Chapter - III
Farmer in the Sky and The Rolling Stones

It all started like this. I thought it would be a good idea to collect some of the poorer members of the community and sent them off to form a colony on Lucifer, for it’s completely uninhabited. Phaeton got jealous and dispatched a contingent of air bone troops, mounted on flying ants, to intercept us when we were half way there. We were hopelessly outnumbered and had to retreat, but now I’m going to have another short at founding that colony, this time with full military support.¹

When arrested by the king Endymion using his flying squad, at that time police from local place who fly a bout on huge, large vultures which had three heads. Every feather of vultures was considerable longer as well as thicker rather than the most of fairy huge merchant ship. Lucian was told to join the war which was fought against phaeton, the king of the sun. Endymion, who was king of the moon, says Lucian “that the war persists for ages” by explaining that the war is result of competing colonial enterprises.

It was not different from colonizing efforts that would occur after some 1,700s and thereafter. Endymion the king’s project based eugenics (By force relocating members of community being poor and less desirable) the force was supported by military. This project was sanctioned and given support from the political economy. So also establish context for his readers, Godwin rightly suggested how the book published by him in relation to colonization in his preface “To the ingenious Reader.”

In substance thou hast here a new discovery of a new world, which perchance may find little better entertainment
in thy opinion, than that of Columbus at first, in the esteem of all men, Yet his than but pore espi all of America, betrayed unto knowledge so much as hath since increase into a vaster plantation. And the then unknown, to be now of as large extent as all other the knowne world.\textsuperscript{2}

In Heinlein’s future history related with space travel it is the American, who led the way as Columbus as well as the travelling like the travelers adopted for the first time. And for Invention on the surface of the moon that was decided to travelling by the spaceship and Santa Maria followed by the Mayflower their crews seem the colony of humans being as Luna city. Harriman D.D. has builds these ships. For financial assistance he opened “New frontiers” in the open space. Also on the moon, there found large space of starship and it covered wagons of galaxy. It means bunch of stars but the experiment failed it has not been succeeded so far as its sister ship was concerned that has been succeeded in the efforts also it came back with full knowledge of the intellectuals. Who were residing there also found superior than these human beings related with technology in addition to that they found stronger opined with regard to socialism. Being superiors of humans they test mankind’s right to expand out ward and everyone should have right of freedom because freedom plays good role in the life of everybody.

As per the Heinlein’s future history is concerned past through tomorrow, and such title is more than enough its level is open wide, and it expects American past as a guide for humanity’s future. In the first mankind civil traditions, who are trying to make tomorrow belong to Walt Whitman’s nation of nations? Americans seems and they hope cosmic on planet. Evers an told that united states of American certainly a country of future and having ideas regard with opening those open ended new frontiers and there will not closing at all. For the purpose of survival of mankind forever, due to which population would be boosted (a Darwinian fact of
life that Whitman well appreciated in his short essay, “Darwinism”, in specimen Days). Expand of die Suffocate in cradle earth outgrown, or move outward, “our race will spread out through space- That requires plenty of rooms plenty of energy lot of wealth indeed for the mankind i. e. human being.

Heinlein has taken the view in favor of human being also some truths from the post has been included in the history of American past they are having such past experiences, those are also settled permanently. As per the opinion of William F. Buckly, Jr. he says that “whatever is to come cannot outweigh the importance to man of what has gone before.” It is of course meaning of Heinlein’s title tomorrow and that would be made from the past American history will rub best of it and this is the only way of liberty.

When Apollo- II landed astronauts Armstrong and Aldrin on the moon and before three and one half centuries, William Bradford in his literature relating with classic and colonial of plimoth plantation, he told that travelling American by the sea was uncertain and there was debating over this often.

raised many variable opinions amongst men, and caused many doubts and fears among themselves, some, from their reasons and hopes conceived, labored to stir up and in courage the rest to undertake and prosecute the same; others, again, out of their fears, objected against it, and sought to divorce from it, alleging many things, and those nighters unreasonable nor improbable… It was answered that all great and honorable actions are accompanied with great difficulties, and must be entered and overcome with unanswerable courage’s. ³

Our puritan ancestor had “the right virtue” of borrowing the title of Tom Wolfe’s book which has been written in the year 1979. It is full of classic of breviary and courage’s.
In *The Rolling Stones*, Heinlein imagined a type I frontier, neatly encapsulated the two homesteading theme in *Farmer in the Sky*. Heinlein being a fiction writer; and relating to early novels, for novel for younger’s, and in his open on the source of position values is possible for the farming frontier it has been first published in installments. It is published as *satellite scout* the magazine namely National magazine which is particularly for *boys scout* and it is very much use focus on high school aged Bill.

As California being overcrowded and about sixty million populations depend on a fragile system of nuclear power desalination plant, faced with constricting opportunities. Bill, as well as his father along with new step mother went to Ganymede along with other sixty thousand other settlers.

The goal of the family’s on Jupiter third moon for the purpose of colony and necessary building set up. The aim of the people to make available fresh air to breathe the atmosphere here to be made breathable for mankind. As well as newcomer will deeded accordingly and build new society. If somebody is enthusiastic to be farmers like Bill and like his father may take keen interest it. And after passing the act namely Homestead Act 1802 they can very well owners of their own homes and adjoining premises in the colony and farm. They can cultivate the farm and can reside peacefully for that in the first place the rocky surface may be broken and it may crush into dust particles with the modified machineries. Rocks may also be broken by new machineries and pure black sort may be used for sowing the seeds. The nourishment may be taken by using pesticides the care may be taken by unsent micro scope for deteriorate of worms fungi. A bacteria when the technical details would be applied funny thing would happen that would be more than ‘Golden Age’ there would also been unimaginable
technical details in regard with science fiction. Middle decades of 20th century’s major issues are invented into moon side soil creation.

Bill as well as his father doesn’t desire to work separately, because American people want to remember it since this is the frontier and indeed it is the place for study of farmers, who have very less land for cultivation and they in pleasure shall cooperate by their own will. Bill’s opinion is that, his father will work as an engineer in town at that time he will apprentices to neighbors Johann Schultz, so that he can learn the art of moon farming. As the Schultz is much experienced and his mind is very much noble his behavior is good the better things will happen with pioneers with good neighbors can live very happily and this would be again proved by both of them also that mythology may be raised strength from American frontier mythology.

