THE
LUNARIAN PROFESSOR

AND

His Remarkable Revelations Concerning the Earth, the Moon and Mars

TOGETHER WITH

An Account of the Cruise of the Sally Ann

BY

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PREFACE.

The reader will please remember that this visit and revelation of the Lunarian Professor took place in 1892, seventeen years ago, and some of the predictions are already due of fulfillment or of apparent progress in that direction. For example he gives Minneapolis a population of 1,780,000 in the year 1925 only sixteen years from the present. This is worse than Walton. But I do not feel at liberty to alter the Professional utterances. If I should begin to do this I would never know where to stop. There will doubtless be found other predictions at variance with our ideas, especially as to the time in which the fulfillment should take place. Time is the most uncertain element concerned in prophetic utterances. Give a prophet time enough and he will successfully predict you anything you like. "All things come to him who waits." But I have not the assurance to change anything the Professor has said and I am not prepared to aver that the truths as they appear to common mundane mortals are to be preferred to the errors however manifest of so illustrious a prophet—just as we accept the dicta of Moses or St. Paul—when we are entirely sure they do not know what they are talking about. Our Professor is probably wrong in regard to the settlement of some of the questions taken up by him, but to tell the honest

truth, I am too ignorant of the disputed points to contradict him. If he says black is white it is safer for me not to talk back. But when it comes to plain statements of facts, concerning the present conditions on the Moon and Mars, in which, from the abundance of personal knowledge there remains no license to draw upon his imagination for his facts, I implicitly trust the Professor. I never saw a pair of eyes so full of honesty for their size, or of as large capacity for honesty as his. Even there, however, some of his statements are liable to be contradicted. For example, the theory of the hump or protuberance on the hither side of the Moon, which had some currency among our astronomers 40 or 50 years ago appears later to have been abandoned by at least some of them, but we should not allow mere theory to counterbalance the testimony of a competent eye witness.

It may seem strange that the Professor has made almost no mention of the great Japanese-Russian war. But as this war settled nothing, did not even settle what there was to be settled it may be considered as a mere incident in the discussion of the real question at issue. This is only my conjecture of the reason of his silence.

The point of view assumed by a Prophet is of little consequence compared with what he sees. Some say, back-sight is more reliable than foresight, and that, considered as a magazine of facts, history is preferable to the imagination. But back-sight is history, and like good liquor it requires aging and maturing. The association of the imagination supplies these effects. History

must be read with the help of the imagination even for present use; still more if the inquiry embraces a glance into the future.

Si quaeris futura, circumspice. If you would know the future look around you. That which has been will be. All things have ever been under the domination of evolution and they ever will be. Therefore, let the imagination explore its trail, and you are at once a prophet.

CHAPTER I.

An Outing.

Let me see. It was six (6) years since I had an outing. It seemed a long time and it was long enough to obscure the conviction I had once arrived at that the average outing is on the whole more of a bore than a pleasure and that its principal value consists in making a fellow satisfied with his ordinary work and glad to get back to it again. I am tolerably sure that I should have reached the same opinion even if I had not been the victim of a certain wretched adventure that happened away back in my "courting days". On the occasion referred to I had taken my best girl for a little rowing and fishing on Brush Lake. We had not proceeded far when she "got a bite", and it nearly drove her wild with excitement, she stood up in the boat and from her frantic exertions I judged she had hooked nothing less than a six pound bass. At last she pulld it out with a horizontal sweep, and whirling around with it, the middle of the line struck my head with such force as to send the fish revolving around my neck five times, and wound up by inserting the hook in the end of my nose and leaving the fish dangling and flapping against my face—a ridiculous little Sunfish not over three inches long. The excited lady dropped her pole and made such a violent lunge to secure her prize that she upset the boat and left us both floundering in the water. Amongst the fifteen

or twenty spectators on the shore was Aquarius Jinks, whose father was a fisherman and had brought him up to think no more of jumping into the water than a water spaniel. So in he jumped and in a jiffy he rescued my lady and took her to the nearest house to get some dry clothes. As for myself, I was getting out all right in spite of the embarrassment of the choking line, my lacerated nose and that wretched fish that did not for a moment let up its frantic struggling and flapping. In addition to this I had the misfortune to be encumbered by the clumsy assistance of a fat German saloon-keeper, who by the help of the pole, which had now floated near the shore, drew me up, amid the jeers of the crowd, that now by the barbarous custom of the times, I was obliged to "treat."

