Chapter – V
Futuristic Vision

It would be gratifying to indulge in idealistic camouflage and proclaim science fiction as an avant-garde medium opening the doors on and stimulating the developments of the future, prophesying the fortunes of the human race and sounding tocsins against the social pitfalls that lie ahead. But let’s face it: perfect honesty will have to recognize science fiction, and all other forms of literature for that matter, fundamentally on the basis of entertainment value. It is satisfying to know, though, that besides discharging its primary function, science fiction can and does provide these other services in the nature of bonuses. In that respect, the genre stands out as the most through, and most appealing. 1

-Danie F. Galouye.

Science fiction has no secret in the past and even now, it has been regarded as a mix form of literature, unworthy of serious consideration by any but the most essential. We admit that any genre, barely literature, fiction is considered the tradition commonly labeled “science fiction”, but in addition science fiction writer has attempted focus remarkable visions of the future. They have produced important themes in which including the nature of evolving man and universe literary depository of speculations, hopes, fears and anticipations. Today the science fiction is growing fast than earlier pulp magazine thrillers. Yet, no doubts we have complained about science fiction of the seventies. But for progress of man’s life we no option without science fiction.

Frontier metaphor has been basic to Heinlein’s writing. Only eight of his… novels take place primarily on Earth and four of them concern relations between
human and intelligent extraterrestrial beings, while a fifth concludes on the Moon
this outward spatial movement. Coupled with a forward temporal movement,
places Heinlein’s characters in situations of extremity. Facing the unknown and
having to learn to understand it, in order just to survive. Whether they are in
spaceships or on alien worlds, exploring or learning to righting wrong-fighting off
other species or learning to live with them, their situations parallel those of the
American pioneers, for all that they are equipped with advanced technology,
“scientific” thinking, and the benefits of historical hindsight. Even in a utopian
situation, even in the present or near future here on Earth, even where mental or
“psi” powers are involved, a kind of frontier ethic is invoked in order to make
possible a free exercise of individual initiative, or to justify pragmatically certain
measures that in more structured situations, such as those of the society we
actually live in, would have to be considered extreme. On the frontier, Heinlein’s
heroes can be free from anything that technology and good will can overcome,
such as physical slavery, mental bondage, the “prisons” of a single planet and the
human body, the limitations of distance and even of death. They can be free to
roam, explore, discover, earn fame and success, learn things that are useful for the
individual or the race, or to achieve self-actualization.

That these freedoms are primarily available to those who can best profit by
them-i.e., that they represent what [Alexei] Panshin calls a “wolfish” sort of
freedom for “the Heinlein individual “ – should not be too surprising, since this is a
logical extension of the adolescent dream, especially its American versions.
American literature and history are full of famous “wolfish” individuals who
pioneered lane, technology, and money matters in a society which encouraged
everyone to seek, and enabled a few to achieve, their wildest dreams, believing the
losses they brought to some were outweighed by the benefits they brought to all. That Heinlein is from a generation and a region which valued those achievements more than many people do today who take them for granted is surely relevant, but so is the fact that in any situation, certain people are more likely to succeed than others. In changing situations, such as the last five censures of Western Civilization and the various futures Heinlein extrapolates from them, these who succeed are likely to be adaptable, even opportunistic. And Heinlein does not treat freedom, for the most part, as a simple escape. To be sure, some of his works contain large amounts of goods-evil melodrama and lengthy sermons generalizing from inadequate particulars, while most of his work is pitched to the level of a reader of modest intellectual achievement. More often than not, however, the melodrama is subsidiary, the sermons are in character, and freedom is a complex issue, involving both power and responsibility and requiring various kinds of trade-offs.

By using analogies with situations familiar from history, legend, and personal experience, by anchoring the unfamiliar in specific detail generated by these analogies, Heinlein manages to make his frontier worlds seem real, however weak he may be in plot construction, however limited his range of characters and emotions, however objectionable some of his tics of style, especially in dialogue.

The background chart for Heinlein’s “Future History” series… places up to twenty-seven stories in relationship to an assumed time-line stretching from about 1950 to approximately 2600 A. D… suggesting lines of political, scientific, and technological continuity which are only sketchily apparent in the stories themselves… Progress is assumed in both technology (transportation, power sources) and society… with some cross-over (psychometrics, semantics), but not
as a straight-line projection. Heinlein takes it for granted that power will be abused by some and that severe setbacks will occur, with a pendulum-like swing between freedom and enslavement (in psychological as well as physical terms). Against this large-scale movement, individual human dramas will be played out which may support or contradict the slow cultural rise and fall; the “Future History” concept does not imply a novel manqué (like [Clifford] Simak’s City or [Ray] Bradbury’s The Martian Chronicles), but rather a general set of assumptions about the history behind the individual stories.

Using teen-agers as protagonists allowed [Heinlein] to combine the two plots with which he was most comfortable, “the Little Tailor”—or the success story—and “the man who learned better,” while suppressing the third plot that he recognizes. “boy meets girl,” Romance is handled just as gingerly as it was in his pre-war magazine stories, whereas the success story keeps most of his books upbeat, whereas the success story keeps most of his book upbeat, however somber their tome may be. Since it is tied to the hero’s education, this kind of story gives Heinlein’s didacticism a free rein. Far from being hampered by formulaic constrictions, Heinlein seems to have thrived on them: new frontiers, the need for change, the proper tools with which to face the future, all these could be emphasized again and again in different contexts each of which is at least related to the grand design of the Future History. Necessary to avoid stagnation, expansionism would require survival traits, some of which are given only lip service in American schools and society. These traits are rewarded, and their opposites denigrated in this series of books which emphasizes not characters (most are indistinguishable) or plot (most are episodic), But ordinary details of living in exotic settings. 