When Bill’s scout troop along with coworkers of his father may erect piles of stone block for residing homes, at the same time women can cook wholesome food for the crew. These are the things Ganymede do. So far Bill’s activities are concerned; he himself participated in six houses rising because one man cannot do it alone. And after the moon quake strike thereafter the entire community pulls together in the rescue operation and builds the houses again.

As far as pioneer is concerned they rewards within two years and you are even do not known if anything had happened. There were no any broken buildings in the community, after the disaster the town was increasing by its population. Bill doggedly determined than ever to stick it out in spite of return to Earth for college he says “I am not going home. If I ever do, until I have licked that joint.” Of course he has seen the future of his own in the new lend quite consciously on the model of the 19th century frontier. At the same time overcrowded earth moves in the
direction of war. As there are no sufficient resource and the colonists will be increasingly self – sufficient. As in Roy Bradbury’s *The Martian chronicles* looming wars on the earth will pass them by as Ganymede can build his own strength and can see out ward for even newer frontier. And US watches 19th century wars between European and across a wide ocean.

After five plus decades Heinlein by taking map of idea like homesteading frontier onto Ganymede, many science fiction writers have continued to utilize the standard homesteading theme, identical and similar face value. And the work which undertaken widely shared American values and concept as well as assumptions. But in larger sense it will not be considered substantially advanced the genre beyond the period of 1949s and 1950s.

The roots of science fiction adventure it’s no surprise that the stories of the settlement of new planets repeatedly visited the problem of the harsh land as pioneers try to habitual with ecologies they are not understand properly and completely, and that fight back. The challenges may be simple there is no any formality with Ganymede moonquake. It was equivalent to “blue northern” blizzard on the Great Plains. Suddenly animals can lurk in the juggle and large raiding crops and animals such as earthy grasshoppers, to rearing up the unexpected settlers exploring jaunts. Allen Steele’s resent planets and related tells, for instant settlement novel “Coyote,” political refuges to a new planet, there the people have to get crops for survive. They can learn the atmosphere so that they could meet the challenge of food shortage. There would be fear of the animals which can eat the mankind and human being. And the speed of the human should be more than the birds, who can fly of much speed and due to the hard efforts will breeds courage within human beings.
Due to which the colony will gather together to fight the disasters, simultaneously there would be language with good sense sometimes hard sentiments will be for their satisfaction due to remembering such sentiment they can also remember the settlement of new colony there. And the pioneers, this had already detailed by Historian David Wrobel, he explains that “the human being should bear all kind of atmospheres which could be hard some for human being. Even they can loss life in such case man and women will survive in such circumstances…” some men will realize their forbearances, which were unaware about it. Some have to surrender to anyone or anything.

Particularly in this book, Robert Heinlein thinks necessity of the things that there is much crowd on Earth which cannot be controlled about rationing devices for more food and immigration would be promoted whole world will feel food shortage. And there would be unrationed food supplies free land after all if pioneers on Ganymede can eke generous amounts of food. At native rock of Ganymede by using futuristic technology expectation from people of earth must be able to figure out as to how to feed them by same technology of course the “green revolution” would do just that in the year 1960’s also in the year 1970.

For making colonizing Ganymede is possible. Twice Heinlein waves his hands only in the first place his pustules technology or total mass conversion, at that place any mass can converted to enormous amount of the energy and this possible theoretically, but prettily unlikely near future. in the second place he search a technology which is called a heat trap this is an energy field of some kind that surround Ganymede also allows photon from the sun for easily coming inside, it should not so escape easily it is one way mirror around a whole moon. If this is theoretically possible we have no idea at all. Certainly it is simple effective plot
device for the enabling Ganymede to be livable. By the use of copies amounts of energy, the native ice of Ganymede has been transformed for breathable atmosphere.

As pioneers, the Lemers are subject to entire hardships and hard way of trials pioneers usually face, there would be starting from starch, uprooted rock for land. They should crush the rock; also they crush the rock into biological material by blending it for making soil before they can even begin the hard task of farming. They may on war footing preparation about the coming disasters before it just as pioneers in the West-American did.

Heinlein by going far past, the usual type of pioneering, or the frontier story that you would get from James Fennimore Cooper or get from jack London. Bill is going through true hardships the people who are close to him die with very ugly ways and he has to face the possibilities that pioneering Ganymede might fail and nobody get alive from it.

As far as the novel concern Farmer in the Sky is a lot more than an adventure novel, Heinlein believes that an era of exploration and pioneer has coming earlier and readers were preparing for it. Letting them know hardships and serious efforts along the way. Even more importantly, they would have to deal with the fact that, at some point, the colonizers have to leave the homes, while leaving homes physically but emotions as well. At some time they should left the place where they leave earlier seek new place.

The book as novel of education, really the book shows the creation or rugged individualist. Heinlein used points of view of unified action it covers half a billion miles of the space and also a good deal of timing. Bill tells has own story while he is relaxed it is conversational style. In which Bill is a scout- as the novel
was serialized in Boy’s life and the scout can build his competent self-reliance. The contrasting characters are the incompetent misfits who can expect society for solving their problems.

That the story has a harsh realism it’s unusual for juvenile. The people who are migrants leave the overpopulated Earth from hunger and also by the reason of threat of war. They struggle for existence on a world never meant for men more than half are being killed by quake. They could not meet friendly aliens, though, near the end Bill and his friend invented a cache of machines, which was left long ago by a space visitor it is not very important and it is beaks from the grimly hostile setting.

Did you know that the first four colonies here starved to death?’s truth! How it is that fifty-odd million can live here and not starve? Barring short rations, of course

Heinlein covered a usually wide range of science and technology while writing this book. The discussion of forming Ganymede is very much detailed and very hard task, even in relation with kinds of insects allowed in and the kinds of not allowed. The discussion about cosmic rays are incorrect in related with several relativity is a lacuna but it is not incorrect the discussion about cosmic rays are in correct in reaction with recent knowledge, but it is correct for the year 1950. Fantastic Jupiter’s interplay, description, and its moons in the sky above Ganymede are more than correct and besides they are beautiful.