This exposure laid me up for six weeks with the chills, and about the end of that time there was a wedding—my girl married that Jinks, who took this perfidious advantage of me. I felt very sore for a long time in the region of the diaphragm. The poets usually designate the heart as the particular organ affected in such cases, but I am persuaded it is the semi lunar ganglion or solar plexus, probably the former, from the fact that the victim is apt to be affected by semi lunacy. But that is a question of physiology.

Although I never had another such disastrous experience, yet as I said at first, the average outing with its accidents, fatigues and discomforts, had on the whole, left no very favorable impression on me. Yet I had made up my mind after an interval of six years to try one more. My literary work had tired

me out, and a trip, if it gave no pleasure, would hurt at least in another place.

August the third, 1892, found me installed in a cottage, at Cottagewood, at the eastern end of Lake Minnetonka. My plans were simple. I had a gun, a boat and fishing tackle, but of these I intended to make small use. I would rest most of the time, and lie under the trees and read or loaf as I saw fit. I would buy my food of such kind and in such condition as to take but little time for its preparation, for I intended to "keep bach" for which I was qualified by more or less previous experience. If at any time I wanted a square meal, I could take a row around to the St. Louis hotel, or if the wind were favorable could sail over to the Lafayette, or to Excelsior. In short, I meant to rest and take it easy; do nothing at all to-day, that I could put off till tomorrow. I thought this all over the first day and in accordance with the programme proceeded to make myself as lazy as possible. I succeeded well. It requires but little effort to become lazy when one is in the afternoon of life. During a week my activity was reduced to a minimum; I saw but few people, although I had neighbors only a few rods away concealed by the thick brush, that grew between us. Once a dog came and after looking aroung, trotted away. As I sat or lolled on a rustic bench near the lake, the drowsy monotomous lapping of the water against the shore kept me for hours on the border land of sleep, just in that condition in which one does not know whether the motions of his brain are dreams or waking thoughts, and in which he often dreams that he is dreaming. The

sound of the distant puffing of a steam yacht or the merry laughter of a sailing party, that occasionally ricochetted to the shore rather directed than disturbed the train of these passive activities.

The exhausted body or brain is like a machine that has run too long without being oiled. It goes with reluctance and with damaging wear and tear. But when we are thoroughly rested, the motives that before were unable to move us, now set us going with the greatest facility.

After the rest and quiet of a week, I began to feel an impulse to do something or to go somewhere; and a short debate settled that I would take a trip by sail and oar to the upper lake. As I did not intend to hurry and might be gone two or three days, I laid in a stock of provisions accordingly; with such cooking apparatus as a coffee pot and frying pan. Nowhere is a cup of coffee, a slice of ham, crackers and cheese so relishable as when they satisfy real thirst and hunger alongside a camp-fire of dry sticks. Then perhaps I might shoot a duck or hook a croppy. At night the sail stretched over a fishing pole could be formed into a shelter tent, something like the "dog tents" Uncle Sam gave us for shelter in the southern campaigns in the early sixties. In short I intended to make a regular cruise, and as my boat was named Sally Ann, this trip should be known in history as the cruise of the Sally Ann.

It was a fine morning when, all things ready, I hoisted sail. The wind was from the southeast and I started off before it at an exhilarating speed, steering northwest. In a short time I came abreast of Big Island, when turning west skirting its north

shore, I soon got becalmed, the island cutting off the wind. I was obliged to take the oars, but as I dallied and loitered along, it was a full hour before I passed the island and caught my breeze again. I was here steering southwest across the wind and heading for the narrows, and the canal leading into the upper lake. Nothing can exceed the beauty of this lake, no matter at what point the view is taken. At this place looking northeast over the stern of the boat, the village of Wayzata partly obscured by Spirit Island, appeared as if seated in the water half a mile away, though in reality it is five miles. On the southeast within a mile, was the Lake Park hotel and beyond it, half a mile further and across the entrance to Gideon's Bay, a part of Excelsior could be seen climbing its picturesque hills, while along the piers at the bottom of their slopes, were numerous steam and sailing crafts of various kinds, besides a fleet of row boats.