194
[The] novels labeled “juvenile” are not necessarily childish. They may be quite serious in their extrapolation and exploration of technological and social problems and, indeed, five of Heinlein’s fourteen “juveniles” were published first in “adult” science fiction magazines. The innocence, energy, and will-ingress to please of the youthful protagonists are often endearing, if sometimes quaint, but allows for only limited distinctions between the heroes of different novels. Other debilitating problems include the apparent formulaic need for something eventful to happen in every chapter and the perennial Heinlein problem with endings…General effect of focusing on a single character in a lengthily narratives to involve the reader in the development of that character, and in the effect on him of adapting to the changing world around him. Since Heinlein’s heroes are survivor-type, their personal stories have happy endings, however somber the background or the theme of the novel may be. But if Heinlein could have taken the same care in developing those characters that he did on their backgrounds. I could agree more easily with Panshin’s assessment of the “juveniles” as Heinlein’s best. Seen as a whole, the series provide a kind of transparent overly of other adventures taking place against the same general background as that sketched out for the Future History. Seen as a sequence, the series shows the same growing seriousness of tone, the same growing seriousness of characters’ social and personal insecurity that is reflected in Heinlein’s other works.5

Certainly Heinlein shares with his whole society, including the makers of science fiction, a positive attitude toward the frontier, toward adolescent potential, and toward the proper use of gadgetry. The frontier, with its challenge of the unknown, inviting expansion of man’s territory and his knowledge, and often threatening his survival, is a staple of Western literature and philosophy. So is
youth, with its romantic dreams, and the volition and potential to learn in order to achieve them. And the ambivalence of man toward science and technology, his fascination with gadgets coupled with his justifiable fear of their progressive disruption of his way of life, is a key theme continuing through at least the last two centuries in western civilization. The settings against which themes are sounded, and to a large extent the manner in which they are presented, Heinlein shares with many other writers of science fiction. Space and the future, instant wisdom and quick technological fixes recur functionally in almost all of his writings, providing the typical science fictional perspective on the present which, it is pretended, allows us to see it whole. Given a single human species, planet, and period in time, differences in race, religion, even sexes, and life-style, become relatively unimportant. And any single-minded assertion of supremacy, of sex or nation, race or religion, and almost any intolerant attitude (except perhaps one’s own) becomes fair game for satire.

From the first, [Heinlein had a] sense of realism, of ordinary actions in daily life, or the detailed texture of a limited range of experience, of the continuity between future and current behavior. Then there was his caring about the larger canvas, the Future History so many readers, and other writers, took to heart, only to have a younger generation rebel against it. Having fitted these to the adventure-story formulas that sustained the science fiction magazines, Heinlein then adapted them to the formulas of the mass magazine and juvenile novel markets, selling all the time to the science fiction magazines as well as other writers, more competent with words, more careful with design, surpassed him, and gradually did away with the need to follow formulas so faithfully, Heinlein tries to keep up. The results were highly individual, but far from unqualified successes, since Heinlein, shifting
more and more from pulp adventure toward philosophical dialogue, did not have the necessary resources of style to fall back on.

Although Heinlein’s work shows belated influence of the great modernist writers of earlier of the age. His vision towards style and manner which is not, like his, lucid, transparent, and different objective. He reflects his vision about science fiction writers of his generation. He was perfect, in sense, his downfall, the need to create shine characters, to quest more than a very narrow emotional range, even to complete the plots and construction of the novel. He is a successful novelist under the formulaic limitations and he suggests a philosophy rather than spelling it out. Heinlein is either undesired or disable to support his options more fully in his speaking later novels, where no taboos or limits on length are operative.

Today, Heinlein explored advertising techniques and His technique of advertising much used in corporate body science fiction. There for is “historically” important as a pioneer in realistic and science fiction. As a chief writer of science fiction has craft man ship and technical knowledge capability were high in the science fiction.

In spherically essential factor in this emergence is the juvenile and student audience. Science fiction has always had strong appeal to certain portion of the adolescent audience. Most life - long fiction are made in their teen or pre-teen years. In the past ten years science fiction has shared many points of the so as known as youth revolution. Its reader is growing slowly and most of those new readers are students.

In terms of subject matter, science fiction’s characteristics, attitude, styles, care to apply, wide-ranging, adventures and getting reward in the literature. Reader
admit that science fiction is expansive but now science fiction find in a bookstore, library.

A new waves of authors and then style entered in the science fiction with new ideal paperback anthologies explain a new concept consist of all new storied based on science fiction. Book publishers began to welcome science fiction with open mind.

In the science fiction spare race, culmination in the Apollo II lunar mission had become famous in the people. We live in a modern society, where sudden and painful changes occurred in our lives, our nation’s patter in every field has changed such as education, employment, social structure, political power, religious faiths and moral attitudes all have changed enormously in the past twenty years.

Science fiction is called the literature of change. From outright fantasy to straight-lime engineering extrapolations of the future, science fiction gives the information about basic message world’s future will change it tells us that tomorrow will not be like today.

Here is question about science fiction that why science fiction more than other types of literature being written today in our times. Isaac Asimov states it; science fiction is nothing but “escape into reality.” Of course much of the science fiction has written over the past twenty years, has shown it is to be much more realistic than most of the best-selling novels of the same period.