*Farmer in the Sky* has been published in the year 1950, is a hymn to the pioneers. The sky frontier is one Ganymede, its largest moon or Jupiter. But the plot parallels the familiar history of American colonization the torch ship ‘*Mayflower*’ which carrying the settlers from the Earth.
The latest development is the mass-conversion ship, such as the ‘Mayflower,’ and it may be the final development—a mass conversion ship is theoretically capable of approaching the speed of light. Take this trip: we accelerated at one gravity for about four hours and twenty minutes which brought us up to more than ninety miles a second. If we had held that drive for a trifle less than a year, we would approach the speed of light. A mass-conversion ship has plenty of power to do just that. At one hundred per cent efficiency, it would use up about one percent of her mass as energy and another one percent as reaction mass. That’s what the Star Rover is going to do when it is finished.\(^9\)

*Farmer in the Sky* was Robert Heinlein’s fourth in the series of juvenile science fiction novels written for Scribner’s between 1947, *Rocket Ship Galileo*, and 1958, *Have Space Suit - Will Travel*. Written in 1950, during breaks from script writing and filming of *Destination Moon* and as far as condensation into a series on establishing Boy Scout troops in the space for the boy, who are related with the scouting magazine *Boy’s Life*, in the novel there is a story of ‘William Bill’ who is Learner a unusual small hero of Heinlein juveniles.\(^10\)

With another juvenile, who are partially consistent farmer is set in the fiction future, (So far as some adult novels are concern written by Heinlein as well) population on the earth is considerably increasing and it’s unabated. Keeping in view the sentient of natives of Mars and Venus that has not discouraged humanity to look ahead for potential colonization. At that point of time Heinlein was aware of some of the visions for large space station of orbits (Which is permanently occupied space station, having been included in his earlier novel *Space Cadet*).\(^11\) Also Gerald O Neil had not created the concept postulated large scale human
settlement on the surface or the Ganymede Jupiter’s largest moon, so that there would be wider colonization within the Jovian system.

The writing of Farmer in the Sky has been done in the per-down of the space age. It was based on optical observations with whatever most of what was known about Jupiter and Galilean satellites, including Ganymede that could be gleaned from optical spectroscopy. In its infancy Radio astronomy was there also discovery of radio emissions from Jupiter lay five years in future. The US launch of Explorer - and also innovation of terrestrial Van Allen belts, and eight years in future for essential knowledge for all aspects of particle activity in a planetary magnetic field.12

As Robert Heinlein wrote Farmer in the Sky 1950 at the same time discoveries were not available to lead and for review of what was known about Jupiter and for Galilean Satellite at the time.14 For the turned to the university library and discovered peak’s book, the book has good contents:

You can make lots and lots and Lots of pretty pictures of Jupiter and analyze the cloud dynamics endlessly try to guess model what the planet rotating underneath the clouds looks like.15

Spectroscopy can be used to determine some of the molecular constituents of Jupiter’s atmosphere (however, ammonia and methane are the only verified constituents as of peeks writing.) otherwise, based on mathematical modeling, consisting mainly of estimates of planetary density derived from the measured mass and size, the planet is made mostly of hydrogen and helium, with the former solidified at the core but also dominant in the atmosphere at the core but also dominant in the atmosphere, water and carbon dioxide in solid form are also expected.16
“It is (in 1958) far too soon to draw any conclusions about Jupiter’s radio emission.”

Any astronomer who thinks he can draw conclusions about the surface features of the rapidly moving Galileans satellites is fooling himself.

There is lot of guesswork and it is needless to say about the guess work, Mr. Heinlein was rely on it his concept related with conservative Ganymede’s surface was sterile and silica based, being the surface of Ganymede with cloudy much ice on it, which could be used for electrolysis and for water thereafter for atmospheric oxygen. If Venues and Mars bypassed still Ganymede was natural choice for colonization as the largest satellite in the solar system and it is larger than planet mercury.

A bit of apprehension approaching this juvenile not usually thrilled by reading about the perils of farm life, though on Ganymede. Heinlein did not disappoint boredom with novel about as rare as the lineup of the Sun, Jupiter along with its four Moons. In the future Earth will be overpopulated and food ration in would be necessary. Teenage protagonist, Bill, lives with his father namely George which was on ninety floors up. In the California is big city along with boroughs. Heinlein could not resist giving us a glimpse of his ideas of the futures---microwaves, incinerators, and likewise. It is amusing how close he was on the mark for certain convenience, especially one about food taking a couple of especially the one about food taking two minutes for preparing.

The space ship namely Mayflower will be completed Bill along with George decides to leave for becoming colonizers of Ganymede, which is third moon of the Jupiter. George marries Molly the day before blast off and she brings her daughter Peggy into the family in very few pages the ‘Bifrost’ takes the load of
settlers, in the orbit around moon, in the orbit interplanetary voyage will start. The trip of sixty days to Jupiter is certainly uneventful save for Heinlein’s desorption his core of heart also he expected pictures of the same. While Bill starts there would be possibility of a little meteor blasting through the ships skin in the moon he will start to board along with other boys. Bill would have the knowledge how to wear the uniform and scout training will saves the day as he stuffs his uniform and then a pillow for slowing down air leak until the hole can be repaired commendations.

Ganymede and the settlers’ story begin when they arrived finally on Ganymede. It is fact- placed, almost devoid of action, but with Heinlein’s obvious love for the rugged individual permeating the narrative. Heinlein takes the time for poking fun and showing plenty of displeasure at the Sissies, who made complain in relation with rough deal they guesses were complaining about the rough deal they got and go for government’s help, each and every time they had to laces their shoes. Moralizing may become somewhat tedious but it is possible to put up with it. According to the Heinlein Ganymedians sky is breathtaking. He not only mages beautifully to bring to life the exotic star dome with a handful of moons gracing the sky, but it is wonderful that how much he had to read to make it believable.

