genuine national culture is the result of centuries of interaction between man and the land, the climate, the geography, the weather, the unique influences that make one spot so different from another. A national culture is not something that can be picked up bodily and transported somewhere else, least of all to a space colony where none of the original influences would exist at all.

You're worried about being stuck in a colony that wouldn't suit your unique temperament? But with enough colonies, there could be something for everybody. Or almost, anyway.

Yes, almost. Except for people like Himalayan climbers and deep-sea explorers and wilderness nuts, obviously. Well, I hear some really weird suggestions. We could have Playboy swinging hedonistic colonies, and hippie-style artistic ones, and rigidly moralistic hard-shell fundamentalist ones. Great. Choose your prison. Would you be free to do that? If you were born into a Puritan fundamentalist colony, do you think you would be *allowed* to move to the Playboy one? I can't quite see Big Brother being so indulgent as that.

Now you're being pessimistic again.

Possibly. But some of the arguments for an enormous space population strike me as pure padded-cell. Entertainment would be marvelous, we are told, because there would be several thousand Shakespeares and Toscaninis alive and working at any one moment. Genius is purely a

matter of straight percentage, they claim; have a hundred times as many people and you'll have a hundred times as many geniuses. Oh really? Well, New York today has at least 25 times the population of London in 1600, so there should be several dozen Shakespeares writing in New York City alone. Where are they? Where are the figures of the stature of Michelangelo and Bach and Rembrandt? For some odd reason, our society hasn't come up with any people like that. If they exist at all, they're doing other things. What sort of deathless masterpieces do you think Shakespeare would have created if he had lived all his life in the restrictive atmosphere of a space colony? And what would any genius accomplish if there were several thousand others of equal stature in his society? Somebody like Shakespeare stands out, even today, because he is absolutely unique. If there were a thousand others like him, nobody would pay the slightest attention to *any* of them. Even a great potential genius would simply get lost in the crowd. With more and more people it gets harder and harder for *anyone* to achieve any kind of greatness. How many really memorable figures can you find in today's world? And I don't mean cult heroes or pop-fad people whose fame is totally synthetic.

You don't think that the space age will really inspire a new burst of creativity.

Well, it hasn't inspired anything much yet in the way of great poetry, or great literature, or even a rash of popular ballads. Truck drivers, yes, but not astronauts. There is some very interesting space art, I'll admit, but there again it's chiefly *fantasy* art. There are thousands of people who claim to be thrilled to the depths by the thought of adventuring in space, but they're thinking again in terms of *fantasy*. The idea of living in space may seem tremendously exciting, if your thinking doesn't go beyond those far-out covers on the SF novels. The Old West wasn't' really the way we picture it, and it's highly doubtful that actual living in space would be the way we imagine it either. The reality could easily be a tremendous anti-climax. In fact it could be downright *dull*.

I'll repeat what I said a minute ago. You're being pessimistic again.

Possibly. But this appealing idea of a new "space frontier," open to a bold new breed of explorer…Well, it's simply unrealistic. The old-time pioneer could hitch up the buckboard and head off into the west to see a new life; you can't do that when the price of the buckboard is up there in the millions. On Earth you can go almost anywhere if you are really determined. You can walk to South America; you can cross the Atlantic in a rowboat that you built in your backyard. But you can't go into outer space in a vehicle that you built in your backyard. Never. No way. The exploitation of outer space is open only to huge organizations that already have a money-bin the size of Fort Knox.

Still, you agree that we'll all benefit from the achievements of the space program.

Oh certainly, if you're talking about knowledge of the universe and various advances in technology. Yes, there will be all sorts of spin-off benefits which will trickle down to the average citizen,

eventually. For 10 percent down and easy monthly payments, of course. In the meantime, I don't think I'll be making any plans to seek my fortune somewhere out past Alpha Centauri.

You're not going to be a bold pioneer and ride off into the sunset?

Me? Right now I can't even afford to fly to New York.

That's your fault. You wanted to be an astronomer. But maybe you'll make a million dollars on your next book.

I hope so. My horoscope this morning was very encouraging.

Are you working on a next book?

Oh yes. But not an astronomical work. This is an epic fantasy in the Tolkien-Oz-Narnia tradition.