Today Science fiction has become popular with the help of technical progress. Science fiction writer from Jules Verne has onward foresaw the submarine, the airplane, bacteriological warfare, television guided missiles, nuclear fission and advances of science, some contemporary writers are hopeful of being hailed in future times, galactic colonization, and the like. Today science
ficiton is being provided by technically nonfiction, like Wily Lay’s Rocket, Missile and Space Travel and The Conquest of Space and Arthur C. Clarke’s Interplanetary Fight. At the sometime George Gamow has written the best kind of informative science fiction in his science fiction Mr. Tomkins Explores the Atom, designed to acquaint the reader with some knowledge of modern physics even he is known as modern physics.8

Ironically, as writers of science fiction change away from gadgetry into ideological themes, they realized that a good science fiction adopted story must, like fiction in any classification, as first and foremost a good story, as they followed the thesis almost all stories of literary people to whom something happens not stock characters who are conveniently platens to attend the birth of some fanciful scientific concept, just so much more have writers moved away from actual science. Writing in the book pages of Science last April on “Science and Literature,” J. R. Pierce pointed out that:

Science fiction has brought a new dimension of escape and an unfettered mind to enjoy it … few of the stories have any scientific ideas in them other than those of the most obvious sort: the atom bomb is dangerous, empires must fall and dark ages come, dictators must be destroyed. Many present-day stories are not built around science and technology."9

Robert A. Heinlein’s best work is found in the Hills of Earth. This work is the most hopeful in among science fiction writers. He has written a science of books presuming to tell the story of the future, from 1951 to 2600, with such hypothetical dates as that of the first rocket to the moon, 1978; the colonization of Venues before the year 2000, “first human civilization” of 2075; the consolidation of the solar system after 2100. Heinlein’s fiction is a fusion of imagination and
adventure, in contrast to the almost lyrical quality of Bradbury’s work. Heinlein, too, pioneered in the writing of a series of science fiction adventures, filled with information for science fiction lover.\textsuperscript{10}

It the very begriming of modern science fiction enthusiast, unsatisfied with the mere popularity of the form, understanding at some level it does more than simply give pleasure. Science fiction works for an important education purpose and for the future world.

William Rupp takes it as a "favorable sign" that 48% of a sampling of English professors defined Science Fiction as "a type of story that . . . tries to anticipate the impact of future technological developments on society." Some recent guides to the future go so far as to insist that anyone who expects to cope with the future at all must read Science Fiction. "Science fiction should be required reading for Future I," declares Alvin Toffler. Arthur C. Clarke maintains that "A critical . . . reading of science fiction is essential training for anyone wishing to look more than ten years ahead.\textsuperscript{11}

“Futurologists” this term associated literal prophesy popular with science fiction thirty years ago. They never agree with the earlier defenders in believing that science fiction trains its readers to anticipate the unexpected and helps them to encounter change and future that will certainty differ radically from the present.

It is sure that new machine, society, race or environment invented by science fiction. But this happiness probably does not have the educational value that is claimed for it. Although science fiction always often gives us a sense of unknown things, but its real things are generally into the known. Its basic value lies not in its ability to train us for the future but to present. Science fiction is a powerfully conventional and deeply conservative—though not necessarily right
wing form of literature which, rather than assaulting the unknown by bold risks of
the imagination, tames the threat of the future and in doing so articulates one
aspect of our present human situation in a way no other literary form can. In
asserting the science fiction does not paves the way up the future its defenders
wish it did. The debunkers, of course, have not been whole without real. Where
they have gone astray is in thinking that science fiction is not what some of its
loudest touters say, it is cheap fraud. On the contrast though one regrets that
science fiction is not often all that it might be, one can perceive a value in even the
medicine hack work. My concern is not to disavow typical science fiction, but to
elaborate its function.

Another side it is this scientific context rather than the surface details of
technology that appeals to the addict, the presence of impossible machines need
not discourage his enthusiasm. Although correct scientific detail helps to establish
the content a “mistake” such as the ramp up pike’s peak which launches one of
Robert Heinlein’s early rockets. While it may provoke a smile, does not seriously
Mars the story’s satisfactions, as it actually functions in a story, technology is
usually as magical as it is science fiction.\(^\text{12}\)

Science Fiction answers a craving, not for a new and plausible technology, but for a science which will mediate
between convictions of the necessity of events-that is, a strict determinism-and a belief in creative freedom. On the
one hand, "the laws of physics are the decrees of fate." By investigating "the remorseless workings of things, scientists
understand necessity.\(^\text{13}\) On the other hand, science is changes that understanding into a means for freedom,
the regularity of nature, as revealed and illustrated by science we have authority to
transcend nature’s limitations through control, prediction, and invention. By
grasping the law of gravity we can escape Earth. Therefore, to a partial extent, science functions like religion. A “law of physics” is every bit as absolute as a “law of God,” and both laws promise security and perhaps even transcendence to those who understand and obey. Unlike religion, however, science fiction advances with man’s development and contribution. The final catastrophe, formerly God’s to initiate or forestall, is now men. The problem is that we do not experience in actuality the awesome freedom that this idea of science promises. For the scientist himself, science represents not heroic challenge and freedom, but an abstract, narrow pursuit which results in, at best, minor victories won at the cost of enormous drudgery and frustration. Even the most major individual contribution to science changes the course of things only slightly; non-scientist the ease of ignorance does not make any lighter the sense of inexorable destiny of the science fiction. The understanding of necessity does not liberate. Science as we experience it oppresses.

It means science fiction restore to the myth of science the promise of freedom and control that experience fails to give it. Whereas science deals with necessities, fiction offers freedoms. Science explores and explains what absolutely must happen; fiction creates its own sequences and consequences. The paradox of the name “science fiction,” encompasses, therefore, a wide range of fiction that, while ostensibly treating of the inevitable, offers fancy. This paradox is, suggest, in itself an important source of pleasure for the addict.

It seems that science fiction is bounded by the laws of the probable. Although its subject just that reality that binds normal fiction, is free form that bond. In the contrast science fiction shows hardly to the fact of experience. Science fiction accepts the essential of experience as given and fantasized from there.
Science fiction set up fictional necessities and then obeys them. Science fiction closely resembles pure fantasy in that it escapes nature’s rules and makes its own. There is difference between science fiction and fantasy, science fiction based on the laws of science, even if it is a mere gesture, that science fiction makes, and what disturbs him about fantasy is that it acknowledges no law that prevents the freedom of imagination from seeming arbitrary. The science fiction wants to feel the tension of the paradox of freedom within structured imperative. It may be desire for this paradox that accounts for the repeated attempts of writers and readers of science fiction to define prescriptive rules of the genre.