As far as lessons of history are concerned, the colony will diminish when an Earth, Ganyquake destroys all the buildings, foremost thing is that the power plant that provides the heat trap. And the heat trap is concerned it’s a wonderful contraption that made the ice lifeless Ganymede into a place where human being can live. It is kind of terraforming it is exactly identical to NASA’s descriptions of what could be possible on Mars. Without the real life timetable which is certainly not the several decades in the novel. It melting’s the ice produces atmosphere and
also keep the meager sunlight from radiating it out. On Ganymede the heat trap is the backbone of life it is for human variety. And one-third of the colonist who survives the disaster is soon busy in restoring life. It is certainly happy to read the curious mixtures of advanced space technology and also farming which is primitive along with animals like caws and horses.19

Peggy, whose body could not adjust because it was align condition, consequently dies and in this way, removing the necessity of going to Earth. The usual attachment of Heinlein’s related with strong family bonds shows up throw out the whole ordeal. Whenever it will seem that the human being has gotten a toehold in new world at that time Bill will decide to trek back to Earth for getting higher education. His desire was that he discovers that Ganymede has become his new name and decides to stay.20

Though there may be many themes throughout. Family ties, honour goodwill self-reliance as story sense of personal liberty from the Scheltzes feel loneliness and also feel quake in their own house, to the colony pulling together. These things remembers “This I Believe” sentence of Heinlein that is one word people in spite of diversion in Astrogation, Physics, Bionomics, Engineering, and also diversion in the assorted esoteric science technology which are constantly taking book seat to the humanly of main characters. In this picture dark cloud is seem in Heinlein’s grim prophecy of the impending war taking place would be caused due to expanding population but since it is new colony there would be new hopes.

In the thirties, Heinlein lived at that time poor people in the US. Was indeed hunger it was huge experiences of formation. A romance writer Kathleen Norris has developed idea that food must be free and socialized time and again
mentioned as a background detail in her fiction. Heinlein remained convinced “by
and by we all people will get hungry” until he revised his predictions in Expanded
Universe in the year 1980. And in 1950’s book there seems tyranny of food
consumption for more stringent than the British WWII rationing. Due to large
overpopulated mass of people worry some matter. Prediction finds the failure in its
totality.

The writing is admirable and brilliant, he suggested the microwave in his
prediction it is like automatic broiler- identical to 1950’s but look how much else is
in there. In this regard Bill is taking restrictions and regulations which are under
taken by him and also in this regard Heinlein shows by having him pleased to
afford “butterine.” Backed potatoes microwave which is found okay, but are
inferior for more cooked potatoes there the skin are soft texture can sucks- but Bill
is undertaken all those troubles along with the Synthosteaks. He is not so desires
about the food such as meat and all substances. Still Bill is very much proud of his
cooking ability. Even his grandfather didn’t like such food he is not reminding it
also of course Synthosteaks and soup cube indeed. He doesn’t even feel oppressed
by then necessary record keeping. But Heinlein very clearly horrified the reader of
1950 precisely with Bill’s matter of fact attitude to this stuff. Heinlein predicated
correctly in relation with increases of food and gadgets for saving time but he is
also suggesting the way about feeling normal in regard with things and thinking
attitude of people he is also showing us masses about the world by the thing which
Bill has undertaken.

The writer showing us masses about the characters also tells us about Bill’s
mother is deal, he is telling us about electric candles are normal also showing Bill’s
family’s normal life style for cooking and comfortable sitting in kitchen. He also
trying to show Bills matured pride and acceptance both are missing their dead mother “just as Anne would have done.” Mentioned six words cover Bill’s personality as his meter died thereafter the attitude and relationship with his father, he is teenage boy and trying really hard.

Of course there is lot of information in those little paragraphs in regard with making dinner. Heinlein did too brilliantly and intellectually by using the words and technique also rationing and social structure that is included, also focus light on personal relationships. It’s all conveyed not painless but breezily and as an aside. Bill himself thinking as if he is telling you that in two minute and twenty seconds made dinner, by not explaining the world, the tech, and his family arrangements. It is surprisingly the information given by Heinlein is very much appreciated through the text.

The affected family is done well. At first Bill resist the arrangement thereafter he feels comfortable along with stepmother. As well as his step sister, new siblings often teenagers do react such kind of things. It is not much important as central we have a story that a boy becoming a pioneer who is teenagers, he doesn’t have the school life as usual or does he have qualifications. It’s indeed adventure to satisfy anyone and all about Bill’s growing up.

Schwartz’s apple tree is a favorite thing in this book, Heinlein putting in a German family as notably positive and affirmative characters. When it was the period of barely five years from the end of war with Germany; there is only tree on Ganymede the apple tree there is something about the tree apples which are treasures since they contain seeds that proves claim and of course all the derails come down in his memory to this Johnny Appleseed image.
There is something in common that the children’s picture books and science fiction have at their heart; for exploring universe in their imaginary the aim to encourage the readers. Not all of the books can satisfy the query which is in their mind and all books with picture cannot do this task successfully. But some thinks that teaching the child he look outwore, beyond themselves to the school teaching tools are even more oriented. It may be rather interesting and therefore such books are having different velocity. In the desecration of the Nikolajeva that may children’s fiction is recursive to; The books as above mentioned they directs children back to stability and to comfort surprising this books aimed at the middle age group which books have most fulfilled Nikolajeva outline which was structural.21

**The Rolling Stones**

In our postmodern, American way, we are alternately fascinated and bored by the media descriptions of cutting-edge scientific and technological areas such as reproductive technologies, genetic research, computing memory and speed, meteor movement, and other futuristic issues that impinge on our present-day reality. These areas of studies are no longer confined to the research laboratory and the imaginative realm of science fiction because all of us daily confront the ways in which present yet future-seeming technologies create and/or solve social problems science fiction and commentary have become in our contemporary world what Donald Pease called in defining the New American studies “a field – Imaginary.”

The field –Imaginary of contemporary science fiction (its topics, themes, style conventions, ideologies, etc.) has been imported into popular culture, elite culture, and general parlance.22 The frightening, frankensteinian imagery or narratives describing biological and mechanistic adaptations of the human
coincides with the realities of a world in which we communicate, calculate, and imagine with the assistance of computing devices, some small enough to wear or carry. As microelectronics engineers delight in reminding us, it is their ability to craft smaller, faster, lighter chips that drives the modern Information Revolution. Each person has the potential to be wired, as Nicholas Negroponte notes in describing the latest items installed with computer chips and tested by the MIT media lab. So given our history literary and scientific, it is not surprising that readers of Mary Shelley’s novel suspect that such technical advantage to turn every human being into a walking computer might lead human being into a walking computer might lead to ethical, philosophical, and political dilemmas, a premise that writers have outlined in cyberpunk literature of the 1980s and 1990s.