As I approached the entrance to the canal, I observed standing on the south bank, a man with a gun in his hand and dressed in outing costume, whose figure and attitude reminded me of someone I had seen before. "Can it be possible", I said to myself, "that that is Allan Ocheltree?" By the time the boat touched the land, I had made sure that it was and I sprang ashore to greet him. The recognition and gratification at meeting were mutual. Our friendship for each other, was always the closest friendship either of us had. We had been room-mates and class-mates for four years at college, and our temperaments and tastes were like complementary colors, of such harmonious contrast as to

fit each other to a T. In our class we were to each other like the two end men of a minstrel troup; he at one end—the head end—and I at the other. It is singular how people, like drift wood on the stream of time, are at times drifted toward each other and float along together till some eddy or obstruction in the current separates them, and hurries them off in diverging directions, perhaps to meet again farther down the stream, it may be more than once. Sometimes a leave-taking under circumstances, that seem to forebode it to be the last and clothe it in gloom, and sorrow, is nevertheless not the last by many; while a cheerful good-by with a light hearted "ta-ta-old-fellow-see-you-to-morrow," may prove the beginning of a separation destined to endure for years—perhaps forever.

The Ocheltree family and my ancestors, were from the same Scotch-Irish stock, were friends and neighbors near Belfast and emigrated to Maryland about two hundred and thirty years ago, settling at first in Somerset County. A few years later they moved north into Cecil County, and from there in 1760 a large emigration took place to Mechlenburg County, North Carolina. Among these emigrants, were Duncan Ocheltree and my grandfather's Uncle John. These two were friends and neighbors in the new settlement and when the revolutionary war broke out, they both adopted the patriotic cause. The Mechlenburg declaration of independence was adopted and signed May 20th or 31st, 1775, by a convention of which John was secretary, and it was supported by Duncan. But in 1780, Lord Cornwallis overran the state and captured Charlotte, the

county seat of Mechlenburg, and Duncan, believing all was lost, hastened to turn Tory and make his submission to his lordship in order to save his wealth of which he had acquired a goodly share. This was a bad break and he made it worse by the supererogatory zeal of a new convert, in harassing his former friends and piloting the red-coated foragers to their hay stacks, hen roosts and pig pens, not sparing his old friend John. But the triumph of Cornwallis was short; in a few days, he was obliged to evacuate Charlotte and then Duncan realized that he had placed himself in a very bad position. As the British troops were packing their knapsacks preparatory to decamping from Charlotte between two days, Duncan determined to throw himself upon the generosity of his former friend John, and so under cover of the darkness he rode out to his farmhouse nine miles in the country. John, who was two miles off in the patriot camp, was sent for. Duncan surrendered his sword and begged his old friend to forgive bygones and advise him what to do. John's sympathy for him at that stage of affairs was not particularly tender as may be supposed, but nevertheless his advice was no doubt the best possible. He said: "Ocheltree, neither your life nor your property is safe in Mechlenburg. The Whigs will take both Your only safety is in instant flight. I advise you to reach the Yadkin before daylight." He took the advice. And so they parted. Four generations later like two stray straws on a flood, Allan Ocheltree and I were floated into the same class room at school. Did it make any difference to me or to him that his great grandfather, made a bad guess seventy years

before? Not a bit. Every man's ancestral tree is just the same height as all the rest, his lineage is just as long and his pedigree must contain practically the same number of terms whether we reckon back to Adam or to the Ascidian or to original protoplasm. Not a member of the long line made himself or the circumstances surrounding him, and in no two cases were these precisely the same. The circumstances that made Confucius or Alexander the Great, or Julius Caesar, or Columbus, or Washington never happened to anybody else. It was no fault of the obscure ancestors or descendants or cousins near and remote of those worthies that these circumstances never surrounded them. On the other hand it cannot be ascribed to the merit of the long line of those belonging to the dead level of the average, in size and in quality, that they have been missed by the untoward circumstances that selected certain individuals to be in one respect or another conspicuously below that dead level.

After quitting college, Allan and I occasionally ran across each other, but the last meeting before this, occurred in 1876 on Arch Street, Philadelphia. He was interested in an exhibit in the great exposition, and being then in a great hurry made an appointment to meet me next morning. I kept the engagement, but he was not there. I knew urgent business had turned up to prevent him, and after I returned to my home I received his letter saying so, and appointing another hour. This letter had missed me at my hotel and followed me to Illinois. Here then, we were having our reunion sixteen years after it was due. But now we could make up for

lost time for neither had engagements that reqiured attention for a week at least. It was speedily arranged that Allan should accompany me and that we should carry out together the plan I had proposed for myself. He wrote a note for his boarding house keeper in Excelsior, saying he would be gone some days, and gave it to a rowing party going to Excelsior, that we shortly after fell in with, and who cheerfully consented to deliver it. The wind was still from the southeast, but light and we slowly sailed westerly and south-westerly passing successively the state fruit farm and Sampson's place lying on our left, and Spring Park on our right, nad in a short time reached Howard's Point that juts a third of a mile into the lake from the south shore. We sailed through the strait between this and picturesque Rockwell's Island with its attractive summer hotel, and restful looking surroundings, and turned southwest toward Smithtown Bay.