When we study of a novel or story we assert a simple ideology, the paradox of science as a liberating understanding of necessity still functions at a deep level in science fiction. Optimistic science fiction, which while promulgating a view of the easy freedom science will bring often exults in brute power and totalitarian control, might seem to deny the element of freedom in the paradox. Science fiction however, it still engages the whole paradox even as its surface vulgarizes and trivializes its. In this way, pessimistic science fiction by attacking science as simple oppressive on its surface level its range of the paradox, but in its deeper form reasserts it. The two ideological sides of science fiction different attitude in the public: Pessimistic science fiction displays to the audience’s anxieties about science, optimistic to its audience’s hopes for science. But they still share a deep structure that unites in some way scientific necessity and imaginative freedom:

Heinlein models his transport workers on the U. S. Marines. And just as institutions and images from the actual past shape the Science Fiction writers' visions of the future, the overwhelming conventionality of this form of literature makes it almost inevitable that styles, images, and
figures from past literature will also dominate the futures described.\textsuperscript{15}

Science fiction gives the impressing of facing the unknown future with daring and foresight. It is possible because it really imagines a new future in any radical way. It tells forecasts change with any precision. Science fiction are paths historical and psychological patterns from the past, it manages to domesticate the future, it habitable and, in spite of a somewhat strange surface, basically familiar.

*Rocket Ship Galileo* is the first novel in the writer’s Juvenile series, aspects the initial flight to the moon. The story is based on historical perspective in which the atomic weapons used to end World War II. In the World War II were developed of nuclear power as well as the growth of internationalism into a more powerful form of world government. Rocker Ship is used routine to carry passengers and freight to the end of the earth.

Doctor Donald Morris Cargraves has designers a method of power generation that is also powerful for existing turbines to handle. He takes the idea from is corporate bosses but they ignore the technology as unlikely to have adequate return on investment. His corporation owns the rights to power generation, but not those to rocket propulsion. Cargraves resigns, because with no hard feelings on either side, to work on the idea.

While he is considers his options, and gives to visit his sister and nephew. However, Art is with his friends’ Foss and Morrie that time Galileo teases a new modern rocket, so Cargraves drives out to meet them. The boys are a test as he approaches and have set the engine to full thrust. All is going well and then suddenly the engine hesitates and then explodes. After explosion the boys check the remains and coverers the instruments and test stand. Then they leave to find
Cargraves face down at the gate. They call a hospital van and take him into the hospital.\textsuperscript{16}

Another day, the boy collected with the pieces of the rocket and tidied up the site. That time Cargraves, shows up with turban bondage on his head. They show him their clubhouse, its work bench, equipment logs and reference books as well as few science fiction and magazines. They speak for a while and the take lunch at Ross’s house with his father and mother. After words they return to the club house and Cargraves suggests that they might won’t to him in constructing a nuclear socket sip to fly to the moon.

\textit{Rocker Ship Galileo} is both dated and ahead of its time. The dialogue and technology are futuristic even today; most of the reference to nuclear power may seem quaint, since the safeguards mandated by today’s regulatory agencies are obviously lacking. Also, the references to walking on the glassy ground that was directly below a nuclear blast makes my toes curl. However, military conducted nuclear tests with army personnel in trenches within a few miles of ground zero the early 1950. Moreover, the risks of induced radioactivity ware not really known at that time.

The concept of heating a metal to propel spaceships is not, in itself, a fantasy. Such rocket engines have been made and seen feasible. The problems, however, are somewhat understated in this novel. For one thing, a nuclear pole that was not shielded on all sides would never be allowed in our society. Also, the legal issues of allowing a nuclear powered rocket to take off, spewing radioactivity may have a short half-life, but still detectable, and some people have hysterics if the sun is shining too bright.\textsuperscript{17}
Another perspective of the novel is sadly, unrealistic in today’s educational environment. Where would three high school boys who have studied different equations and mathematical logic? There are probably some out there, but not many of them would also be able to weld a seam, turn a piece on a lathe, and wire a console. The writer has high hopes for the public educational system, but that turns out to be fantasy. At the east this novel is the inspiration for Destination Moon. Author has originally depicted technical advisor, so most of the realism in the movie comes from his efforts.

In *Space Cadet* he was written a futuristic history, and describes an era of commercialized, established space travel. He could write Juvenile stories about a future history of the early days of commercialized space travel. However instead of writting a stratemyer syndicate-style series is about the young Atomic Engineers and their adventures in the solar system, Heinlein chooses a different path, to write different and unconnected stories.

Heinlein’s second juvenile, *space cadet* is markedly better than the first, mainly because its plot is not nearly so over-simplified … The story is about the training of a cadet in the ‘Interplanetary petrol’ In this case, Heinlein knows his material particularly well the training he writes about is quite clearly an analogue of the training he himself received at Annapolis. There are a number of novels about the US Naval Academy, and my comparison will show the basic similarity. If this transference were all that Heinlein was doing, he might as well not have bothered… However, Heinlein is doing a job of extrapolation, not merely a simple job of reporting. In others words, there is much more than a mare one-to-one correspondence.18 Heinlein has inspired by many of today’s scientists and engineers. He is being science writer of space cadet. In the story Matt Dodson is young boy entertains to
be a space petrol officer. It is portrayal very adolescent ways. The first half of the novel deals with his training. The second half of the novel deals with details his experiences; His job training, as a school graduate and from long boring hours in space. He finding of a missing petrol ship, to his experiences in the art of negotiation with Venussians natives. The Venus planet is mainly a hot and very wet but habitable planet. At the same he was depicting everything from rocket ship design, fuels, space walks, space sickness, space habits, eating utensils designed for spare use. The utility of a global space-keeping force and even predicted the use of microwaves for cooking, Heinlein portrays correctly the inventions of the future as mere commonplaces of their time.