…our myth of national identity is intertwined with ideas of scientific progress and technological innovation even as individual authors have expressed suspicion and regret about technical possibilities.23

A good example comes from ‘The Rolling Stone’ by Robert Heinlein, in which the technology of the reciprocation engine powering the automobile is explained in such a way. The excuse for doing so is a retrospective look at the “mechanical buffoonery” of our primitive road machines, viewed form a future stage of “proper design.” The narrator goes on:

A reciprocation engine was a collection of miniature heat engines using (in a basically inefficient cycle) a small percentage of an exothermic chemical reaction, a reaction that was started and stopped every spilt second. Much to the heat was intentionally thrown away into a “water jacked” or “cooling system,” then wasted into the atmosphere through a heat exchanger.
What little was left caused blocks of metal to thump foolishly back and forth (hence the name “reciprocating”) and thence through a linkage to cause a shaft and Flywheel to spin around. The flywheel (believe it if you can) had to gyroscopic function; it was used to store kinetic energy in a futile effort to cover up the sins of reciprocation. The shaft at long last caused the wheel to turn and thereby propelled this pile or junk over the countryside.\textsuperscript{24}

Not only mechanical subjects are treated to this kind of exposition. Even more remarkable is the basics of mental health, most use to adolescent readers. Small wonderful that youthful Heinlein fans have the least use of any teenagers for school psychologists.

In \textit{The Rolling Stones} two thing that fascinate to me The first is the way in which Robert Heinlein manages to create a realistic technical framework for his story that still works over sixty years later The second is the story itself. After all, we don’t find many rockets – powered covered wagons, either back in 1952, when Heinlein wrote the juvenile novels, or now when I am writing this afterward 2013. It’s easy to assume that a “juvenile” novel has little thought behind it beyond an entertaining plot and a few likeable characters when it’s an science fiction novels also expect to find some interesting locations and maybe. A little fun technology Heinlein provides all these as expected but he also waves his simple story against a subtle, complex background.

What could be more America in the early 1950s than to pack up your family in a long, long trailer and set off to see what there was to be seen? Mr. and Mrs. Middle-class responded to the breakup of settled life ways just as jack in the late 1940s. Few of them pounded out nonstop novels on continuous rolls of
teletype paper as the decade wore on. Some went from Midwest to New York City; others took families and house trailers to the no-longer-quit –so wide west.

But Robert Heinlein got there first – and in many ways, *The Rolling Stones* is the best of them all, for the others of the genre are all but forgotten while The Rolling stone continues in print continues to delight, and continues to too keep alive the story of the Resless worm. Heinlein had no ideas for a story when he needed to start his fourth boys’ book of Scribner’s late in 1952. Ginny his wife suggested a pair of mischievous twins – Castor and Pollux – always getting into trouble and always being hauled out by their feisty grandmother. Astronomer and science popularize – colleague Robert S. Richardson wanted to see more of the boy – businessman character Heinlein had created for *Red Planet* (another story that turns on family solidarity).That reminded him of Tom Sawyer *Whitewashing the fence*, and the mischievous twins became fast-talking, sharp, – dealing film – flam men in the making.

The two brothers stood looking the old wreck over. “Junk,” decided Castor.

“Not junk,” objected Pollux. “A jalopy - granted. A heap any way you look at it. A clunker possibly. But not junk” “You’re an optimist, Junior”. Both boys were fifteen; Castor was twenty minute older than his brother.

“I’, a believer, Grandpa- and you batter be, too. Let me point out that we don’t have money enough for anything better. Scared to gun it?”

The background of the story is an old as the settlement of North America. While the technology that makes it a science fiction story still lies just “beyond this horizon.” So first let’s take a look back into American history to see where the setting for the story comes from. Then we’ll set the clock to 1952 and look at the basis for the technology in *The Rolling Stones* and how well it holds up today.
The family Stone is a microcosm, in three generations, of the people created by the frontier experience, Hazel Stone, and the grandmother is a first stage settler. She also shows the adaptability needed to survive in frontier conditions, her careers, from engineer to professional blackjack dealer, show this willingness to do whatever is necessary to survive. She provides, somewhat muted by the fact that the book is intended for a juvenile audience, the elements of lawlessness and concession to civilized life is to load her handgun with cough drops.

The second stage setters are represented by Roger Stone and his wife. They are professional people actively involved in building the infrastructure of the city. Their professions – engineer, pilot, doctor, politician, and writer – are those necessary to transition from one stage of development to the next. The twins, who represent the third stage settler, are both bright, intelligent, entrepreneurial types living in a city with a busy spaceport, commercial ventures of all sorts and a good tourist industry. But they can find no better way to make money than to run a tramp cargo ship out to the Asteroids.

The Stone family is average nuclear family living in Luna City. Protagonists are Castor and Pollux stone, twin teenagers who live with their parents, a younger brother and sister and their grandmother, Hazel stone. Mr. Stone is the writer of radio adventure serial, the scourge of the speedways and the former mayor of Luna city Mrs. Stone is a doctor and researcher. Grandmother Hazel is retired, but played a part in the revolution that freed Luna from Earth and is considered one of the founding fathers of Luna city. Later, Hazel will take over the radio sense and suppose the family by radioing in new episodes as they travel.

The colony was made up of homesteaders and townies. The townies worked for the government and lived in
government owned buildings … But most of the colonials were homesteader and that’s what George had meant us to be. Like most everybody, we had come out there on the promise of free land a chance to rise own food.26

Ray Bradbury and Robert Heinlein define opposite poles in postwar American science fiction; Bradbury made and sustained his reputation as a stylist who crafted small stories with big emotional wallops. He has published only one science fiction novel – *Fahrenheit (1953)* – but many collections of loosely connected stories that wander back and forth among science fiction, fantasy, and nostalgic realism.27 Heinlein started with space adventure stories for *Astounding* but soon learned how to sustain longer narratives in more than two dozen novels for juvenile readers. He liked problem in physical and social engineering and protagonists with can-do values. In his literary heritage are hits of the Tom swift books mixed with jack London’s politically charged romances.

Beneath their stylistic choice, however, Heinlein and Bradbury had much in common. Both writers harkened back to midwestness childhoods, but their ideas about the future drew as well on their firsthand experience of California’s great transformation during and after world war II. In the later 1940s, each made crossover sales to mainstream magazines, such as *The Saturday Evening post*, that were helping their readers understand the post war age of galloping technological change. In their very distinct Voices, Heinlein’s and Bradbury’s mass market stories evangelized for the high frontier of space exploration and its power to redeem or rescue to troubled had threatened world.