We entered Smithtown Bay, but did not go to the end of it, for the wind was not favorable, and as we turned west toward the highlands of the upper lake I fell into a reminiscent mood. Up to this time we had occupied ourselves in admiration of the delightful scenery and in such careless chat as occurred to us, sometimes taking a pull at the oars, when we entered a locality becalmed by being screened from the wind, and sometimes pulling in the fish line that dragged over the stern of the boat to see why we never got a bite. But here the memories that crowded upon me completely absorbed my attention and I became silent. I had tramped all over this country in 1877 in the selection of a route

for the Minneapolis and Northwestern Narrow Gauge Railroad, and so was familiar with the topography, not only of the upper lake, but of the whole route from Minneapolis to Hutchinson. The first preliminary line surveyed from Hutchinson to Minneapolis in the latter part of November, 1877, passed along the foot of the high bluff just in front of us, but the line was not finally located till October, 1879.

When I explained to my friend how the line passed south-easterly along the foot of the bluff, at the edge of the water, except where it dodged behind Hoffin's headland, and then swept around the head of Smithtown Bay turning north-easterly toward Excelsior, "I declare" he exclimed, there never was so romantic a place to locate an excursion railroad. So attractive a line ought surely to have been built. Why wasn't it?"

"Well" I replied, "it was a case of infanticide."

"How was that?" He asked.

"You've heard of treacherous midwives and nurses and murderous baby-farmers being subsidized to strangle an unwelcome cherub as soon as it is ushered into the world?"

"Yes, was it a case of that sort?"

"This infant was born healthy and vigorous after what might be called a rather protracted period of gestation—some thirty months. It had no less than twenty-one nurses in the shape of directors, which number was four times as great as it should have been and one over.

When there is such a mob of officials, the management usually devolves on a few of the more active and interested. That active minority in this

case somehow either had from the first, or acquired, a greater interest in killing this enterprise to please its rivals than in carrying it out in good faith."

"How did the line run west of here" he asked.

"It passed north-westerly along the foot of the bluff yonder, on the top of which you see Smith's stone house, then along the shore just in front of the "hermitage", and a quarter of a mile beyond that it turned toward the west and cutting through the ridge of the peninsula that separates the upper lake from Halsteds Bay, it skirted the south shore of that bay, and thence bore in a generally westerly and northwesterly direction, through Minnetrista township to St. Boniface and thence to Watertown.

Halsteds bay itself is so secluded as to form practically a separate lake and a beautiful one too."

"Suppose we sail up along this shore" said Ocheltree, "I am quite interested in the place.

We turned the nose of Sally Ann toward the northwest and sailed slowly before the very light wind. We passed Crane Island lying upon the right —a sort of lying-in hospital and nursery strictly sacred to the use of Cranes only, whose occupancy dates back of the earliest settlement of the country, and whose title has been secured to them by an act of the legislature, against the claims of all featherless bipeds. Further on, upon the mainland, is the hermitage and just in front of it the grave of Halsted, who many years ago, lost his life in the lake so sadly and mysteriously. A short distance beyond the hermitage, I pointed out the place where the survey left the shore of the main lake and cut across to Halsteds bay. We concluded to go on to the

strait leading into that bay and sail around to its south shore. To reach the strait involved sailing north a mile and then over half a mile west. As the wind was still favorable this was soon accomplished. But when we reached the strait, we could no longer use the sail, and were obliged to have recourse to the oars. Inside the bay there was but little wind, and that was against us, as our route now lay due south. A little over a mile of rowing brought us to the south shore of the bay. Here the bluff covered with timber and underbrush slopes down to the water's edge. Along the foot of this slope, I pointed out to Ocheltree the position of the narrow gauge survey. "It is a wonderfully romantic place for a pleasure road," said he.