Heinlein explains a perfect cell phones and cell towers in the novel *Spare Cadet*. Heinlein actually uses the term “the federation.” His interplanetary patrol is obviously the inspiration for star fleet with its noble ideas, multi-cultural make up. He kept the peace and its hundred years record of the keeping the pace. The importance of the Academy and its naval style of organization came from Heinlein; The Annapolis graduate is a type of Space academy which stores focus on education and character. Heinlein imagines about that academy and thinks its curriculum, teaching method, where will it be located, who or what will the instructor’s be like? How will discipline be meted out? How will student be guided and tutored? And student must also be clearly envisioned. What are they like before entering the Academy? How will they resist instruction? What sort of people will they be after leaving the Academy etc.? He portrays an academy of the far future in which students work as a team to solve advanced scientific problems on alien planets.19
The novel *Space Cadet* was set several hundred years into the future, the solar system has been colonized on one of Jupiter’s moon and on Venus, where beneath the cloud the air is breathable, and intelligent life was discovered. Keeping the peace is the solar patrol, whose atomic bombs circle the earth while its members continue exploring the plants, moon, and asteroids. So the *Space Cadet* brings with it the charm of “Golden Age” science fiction: the finned rockets, the elite space organization, and a few aliens throw into the mix. Heinlein nails portable phones, but computers are room-sized, and rocket land on their tail. In his perfectly run solar patrol, he includes officers from all races, and yet the patrol is firmly phallocentric. As far children, ‘*Space Cadet*’ is pretty bland stuff. To children brought up on Harry Potter, video games and anime, *Space Cadet* is more likely to induce eye-rolling than a sense of wonder.

Next novel of Heinlein’s is *Farmer in the Sky*. In this novel young Bill Lerner and his family moves to Ganymede. We first see a future earth of austerity, dappled with some good foresight, such as an offhand description of what is clearly the casual use of microwave ovens:

I grabbed two Syntho-Steaks out of the freezer and slapped them in quick thaw, added a big Idaho baked potato for Dad… would be ready when the steaks were.\(^{20}\)

Heinlein’s character’s journey is described with blend of fast-paced adventure and meticulous research, a style of painless reader education that runs through all books, Heinlein in this novel celebrates nineteenth century American frontier life, and homesteading by imagining much the same situations on Ganymede. But that demands terraforming where by sentient life from worlds by this system, life from earth- not just humans grows independent of the fate of the earth. Heinlein studied, based on the best scientific knowledge at that time, Ganymede work, ingenuity,
and heartbreaking perseverance; these raw materials can be slowly reworked into a richly welcoming world. Things go will at first, but tough conditions are harsh on Ganymede. The family is considered returning to earth, but the pioneer’s spirit prevails. They remain despite the dangers to rebuild and with another home for humanity. Bill sets out to survey more of Ganymede where terraforming continues, and by the end of the book we see how it’s changing.

Heinlein is correct throughout, except for that quake. The three inner moons-Io, Europe, and Ganymede orbit in resonance with one other, so that even if two line up, amplifying tidal forces, the third will always be non-aligned, frequently on the opposite side of Jupiter, offsetting the effects.

The first half of ‘The Future of the Jovian System’ here as a popular historian would. The second step will be prefaced with thoughts on recent astronomical discoveries about the Jovian system. Robert Heinlein’s work sows shapes the future explores might get from the early world-shaping of fiction to future environments there.

Father of all! In every age,
In every clime Ador’s,
By saint, by savage, and by sage,
Jehovah, Jove, or Lord!²¹
- Alexander Pope.

When George, Bill and the other travelers go to Ganymede there they feel a number of nasty surprises waiting for them. Firstly, the colonists have more people than the worlds-system can reasonably cope with, which leads to rather Spartan treatment for many of the new colonists. Secondly, the farm set-up at Ganymede that was promised before their embarkation is, in reality much less developed and overstretched than they had believed it to be. Heinlein’s echoes of dissatisfaction on Mars in Red. On the planet where big corporations threatened and even killed
pioneers in order to advance colonial expansion into the solar system. The system of the 1950’s is a harsh and unforgiving place.

It is said that time has not been totally kind to some aspects of the tale, however on that occasions Bill and George settle down in their leisure time for a nice game of cribbage, a card game most people today don’t know about, never mind play. Similarly, Bill prepares a lovely steak meal in two and a half minutes, and it is written as something as a major development. Generally, it is not as bad as you could expect, and does not slow down the reader should really expect some datedness in tale over sixty years old. Many of the novels science has been superseded by more recent discoveries. It is said that as an adventure tale, still a good reading.

Indeed this novel shows a Heinlein honing his carafe. Whilst he can be seen to be working to a template, and clearly knowing the audience he is writing for. His novels are dealing with basic values such as honor, respects, and perseverance. Heinlein ties relation between society and culture. This is the story all over it, but a tribute to scouts making the most when dealing with a bad hand and coping with difficulties.

What is perhaps most interesting is that Heinlein does not sugarcoat the difficulties and hardships encountered by the characters, but instead uses these difficult situations to highlight the versatility, ingenuity, and gritty determination of these pioneers, all laudable qualities for any reader to emulate. As a reader we can appreciate the difficulties and respect the way that Bill and his colleagues deal with any difficulty thrown at them. There is a degree of realism that is not hidden here, and the book is stronger for it.
The ‘heat trap’ which is never really described would deal with only one of the problems any colonists would face. More updated information indicates that below the ice are large bodies of subsurface water (much bigger than Lake Vostok in Antarctica, possibly even whole oceans). Not only might these bodies of water be habitats of life like those around hydrothermal vents (not sterile at all, likely), which would probably lead to significant cloudbursts if an atmosphere were created at all and gully washers would wash away any soil that wasn’t almost immediately anchored by plant roots and filtered by leaves, humus, etc. There are very few trees in this book, but they should be nearly the first step in terms of vegetation. Grasses (all cereal grains are grasses,) other produce plants, and even legumes should come after the trees.