In Le Guin’s 1974 stories *The Eye Altering*, is the process of learning a new planet has been abstracted into metaphor. The settler on New Zion finds the light and landscape ugly, showing brown, purplish, and dark red:
Dirty coolers, the colour you got when you scrubbed your water colour too hard. They are aliens to the new environment who depend on special enzymes to enable their bodies to metabolize the native foods. But one of the Zion-born, sickly since his birth decides to forgo the medication and take his chances with the local flora. His decision turns out to be correct, showing that many of the planets born have suffered not from Zion itself, but from their loving parents’ efforts to treat them as Earth-born.

For Le Guin, with her family background in anthropology, the frontier stories are ultimately. About the cultural gap between pioneers and natives to her simple “technical” plot, metaphorical as it is, Le Guin adds a second layer of adaptation. Genya, the young man who with local diet, is also artist who has skillfully painted portraits and other pictures that the first generation can appreciated, but he now started to paint Zion as it looks in its muddled ugliness. It is still the same picture, but the earth-born realizes that young people who have adopted and adapted to Zion see their surrounding as a beautiful landscape:

It’s here Zion. It’s how Genya sees it. With the eyes and the heart …. How do we know what a child of Zion sees? We can see the picture in this light that’s like Home (Earth). Take it outside, into the daylight, and you’ll see what we always see the ugly colors, the ugly planet where we’re not at home, but he is at home! He is! The Stone families at first sight look like a perfect suburban 1950s family only on the moon. There’s a mother and father, a grandmother, a nearly grown girl two teenage boys and a much younger additions, Meade, the daughter and firstborn child bears her grandmother’s maiden name, the twins are Castor and Pollux, and as they are born 20 minutes apart they address each other as Grandpa and Junior. I
find them completely indistinguishable – it they were one character with a habit of
talking to themselves. I (couldn’t tell) the little kid is Lowell, or “Buster,” The
father, Roger, has been mayor of Luna city.

Edith, the mother, is an MD and who wins family arguments by not arguing
and by manipulating with feminine wiles. she’s a doctor and cures an epidemic,
she insists that she is in practice when her husband insists that she isn’t she does
cook: on the moon, they are dialing cooks with help from Meade and Hazel After
some days the family is bored with Mars and tired of the myriad rules and taxes
(they are used to a more freewheeling society, like Luna city). The body talks their
parents into extending their vacation to a visit to the Asteroid Belt. This time at
their grandmother’s advice they stock up on luxury foods and other items that they
plan to sell to the asteroid miners. They also take along partly by chance a new pet
their younger brother has acquired, a maritime “flat-cat” named fuzzy Britches
(imagine a small furry animal about the size of a saucer that purrs when you yet or
hold it).

fuzzy Britches took to free fall as if the creature had been
born in space; if it was not being held and stroked by
someone which it usually was it slithered over wall and
bulkhead, or floated gently around the compartments,
undulation happily, castor maintained that it could swim
through the air; Pollux insisted that it could not and that its
maneuvers arose entirely from the air currents of the
ventilation system, They wasted considerable time,
thought, and energy in trying to devise scientific tests to
prove the matter, one way or the other. They were
successful. They arrive at the Asteroid belt mine with less to sell than they expected, but find
out that the miners are homesick for flat cats. So they create a radio show to
entertain the miners, hawk their wares and sell flat cats – quickly, before they start
to reproduce and flood the market. This time they make a modest profit, but see no
immediate way to reinvest. Dr. Stone is again called upon this time to treat sick
miners, An “ambulance service” is set up where the miner themselves use their
“scooters” (small, unpressurized rockets that transport four or six people at a time
from point to point within the Asteroid Belt), to bring patients to the doctor or vice
versa. The boys buy a rocket motor and, with a bit of welding and some equipment
from the ship device a scooter for the families own use.

The boys accidentally, but irresponsibly, fail to leave a note on the family
scooter while they are working on a problem with one of its gyros. Their
grandmother and young brother are using it when the gyro fails and the scooter
shoots off course. They are stranded, far from where anyone will look for them.
There is a manhunt when they are missed, but people aren’t looking in the right
area. The twins figure out, by reenacting the accident and knowing exactly how the
gyro always failed, where to look and they rescue their grandmother and brother
just in time. The family, now addicted to travel, decided to push on to an outpost at
Titan and see what they can see. The book ends with them outward bound to
Saturn:

All stations were manned and ready; from an instruction
couch rigged back of the pilot and co-pilot Meade was
already running down the count –off. Roger stone glance
across at his mother and whispered,” what are you smiling
about?

“And five And four” chanted Meade.

“Nothing much. After we got to Titan we might-
“The blast cut off her word; the Stone trembled and threw
herself outward bound, toward Saturn. In her train followed
hundreds and thousands and hundreds of thousands of
thousands of restless rolling stones … to Saturn…to
Uranus to Pluto…rolling on out to the stars…outward
bound to the ends of the universe.”

Not a particularly complicated plot or even an imaginative one, by Heinlein
standards. There is however, more going on her than meets the eye. Each juvenile
is an excuse for Heinlein to teach his young readers some lessons. The main
lessons here, oddly enough, are “duty towards others” and “respect our elders.”
The message is subtle, but it’s woven all through the novel. The elder in question is
usually Grandmother Hazel, but both parents have their moments as well. Both
parents are portrayed as pretty average people. Smart, perhaps, but not better at
parenting, parenting, and relationships than average people.