Everyone else seems to be doing that. You might as well too. What's it going to be like? Is it an adult fantasy?

I would rather say it's intended to be suitable for readers of all ages; all, at least, who remain young at heart.

What are you calling it?

The Chronicles of Deriyabar. It's a tale of magic and suspense and high adventure, centered around the theme of the quest for a wondrous enchanted island. With four young and thoroughly human heroes who learn, bit by bit, that they have been chosen for a great and splendid destiny.

Unicorns and dragons too?

Oh of course. And enchanted swords. And haunted castles. And a goodly supply of creepy horrors, naturally. And lots of joy and humor. But I don't think of the thing as just a story, you see. What I am doing here is building up an entire world, and an entire new myth-tradition. So there is a definite parallel here with Tolkien's Middle-Earth. Aside from that, my style is nothing like his, so no one will be able to say that *Deriyabar* is just another second-rate imitation of *The Lord of the Rings*.

Is it going to run to 2,000 pages and weigh ten pounds?

Not unless I have another spell of insanity. I could, at any moment.

What do you think about the chances of publication?

Probably rather slight. Partly because of its size — I have it set up as a six-book series — and partly because I don't write in the terse, spare, understated style which modern publishers seem to think absolutely essential. In an epic fantasy, where I am dealing with wondrous and magical things, I like a lot of colorful exuberance and unabashed eagerness, and touches of baroque splendor. I feel that a fantasy written in a taut, clipped, grittily realistic style is a contradiction in terms. Anyone who prefers that sort of thing can go and read some modern hard-boiled detective yarn. Or one of those bleak, sordid, pathological studies of degeneracy and hopeless despair in a squalid Brooklyn slum. I don't see anything very attractive about that kind of stuff. If you go for it, well, go ahead. It's a big world, after all. Plenty of room for all sorts of different styles and techniques. I'm offering something else.

You sound like you've been having some battles with publishers.

It hasn't really come to that yet. Perhaps it never will. But you run into some weirdly close-minded people in the business. If you don't write like Hemingway, you're automatically accused of "overwriting." Unless your heroes are jaded world-weary barbarians who haven't got an inch of brain between their eyebrows, you're accused of indulging in sentiment and whimsy. Nobody in a story must ever show any real feeling, or display any genuine open-eyed wonder at the marvels of their world; this is condemned as "unrealistic" or "romantic." The modern reader won't go for it, they'll tell you. The only thing that will hold their attention is lots of swift, exciting action and gory violence and sordid brutality. And forget all those little extra touches that give your story its unique personality; the modern reader has no time for anything like that. Ruthlessly cut out everything that does not immediately move the action right along like a juggernaut.

That sounds like the philosophy of the hack writer.

Yes. But that's the sort of stuff that will *sell*, they'll tell you. They'll also tell you that the important thing is to dazzle the reader with a lot of strong, colorful action right at the beginning; otherwise he will complain that nothing seems to be happening, and toss your book aside with a yawn and reach for something else. Or turn on the TV.

Your tastes are a little different.

Well, yes. I really prefer a story which starts out rather quietly and builds up step by step to exciting things. When you write a symphony you don't put the thunderous climax in the first few bars. You work up to it bit by bit. And I don't care at all for a story which plunges the reader into furious action at the very beginning. In the first place I don't know enough about the background to understand what any of this means, so the whole thing is liable to be bewildering rather than exciting. And in the second place, I don't know enough about the characters to really care *what* happens to them. Let me illustrate this…

Sure.

Suppose you're reading your morning paper, and you come across a headline: "Twenty-eight People Die in Fiery Train Wreck in Pennsylvania." You murmur, Oh my, isn't that terrible, and go on to the sports page. Suppose, however, that among the victims you suddenly catch sight of the name of your wife or son, or even your next door neighbor. *Then* your reaction is going to be *very* different. Naturally. The whole thing suddenly becomes horrifyingly real to you. Well, fiction isn't any different.

I can't argue that. But most serious writers don't depend on constant violent action to hold the reader's interest.