It was now considerably past noon, and our exercise had begun to tell on us both somewhat and to suggest a rest and something to eat. Accordingly we pulled the boat up on the beach, and got out some cooking utensils and provisions. I started off to collect some dry sticks to make a fire and Allan took a pail and proceeded along the shore to find a deep place or a boulder from which he could dip up clear water for our coffee. We happened to go together for a few rods, when glancing up the slope a short distance, I discovered a stake sticking in the ground. I gave an exclamation of surprise and quickly ran to secure it. It proved to be what I suspected, one of the stakes of the narrow gauge surwey. "What have you found, old fellow?" Allan asked. I told him, and it seemed surprising to both of us that that frail bit of a pine stick should have survived the storms and accidents of thirteen years.

We had used for stakes on those surveys common plastering lath; one lath four feet long being cut in the middle made two stakes. This was such a stake, an inch and a half wide and three-eighths of an inch thick. It owed its exceptional preservation to the fact that it was full of pitch and to its protected position. It had been driven in a slanting position, partly under the body of a large fallen tree, that lay over the point where the stake should have been set. The number of the stake had been written with red chalk, on the side that had happened to come underneath and so was largely protected from the rains. But it was now illegible, four red blotches being all that remained.

A person walking through our Minnesota woods will often meet with a little mound of earth, alongside of which he will see a cupshaped depression in the ground. The depression marks the spot where at some time in the past there stood a noble tree, and it indicates that the tree yielding to the force of an ancient tornado was toppled over, and, pulling its roots out of the ground drew up with them a cubic yard, more or less, of earth. Afterwards when the roots began to decay the earth was dropped in a heap beside the hole. There was such a mound and hollow at the west end of the rotten log in question, showing that it had been overthrown by the fierce assault of a western hurricane. The mound was old, well rounded by the action of the weather and covered with a mat of grass. I sat down on this mound in a half reclining position, with the stake in my hand, and tried again without success to make

out the number*. A solitary mosquito was singing about my right ear, and persisted in returning and constantly evaded my efforts to capture it. Directly however, its wings became still, and unaccountable stupor appeared to steal over me, my head drooped over toward the left till it touched the grass and for a moment I was unconscious. But it was only for a moment for a new consciousness almost immediately supervened. It was a consciousness composed chiefly of subjective sensations, although I hold that even subjective sensations, very often in an unperceived manner, receive their direction and stimulation to activity from objects around us. But that is a question of psychology. At all events the sensations, I am about to relate were the most remarkable I ever experienced, and at the time were not accompanied by the least intimation, that they were not purely objective.

CHAPTER II.

The Professor.

First there was a loud singing noise in my right ear, pitched in a high key. Presently this pitch became lower and the sound resembled the rattle of

*After reaching home and looking over the notes of the survey, I found the number of the stake to be between 1175 and 1185, and it was set on Saturday afternoon, October 25, 1879.

rolling car wheels on a track, and they seemed to be approaching. I suddenly realized that they were advancing to the place where I lay, and greatly startled, I sprang to my feet. I was non too quick, for a train of four cars rolled rapidly over the very spot where I had lain. I saw they were filled with gay well dressed people evidently on a pleasure excursion. As I gazed after them toward the west along the gleaming rails, I remembered there was no locomotive with the train. Of course not, thought I, the road is run by electricity. But there was no overhead wire and no trolley. O, I see, these cars are propelled by storage batteries that they carry with them. I felt no surprise at this, nor at the fact tht the road had been built after all, for it all seemed to be a matter of course. Turning toward the east where the line penetrated the ridge that lies between the bay and the lake, I saw on the edge of the cut the tall white mile post so illuminated by the direct sunshine that the number 24 in large black figures could be made out, although the distance was a third of a mile or more. While I was still gazing in that direction I suddenly became aware of a strange looking object coming through the cut and around the curve. It was a four wheeled vehicle something like a hand car, but it was not being "pumped" nor were there any handles for propelling it in that way.