Hazel, however, is the character who most drives the plot. She’s at the
center of all the action and behind a lot of it; she’s shown as strong, smart, devious
and cunning. When the boys expect that their father won’t notice that the cargo
they propose to ship to Mars includes copper pipe, valves and fittings and
foodstuffs like cane sugar and dehydrated potatoes – everything you need to distill
vodka and rum – Hazel bets them that he will indeed notice, He does and they have
to pay up. When it comes to the cargo they want to take from Mars to the
Asteroids, it is Hazel who clues them in on the history of mining starkest not
generally the miners that make a fortune; it’s the grocers and outfitters that equip
them that make it big. When the family sits down to compute their orbit for Mars,
its Hazels figures that are closest to the mean, so hers and used. Hazel supports the
family, while they travel, by turning out episodes of The Scourge of the Space
ways. It’s also Hazel, with her background as a revolutionary, who habitually
carries a gun.
Time and again, the boys learn that brash youth – smart, inventive and driven though it may be – is no match for mature wisdom. Hazel has been around and she knows what she’s doing she is very clearly rising her grandkids with wit, wisdom and cussedness – all qualities that Heinlein praises. Hazel, in fact, will show up later as a minor character in *The Moon is a Harsh Mistress*, where her role in the lunar revolution will be detailed. Even later, she will show up as the central character of Heinlein’s novel *The cat who walks Through walls* where she will outdo Heinlein’s more famous character, Lazarus Long. Hazel was obviously one of Heinlein’s favorite – perhaps his most favorite.

Mrs. Stone demonstrate that her job treating the sick can be more important than her role as a mother. When a ship full of sick people needs her help, she does her duty; even though it’s dangerous and cold leave her family without a mother, when as Asteroid minor has a crushing fracture and many lose his leg, she immediately leaves to do surgery. Even the twins have to subordinate their profit to the safety of others when duty calls. But see that adults as well as children sometimes have duties to others – sometimes beyond even family ties.

The twins also learn that their father takes his job of ship’s captain more seriously than his job to father. Family ties aside, their father will use discipline and rigor to keep everyone safe in a dangerous environment. From his example, they get insight into what it means to him responsible for the fate of your crew. The final incident, where the boys forget to note that the scooter is out of commission, is also very clear lesson; it’s not all tea and crumpets when you grow up. You’ve got to pay attention and take your responsibilities seriously. Instead of punishing the twins, their father tells them, “…you’re going to have to live with it. That’s the way adults have to do it.”
While this novel is strong on technical detail, there is a good deal of it sprinkle around. The types of orbit that will get a spacecraft from the Moon to Mars are discussed at length (tack around Earth and pick up some energy from it – a legitimate and much used maneuver today). The ecology of a spacecraft in transit, including balancing its heat load from the Sun, is discussed. A good deal of information about Mars, Moons is given, including their use as a space station transit point for ships going to the surface of Mars. There is even a bit of technical information about the density of the Asteroid belt and the orbits of its inhabitants.

This is Heinlein’s second Juvenile to contain twins. There will be many more twins to come; however, Heinlein seemed to be fascinated with them. These twins exhibit some qualities that later ones will, they complete each other’s sentences, and each seems to be able to know what the other is thinking.

On a fun note it’s interesting to note the similarities between flat cats and tribbles” from the star Trek episode The Trouble with Tribbles by David Gerrold. After writing the episode and having it accepted to be filmed, Gerrold realized that tribbles were amazing like flat cats. Someone called Heinlein to ask if he had a problem with the similarity and he said, “No, we both owe a debt to Ellis parker Butler’s story pigs is pigs’ We observe of the Stone’s future adventures is that Hazel, the twins and their younger brother all live through it. All four show up or mentioned in novels set at later times. The further adventures of the Stone family are a nice niche for someone to contribute some fan fiction,

This is one the humorous Heinlein’s juveniles and a pretty entertaining one too. The story of the restless twins, Castor and Pollex, grandmother Hazel, and the rest of the Stone family is a lively quick-paced and sharp – witted gallop through the solar system --- from Luna, to Mars, and then to the Asteroid Belt. As the
author himself admitted, the story seems to sag a little in the last quarter or so, but the characters have no problem keeping up wisecracking and being generally obnoxious, much less serious that many of Heinlein’s others works in turns of social issues (there’s barely a stab at the tax collecting mars authorities), *The Rolling Stones* of a comedy with some formidable scientific backing to make it stick.\(^{34}\)

It seems that Heinlein’s fascination with science got the better of him in this novel --- there’s an almost endless tirade of ballistic navigation data, Astronomical measurements, a little math’s, scone physics, and plenty of engineering. The best of it all has to be the unflattering rant about the inefficiency of 20\(^{th}\) century automobile design (still true, almost half a century later) and the three stages that technology goes through --- invention, monstrous complication to correct the errors in the original design, and a complete overhaul, usually much simpler and more efficient than the original.

Another notable Heinlein’s invention is the “flat cat.” The furry purring Martian has been a favorite of Star Trek, reborn as Tribbles in at least two episodes, and not one single attribution to Heinlein!

But in the main they depended on the flat cats themselves. The boomers from Mars, almost too a man, bought flat cats as soon as they heard that they were available, and each became an unpaid traveling salesman for the enterprise. Hardrock men from Luna, or directly from Earth, who had never seen a flat cat, now, had opportunities to see them, pet them listen to their hypnotic purr- and were lost. The little things not only stirred to aching suppressed loneliness, but having stimulated it, gave it an outlet.\(^{35}\)

Children protagonists, twins who are technically proficient, but not terrible say either in personal or business skills, decide to make a killing as interplanetary
traders, settling on bicycles as their item of choice. Although them to go in business on their own, the family decides to leave their house on Luna to travel for the fun of it. And off they go, in a spaceship called The Rolling Stone, to visit the colony on Mars. An uneventful year later (with the exception of that epidemic on board of the “war God” which Dr. Stone managed to keep under control) they make it to the red planet. The twins sell their bicycles of tourist tours, get in trouble with the law, and are bailed out by Grandmother Hazel – cum – lawyer only to find that their entire profits has been hulled by outrageous taxes. A little, very little, wiser, they stock up with luxury foods before the family blasts off for the Asteroid Belt and give their young brother a gift, a Martian pet, a “flat cat”. This turns out to be trouble when the flat cat has eight kittens, who in turn have eight kittens each who…soon the ship is brimming with flat cats and the crew are in danger of starving under the purring animals before they put them in hibernation mode on Ceres, the flat cats prove to be a commercial hit as the lonely miners but them for their recreational qualities. After Hazel almost with the scooter, the family decides to go visit Saturn--- the rings must look spectacular.