No. I can't write for people who expect my hero to be fighting hordes of monsters by the middle of page 3, and feel cheated unless there is someone dangling over an active volcano at the end of every chapter. I am introducing my reader to a whole new world, and he has to be willing to come along with me for a little while. What's all the rush about, anyway? Unless you are ninety-eight years old and hooked up to a life-support system, you expect to last a while yet, don't you? Does anybody expect to get through something like *The Lord of the Rings* in a single night? Slow down. Take your time. When the Good Lord made time, as the Irish put it, he made *plenty of it*.

In an age of movies and TV, a lot of people don't have the patience to put any effort into reading a long story. Everything has to happen instantly.

Yes, well, it's a mystery to me why such people still exist. Surely they should have committed suicide at about the age of eight, on the grounds that nothing very exciting had happened so far, and if that's all life's going to amount to, it obviously isn't worth it to stick around to see the rest of it. If both readers and publishers are so unperceptive as that, it isn't hard to see why there is so little of any real value on the book racks. Only trash sells.

But a number of good-sized fantasies *have* been quite successful. That must prove something.

Well, it proves that the typical publisher doesn't have much real understanding of public taste. Tolkien's epic was accepted with grave misgivings; no one expected it to be a tremendous success. Frank Herbert says that *Dune* was rejected by all the major publishers; twenty-two of them if you include the cases where he was told that there wasn't any point in even submitting the manuscript. Another case is Asimov's *Foundation* series. The author himself admitted that he felt quite uneasy about the work because it contained almost no real action or exciting suspense. Well, *Dune* really doesn't either. Both of these classics are very long, very detailed, slow-moving, rather dense and opaque in style…So is the *Thomas Covenant* series. Whatever the appeal of these things is, it isn't this old hackneyed idea of constant taut, fast-paced action. Any orthodox publisher would dismiss all this stuff as tedious, tiresome, and boring, you would think. Pure dullsville. So what has

happened? *All* three have been marvelously successful. So obviously there is something wrong with the narrow-brained attitude of the average publisher. And the professional critic.

Do you think it's just a matter of individual taste? If a publisher doesn't go for something, he assumes that the general public won't like it either?

Well, a publisher has to read with one eye on the cash register, naturally. But it's a little hard to say why a publisher would fail to see the possibilities of something like the Tolkien epic. Looking back on the whole thing now, you would imagine that *any* publisher in his right mind would say, "There are millions who would find this thoroughly delightful." Anyone who couldn't see that *immediately* should either get himself a seeing-eye dog, or be confined for life in a padded cell.

He is either blind or crazy.

Yes. That's what I said. But individual taste is a really curious thing. I recall hearing one lady — quite intelligent in all other respects — say that she couldn't enjoy anything like *The Lord of the Rings* because "it's too impossible." Oh my. How awful. I guess *The Wizard of Oz* is a closed book to her too. And so is *The Arabian Nights*. And *The Martian Chronicles*. I don't know what to say about such people except to class them among the mental defectives. There is obviously something wrong with their brains. Well, you can't argue with personal taste. if you go for Mickey Spillane, go ahead and read him; if you enjoy *Pollyanna* or Horatio Alger, that's all right too, I guess. It's a free country. But nobody with such limited tastes should be on a publishing staff, making decisions about what should be produced for the reading public.

Do you think there are millions who would find *Deriyabar* thoroughly delightful?

Naturally. But I am such an eccentric, you see, that I can't trust my own tastes. Or so they tell me.

Good luck, anyway. One last question — how did you happen to get into astronomy in the first place?

When I was nine or so — something like that — I came across a little book called *Seeing Stars* at the local five-and-ten. It had simple sky maps and some notes on the interesting objects in each area. And you can imagine how long ago that was when I tell you that it cost all of fifteen cents.

Bob, you've given us quotes from just about everyone tonight. How about finishing up our evening with a quote from *Deriyabar*?

All right. Here's one from Book III. This is Altanynn the Wizard, High Mage of Deriyabar in the ancient days, speaking to his disciples: *"The wisdom which I would give you now consists of nothing more than this: The Universe is intelligent, with an all-pervading wisdom far beyond the comprehension of Man. Do not think how you shall rule it, or what you shall command. Think rather how you shall*

conquer yourself. For without that conquest and the enlightenment it brings, you are fit to rule over nothing, not even a single dust-mote in the sunbeam…"

Thank you, Bob. We'll all look forward to seeing the *Chronicles of Deriyabar*.