But all this is predicated on the resolution of one major problem. Heinlein understood (probably better than a lot of paleographers at the time) about the impact of tidal forces. What he likely didn’t know about was the danger from magnetic flux. Jupiter’s colossal magnetic field extends well beyond the Galilean satellites. It’s said that despite low’s lack of atmosphere (because of the outguessing from volcanoes), lo has the most spectacular aurorae in the Solar System but that if you were there to see it in person.

A correction to the above Ganymede is future away from Jupiter, but still well within Jupiter’s magnetic field. The novel states that its’ tide-locked, don’t quite see how this would prevent tides in liquefied ice. The same face may a always face Jupiter, but there should still be movement of water. And tidal forces increase internal heating, so that a planet that had lost most of its original heat through radioactive heat dispersion would still be generating internal heat, even billions of years later.
And there are the other satellites. He has given the new understanding after the impact of shoemaker-Levy. You could have to keep constant watch against the danger of a collision between satellites. It is more hit Jupiter itself but what effects might that have? And there be tidal effects from the other moon, particularly the Galilean moons, even where there is little risk of collision.

The offered system of creating on atmosphere is frankly in the extreme. Even give the postulated unlimited power, suing electrolysis to disassociate water into hydrogen and oxygen is basically dangerous process. It finds the extremely implausible that the hydrogen will rise to the top with no risk of massive fires. The hydrogen would at the end escape to space, resulting in a significant loss of water. Next since oxygen is extremely reactive stuff, it would tend to be constantly trying to reform itself into water with escaping hydrogen, perhaps explosively. And nitrogen which is necessary for plants is described as plentiful. But it is not released by the atmosphere project, seems a bit shortsighted.

In Heinlein’s book science element insist. Early in the novel Heinlein could a device calls a “quick thaw,” that prepares frozen meals in minutes. Whatever Heinlein explained of course, it is a microwave oven, an invention is not introduced as a household appliance until twenty five years later. In addition he describes detailed of the complexities associated with planetary ecology, again decades before the term ecology came into wide use. And, Heinlein gives us an introductory course in the concept of free- fall, interplanetary orbits, and the physics of atomic power. When we say the planetary science about Ganymede is dated, that what we believe to be true now will be dated soon as well.

The underlying themes of this book are strong and invoked many times during the narrative. They involve homesteading, opening a frontier, jealousy, self-
reliance, and courage in the face of adversity. How Bill handles these many challenges and how facing them causes him to mature is the overarching theme of the novel.

In Heinlein’s future history of space travel it is the Americans who lead the way be replaying the adventure of Columbus and the voyage of the pilgrims. The first flight of discovery to the moon is by Santa Maria named the lunatic in a related story.

In *The Rolling Stones*, Robert Heinlein described computers, communication technology, Astrogation systems radar, neat stuff, zero-g, and the solar system very systematically. The ship’s computer was described in the book as being of the standard, which means in today’s terms that it had three processing cores with internal self-checking. Doesn’t sound all that impressive, does it? Well, let’s look at the closest thing Heinlein had to extrapolate from.

To start with, it probably was not an IMB machine since IBM, the manufacturer of the ‘ballistic” computer used in *The Rolling Stones*, would not deliver its first commercial computer until 1953. It was not even announced until April of 1952. The best candidate would be a Univac system.

In 1951 Univac had installed the first commercial computer in the United States. It weighed over 14 tons and contained over 5000 vacuum tubes. What we would call the CPU unit alone filled almost 900 cubic feet. But it was fast; in fact, it could execute almost 2000 instructions a second. Okay, it was fast compared to a mechanical calculator.

Unlike modern computers, the UNIVAC-I had no operating system and only ran one program at a time. As unbelievable as it may sound, that program was stored in a “delay line memory” in the form of a series of waves in liquid mercury.
With only 1000 words of program memory, the UNIVC I was more like a big programmable calculator than what we think of as a computer.

To make a simple comparison, if The Rolling Stone’s computer had been built with the technology of 1952, just the three processing cores would have weighed over 40 tons. It’s hard for the modern reader to understand how enormous a jump it was from slide rules and mechanical calculators, if you remember those, to computers. Even today it’s hard to grasp the rate of development in computer technology.

A cheap desktop PC today has more computing power then all the computers in the world had in 1952. With the development of promising new technologies, like optical computing, it’s very likely that we will be able to make the same statement about 2008 in 2064. So as simple as the Rolling Stone’s computer seems today, it was really advanced for 1952. Heinlein was making a big jump in technology when he envisioned a computer small enough to be built into a spaceship.

The crew of the Rolling Stone spends a lot of time studying and talking about astrogation but Heinlein never explains what all the fuss is about. He just points out to us that the consequences of mistake include “…the ship plunging endlessly on into the empty depths of space.” So why is astrogation so difficult?

The pilot uses a “coelostat” to observe three stars, then lines up the ship until they appear at the correct position in this instrument. He then knows he is on the correct heading Heinlein’s use of the term “coelostat” to describe the instrument used to track the relative position of target stars is not its normal use. Normally that word describes a system of moving mirrors used to direct the sun
into telescopes. This technique, of using one or more stars to fix the heading of a spacecraft, is used today to orient space probes.

All of this would have made much more sense in 1952. Unlike the reader of today who would simply assume that “the computer takes care of that,” readers in 1952 were well aware of how difficult navigation can be. Especially the Boy Scouts who read the condensed version of the book published in Boy’s Life. They had. To earn merit badges in terrestrial navigation. To them, navigating among the stars would have been a fascinating problem.