Heinlein’s mastery of the dialogue makes the family banter a hilarious read. The half-serious, half-facetious threats and friendly insults create a barrage of remarks and witier retorts as the novel skips along blithely without much content. Among the more interesting things are the schooling schedule on board The Rolling Stone (plenty of math above all else) and the twins’ ability to read with the book turns upside down. Heinlein’s complete faith in science show through as does his firm belief that high school kids should be able to do at least vector calculus in their heads. Another amazing science fiction idea is playing chess in your head, which Grandmother Hazel seems to be especially good at. Finally a
theme that is later forcefully present in Heinlein’s work can also be seen here: despite Mr. Stone’s nominal position as the head of the family and the captain of the ship, it is the women who are in charge Dr. Stone with her “yes dear” and always getting what she thinks is necessary, and Hazel, with her confrontational style that is just as successful. Despite token resistance, Roger stands no chance with those two.

It is a story of exploration and the principal interest is in Heinlein’s use of a fairly ordinary family rather at the upper end of the intelligence curve as Heinlein heroes tend to be in his portrayal of the different ways people will respond to the challenges of the extreme environments which exist on other planets. It was written at a time when rather less was known about the solar system, Mars in particular, and the conditions are in fact more extreme than those used in the novel. The mathematics of chaos was completely undiscovered, and they would have changed the way he wrote about the Asteroids; no mathematics could prove their orbits to come from an exploded planet.\textsuperscript{37}

Aside from the outdated science, the major criticism these books also are sociological. Each community – Luna, Mars, and the Asteroids – closely mirrors some aspect of small – town American life. This is not intended by Heinlein to make some sort of critical point; science fiction novels criticizing contemporary society were not his forte. It has more to do with a lack of imagination;\textsuperscript{38} he was simply projected the technological advances in which he is really interested –it’s really a “Hey, wow spaceflight” novel from the days before sputnik against the social background easier for him to portray and for his audience to understand. Mars is the only place he really has criticism of, and that is to do with the
obsession with commercial gain and taxation he considered more typical of the slightly large community.

*The Rolling Stones* are Heinlein’s family values” novel, with the highest virtue held to be loyalty to one’s kin. Grandma Hazel Meade lies under oath and practically vamps a Martian judge. At one point, to save her two grandsons from doing hard time as punishment for trying to sidestep Martian import taxes. Earlier in the family’s travels, the usually self – oriented tone twins endorse the idea that the family should return to the moon, rather than go on forward Mars. Because their younger brother Lowell seemed to be incurably space- sick. Even father Roger Stone’s decision to override the computer and force a launch from the moon in the event of a mechanical glitch is explained as loyalty to the family honor, rather than being a petty manifestation of his own egoism.

In spite of moments that are steeped in 1950’s sexual politics (the women do all the cooking and care taking for younger Buster); Robert Heinlein succeeds in pushing the boundaries of the expected roles of women by his treatment of them in *The Rolling Stones*. Gramma Hazel is afire – ball. She is a brilliant engineer in her own right, takes no guff from anyone, and dishes it out liberally to anyone who gets in her way. Edith Stone is not only a wife and mother but is also a skilled doctor who is called upon to make decisions at the risk of great personal sacrifice. At one point in the story she pointedly stands up to her husband and will not let him control her decisions, as she knows that she has a course of action to take that must be taken. Even Meade is shown to not just be a soppy romance – seeking teenage girl but instead is an intelligent and integral part of the family unit. While he did not shatter the mode of female stereotypes in this book, he gave them a darn
good whack and a *The Rolling Stone* is better for it. Campbell is quoted in “science fiction and market Realities” as claiming that

Science fiction … unlike other literature, assumes that change is the natural order of things,” a bold and over exclusionary. Statement if one recognizes that realist and naturalist narratives implicitly or explicitly promote political or social changes by delineating the human cost of the status quo, such as Herman Melville’s *Criticism of novel discipline in white Jacket* (1850), Harriet Beecher Stowe’s of slavery in *Uncle Tom’s Cabin* (1852), Upton Sinclair’s of *Meatpacking in The Jungle* (1906), or feminist literature identifying the pain of patriarchal oppression, such as Kate Chopin’s *The Awakening* (1899) and Charlotte Perkins Gilman’s *The Yellow wallpaper* (1892), yet although other kinds of fiction can he see as promoting change.42

*The Rolling Stone* was a good adventure story, it would recommend to any patron interested in that kind of story. Because it is a family story there are no galactic overlords or grand space battle. But with a scheming entrepreneurial set of teenage twins boys, who land themselves in Martian jail, a little brother who can read minds, a wily grandmother who was one of the lunar pioneers to provide entertainment for the other three “filler” member of the family, the story still moves quickly enough to keep most adventure lovers interested, Heinlein’s solid foundation in real science will also keep reader especially interested in science more than intrigued.

Heinlein makes sure that the science of the story is right. The orbits and trajectories they follow on their journey to Mars from the Moon and on the Asteroids are all accurate and quite feasible given the conditions set forth in the story. The nuclear propulsion system described in the book, while not within our
capabilities today is certainty not of a design inconceivable in the future. The need for a balanced internal ecology, with oxygen generating and food producing plants aboard the spacecraft, was ahead of its time. The systems as postulated in the story are still not fully realized even in our only long duration, extra-terrestrial vehicle of today: the International space station.43

The science presented here is real. Heinlein was always careful with details in this area, and in this one he presents, the facts of orbital mechanics, delta-v requirements, and calculations of best possible orbital transfer trajectories. Each of these items has a direct effect on the story line, and Heinlein makes all this real-world stuff go down easily, an aspect of his works that has inspired countless youngsters to pursue careers in science and engineering. His speculations about various planetary conditions, however. While plausible at the time this was written (1952), have since been shown to not be true, so a certain amount of suspension of disbelief is required of today’s reader and allowance made for its age. Also causing some believability problems are the very limited ‘computers’ shown, and the possible necessity of doing orbital calculations by hand. This is one area where Heinlein consistently underestimated not just what was possible with computers, but just how fast progress would proceed, making this book seem possible.

Much of the effect comes as usual from the sense of an accurately extrapolated future background. With all the new technologies given an air of commonplace reality, the used spaceship, for example, is bought from “Dealer Dan, the space ship man,” who is drawn after today’s used-car salesmen. Though the meteor miners use radar and rocket scooters, they live like forty – nine.
End Notes to Chapter - III


2. Ibid., P-32


15. Ibid., chapter 1 – 20.

16. Ibid., chapter 21-4, 26 – 7,

17. Ibid., chapter 25.


32. Ibid, p. 287.

33. Ibid, p. 162.

34. Ibid, p. 276.