In a universe with atomic rockets and technology that allows terraforming Mars to the point where it has a breathable atmosphere, *radio communications* seem to have peaked about, well, 1952. Things are so bad the crew worries about losing communications with Earth and must depend on the more powerful transmitters of a large passenger ship that happens to be nearby. It’s probably the place where Heinlein showed the least vision, but there is a good reason.

Bell Labs researchers had discovered the transistor in 1947 and announced it in 1948, but the first commercial units did not show up until 1952 when Raytheon started using them to replace micro vacuum tubes in hearing aids. You need transistor technology to make integrated circuits and you need integrated circuit technology to make microcomputers.

The high-speed highly reliable communications we take for granted are all based on technologies like data compression, error correction and spread spectrum transmission that are not practical, if even possible, without microcomputers. Heinlein cannot be faulted for not making the enormous leap from primitive transistor to microcomputer that would have been necessary before he could have forecast modern communications systems.
Of course, in a later space adventure, the script for the 1953 movie Project Moon Base, he correctly predicts one of the most prevalent communications technologies in homes today: the cordless phone.

If we’re looking for cool tech that’s still pretty impressive today, the Rolling Stone does have one extremely modern piece of equipment in the form of a stereo, meaning 3D, radar system with the ability to create an enhanced perspective image that allows the user to “see” the relationship of things in nearby space. It can even eliminate fixed objection while showing the relative motion vectors of others.

With its 3D display, it’s also an incredible toy that would be considered advanced today. Heinlein worked on radar development during World War II so it’s not surprising he invented such a futuristic radar system for the story.

Then there is the neatest toy all: the atomic powered spaceship. In spite of its being the centerpiece of the story we are told very little about the ship. About all we know is that it’s approximately 150 feet, tall, slim, and 20 years old.

The atomic engine is described as being simpler than a Model -T, which would have meant a lot to someone in 1952 but not much to a modern reader who had probably never seen a Ford Model -T automobile. The exact workings of the engine are never discussed but we can guess, from other Heinlein novels, that it’s a heated fuel, or nuclear thermal, rocket. An earlier novel Rocket Ship Galileo revolved around using a similar engine to reach the Moon. The basic idea is very simple: a nuclear reactor heats a working fluid into a high pressure vapor that’s exhausted out rocket nozzles creating thrust. This is not just a flight of fantasy.

The government started a program in 1956 called ‘Project Rover’ to develop a working nuclear powered rocket engine. The Kiwi engine was fired in 1959. It was an experimental setup built to see if the basic idea was workable and
never intended to be flown. Later NERVA a MASA project was started with the goal of producing a working engine that could be used as a replacement on the Saturn V. 24 This project showed considerable technical promise but by 1972, when it was cancelled, it had become clear that the public attitude toward nuclear power would never allow the use of an atomic powered engine.

But public attitudes change, unlike physical constants, and this is one prediction that is probably dead on. When we go to the planets there is a good chance the ship will be powered by some form of nuclear thermal rocket, or NTR, engine. Nuclear propulsion has distinct advantages over traditional chemical rockets. Early design studies for a manned Mars mission launched from low Earth orbit indicate an NTR powered craft would need to carry less than half the fuel mass of chemical rocket. The total mass of the NTR powered spacecraft would be about 30 per cent that of a chemical rocket powered ship for the same payload. This implies lower cost and much faster total trip times.

In the book, *The Rolling Stone’s* atomic engine uses the same fuel, hydrogen, as was used in the NTR tests. Yet another thing that Heinlein accurately predicted. The background that makes a story like this convincing is not made up of big, awe-inspiring bits of technology but rather in small simple things that convey the felling of being in future. Heinlein is a master at this. Unfortunately a lot of the future tech in the book will seem like old hat to modern readers. They may not even realize it was future tech. Let’s look at a few examples. Take the little matter of the voice recorders used by the Stone to write the episodes of their space opera. Today they seem trivial but in 1952 they would have been very high tech. The standard of the day for home recording was the wore recorder.
A wore recorder used a spool of fine magnetic wire as its recording media. The wire was thinner than a human hair and came on small spools. They were not all that small and were quite expensive. They also had some real limitations like not having a fast forward function. It would have been impressive that the recorder in the book was small enough for the user to hold it in his lap and that the recording could be dumped at high speed and transmitted to a remote site.

Another neat toy we might take for granted is the “autotype” sued in the story to transfer dictation to paper. Voice recognition software is common today but it was pure science fiction in 1952. The “film spools” that replaced books in the story actually seem pretty old fashioned compared to modern e-book readers but they were a very advanced idea at the time.

There are several other examples of high tech that we take for granted today. Things like Touch-Tone phones, video projectors, 3D photography, and “radio satellites” were all wonderful future tech.

Heinlein was a writer a wonderful gift for making the future seem real but he was not prescient. As amazing as his vision of the future was, there are some things that will bring the knowledgeable reader to a full stop.

The Solar System Then and Now

Let’s start with the really big one: the solar system. In 1952 our knowledge of the solar system was entirely based on observations from Earth. While know that may invoke a “duh” response, just stop and think about it for a moment. If you can’t see it through a telescope or hear it in a radio receiver, you are just guessing. Even what you can see, you may easily be misunderstanding.

This all changed in the 1960s when we started sending space probes out to the plants. The probes sent back high resolution photos of planetary surfaces,
mapped magnetic fields and did chemical analysis of atmospheres. Suddenly theory was replaced with knowledge.

Heinlein refers to the asteroids s the remains of a ruined planet. This was a perfectly valid theory at the time and was widely believed. Today we know that the alternate theory, that gravitational forces prevented the development of the planet that theory predicted would be found in that orbit, is probably correct. Current estimates of the total mass are too small to have made up a planet. In fact the total mass of all the asteroids in the main belt may be much less than the Earth’s moon. This makes the chance of finding “core material” pretty slim, though there are others things primarily a wide range of metals, that might make mining operations practical.

Venus gets a passing mention as a colonized world and we know that would be quite a job give our current knowledge of conditions on its surface. In 1952, high school textbooks showed a water world or a jungle planet or a desert, instead of the extremely dense, hot and dry atmosphere we know it has (from over 20 spacecraft visits as of 2008), making it possibly the likely place for life in the solar system.

Unfortunately it was all simple guesswork based on the fact that we knew nothing at all about the surface of the planet. In some ways ignorance was more fun.

Of Course the Big Anomaly is Mars.

In the book the Stones take a shuttle down from Phobos to the Martian surface. The problem is that they make a water landing on a canal. It was the wonderful photos from the Mariner series of spacecraft that dispelled both our ignorance of Mars and the mists of illusion that had allowed ancient Martian
civilizations and world-circling canals. Then there are the Martian life forms. The civilized Martians play a minor, off-stage, role in the story but other today it does not seem likely that any of those exist. Heinlein’s solar system would not have raised an eyebrow in 1952 or for quite a few years later. In many ways he was actually fairly conservative. In the case of The Rolling Stones very little of the story would need to be changed to match reality.

Living in “zero-g” is seen as having positive health benefits in the book. We know this is not likely. Experience from long term missions on the Mir space station shows that muscles tend to rapidly atrophy. The crew would have needed a constant program of exercise to prevent this happening during the months-long trip to Mars. Without it they would have arrived too weak to even walk under Mars gravity. This is far from the worst potential problem.

There is a real danger of severe osteoporosis and there is good reason to believe that immune systems are weakened over time in zero-g. This latter problem is complicated by changes in the effectiveness of medications in space. The epidemic Dr. Stone must fight in the story is all too likely. Just beyond this horizon it is easy to create technology when it is not based on anything. Just say the ship is powered by a quantum singularity engine and get on with the story. It’s much, much harder to make predictions that are reasonable, based on the technology of the day, and futuristic.

Heinlein took the hard option, practically everything about the Rolling Stone, from its atomic engine to its life support systems are just what we would expect to see in a ship designed today. The same thing is true of the Moon colony, space tourism, and asteroid mining. While still in the future, they are all very easy to believe in an amazing achievement in a book written over fifty years ago.
Starman Jones, a science fiction originally published sixty years ago in 1953. It shows its age in a few places, but it is still a wonderful yarn with one of my favorite characters in it, Sam. Hardly the perfect hero or role model, he was a lot of fun shows the main character.\textsuperscript{27}

The story of this age is most important in the technology. Max has to studies a computer by opening a panel and tracing circuits. Logs were pulled out of tables in books; problems are created by humans input to the computer in binary. Correctly what poor machine actually did, readily but it much? It doesn’t really harm the story even though it is one of the major points that everything revolved around. It is more interesting because it kind of a blast from the past and a reminder of how for we’re come in such a short time.\textsuperscript{28}

The way star commuter ships moves hold up pretty well as did the almost military discipline of the ship. No woman in the ranks, but Heinlein does manage to strike a great blow for sexual equality at one point it is scholarly addressed too. There are so good in orals running through the story. Originally read these stories as a kid aspired to be like Heinlein’s boy heroes. I think there are far worse role models. He addresses systems injustice and how a boy with few choices lies and cheats his way into his dream.

In Citizen of the Galaxy, citizen explores what should be freedom they want. It follows a young man, Thorby who matures from childhood to man. Starting he is a beggar and slave man. We see that Baslim is the opposite of freedom, although we seem that in fat ‘slaves’ sometimes have more freedom of choice that ‘free men,’ the society he paints here is vivid and believes. Baslim is for more than he appears to be and puts Thorby through a rigorous education, both a academic and practical. There arise question like how do you become a rally
good beggar? Here Heinlein falls in with Ayn Rand—whatever you do, do it to
best of your ability, from begging to juggle. There are several comments including
here about the integrity of the self-lies to others and misleading yourself both come
in for some dictums. The Personal integrity is more important than ‘success,’
those consequences of action should be examined carefully before committing to
that action. 29

After, Baslim calls in some favors and sends Thorby to live with the free
trader, a group of space merchants that keep to themselves with their own unique
culture. Thorby discovers another aspect of freedom. A person should have ability
to do as he wishes is severely constrained by the culture in which he lives. The free
trader society this idea developed by Margaret Mead. And this idea highlighted by
an anthropologist characters, Margaret Madre. Heinlein is not used obvious with
his names of rigid matriarchal domination and separation. In the free trade society
group there is peace of mind, and the ability through rigid rules of formalism to
allow a small group to live together for extended periods without breaking any
heads. Group has its own limitations on freedom of choice. In the Heinlein’s
novels we find the society is so different from today’s American culture. It
becomes fashionable in its own right, apart from its effects on Thorby. Thorby
himself grows and changes significantly in this part of book. From first love to
determining just how he must balance the demands of duty and personal desires.
The last selection deals with Thorby return on the earth. It is example of the free
trade society and shows a third aspect of freedom. At the end last section offers
little in terms of new or different views of society. It isn’t as engrossing as the first
two sections, but is highly important in terms of competing Heinlein’s
investigation of all aspects of freedom.
Heinlein’s characters as Thorby and Baslim is very pretty thin, especially for the females that appears in supporting roles. This is fairly typical juveniles’ story. It seems that novels strong point is he has focused their central character. Heinlein’s slavery/freedom is stronger point than messages in the books. This is a particular position stated in some of other works.

End Notes to Chapter - V


4. Ibid., p. 111.

5. Ibid., p.132.


7. Ibid. p.808.