The idea suddenly came to me that this car like the first I had seen, was propelled by a storage battery concealed somewhere about its anatomy. But the interest created by the car was quickly eclipsed by that inspired by its occupant; and a more remarkable creature I never read about or dreamed

about. He sat bolt upright on the seat at the rear end of the car and while he was at a distance, I took him for a rather stiff dignified and odd specimen of a man. But as he approached and I got a better opportunity for observing details, I directly came to doubt if he could be a man at all. When I first saw him, I observed what seemed to be a large fan-like appendage projecting from his back, which I then took to be some peculiar garment streaming out behind. But as he approached, this appendage separated into two, and spreading out to the right and left acted like brakes against the wind and rapidly checked the speed of the car, reminding me of the action of the wings of a bird, when it alights. In short to my great astonishment it turned out they were wings. I instinctively stepped back two or three paces to allow this strange apparition to pass, but to my surprise the car stopped directly opposite to me and its occupant with a slight flutter of the aforesaid wings, hopped lightly out of it and stood beside the track so near to me, that I could have touched him. For a moment or two he busied himself with some arrangement about his car, the nature of which I did not observe, as my attention was absorbed chiefly by himself.

In the description, that I shall now give of him, will be included a number of details that I did not observe at first, but which showed themselves during the progress of our interview. The large wings mentioned above were at least six feet in radius, and each was nearly a semicircle. They could be folded like a fan and when in that position they lay down along his back from his shoulders to his heels

and when fully extended reached from his heels to a point nearly five feet above his head. They were of a soft semitransparent, but thick and tough membranous material, full of veins and nerves and supported by stiff elastic ribs, radiating from their articulation at the shoulder to the circumference.

Besides these wings, he had two other pairs similar in texture, but much smaller. One pair was attached just in front of the principal pair and ordinarily they were directed upward beside his head and reaching above it. But he could also extend them laterally, so as to cover his face, as well as the back of his head and did so repeatedly while he was with me, apparently to shield himself from the rays of the sun. The other two were attached just below the main wings and extended downwards alongside of the body to the feet. But they too were extensible laterally and could be made to cover the entire lower half of the body. In short, these four minor wings were equivalent to clothes, and the numerous nerves by which they were traversed, indicated that they were also delicate organs of the sensations of heat and touch.

In addition to these wings, there were six other limbs, two of which were legs and two were arms, in much the same position in which they occur in man. The third pair of limbs were attached to the thorax between the arms and legs, and were ordinarily folded across the thorax. I came to the conclusion these limbs could be used either as hands or feet as occasion required, but while he was with me he made little other use of them than to occasionally give me a sly poke with one of them—usual-

ly the right—in the side—usually the left side—about the position of the second rib from the bottom. As these gestures always came about in connection with some humorous or ludicrous idea, it occurred to me in a whimsical way to call these limbs his jokers. His head was immense, possessing, I should say, double the capacity of the largest human head. The top part was globular, and the lower part, which might be called the face, was long and wedge shaped, tapering down to the jaws. The jaws were strong and well set with teeth and worked laterally instead of vertically as with us, and the slit forming the mouth was vertical and in the middle. There was no chin. The eyes were placed just above the mouth and at the base of the upper dome shaped portion of the head. They were of enormous size fully two inches in diameter, half globular and set far apart, forming as it were the corners of the face. They were not movable as ours are, because every part of the surface of the eye was equally good to see with; and their position enabled their owner to see three-fourths of the horizon without turning his head. The face had not one particle of expression or mobility to it, but this was compensated a hundred times by the expression of the eyes. Their usual expression, when at rest, was one of supreme kindliness and benevolence with a slight element of humor. But when the mind was in activity, the eyes beamed with good natured wit, were suffused with tender sentiment or flashed with intellectual brilliancy to a degree I would never have imagined possible. Under each of the wings there was an opening leading into the body, those of the middle wings

being nearly three-fourths of an inch in diameter, and the others very much smaller. All were protected by movable lips. I soon discovered that these were for the purpose of breathing, the air being constantly inhaled and exhaled through them. I have no doubt the lining membrance of these breathing tubes was sensitive to odors and was therefore an organ of smell. As to ears, there was one plainly to be seen on the upper part of each arm, and I observed him move his arm in the proper directions to catch the sound. In the long conversation I had with him I cannot say that I heard any articulate voice. There was a slight humming noise, rising and falling in very agreeable musical cadences, and these appeared to accompany the enunciation of his ideas and thoughts when he addressed me. When I spoke to him, I used articulate words in plain English and he appeared to hear in the ordinary way. But his thoughts came to me like waves or pulsations and appeared to be injected bodily into my brain without any distinct sensation of hearing them. In short I directly came to perceive that it was a case of the telepathic transfer of ideas, experiments in which are known to most people, but which was in this case vastly more complete and perfect than I had ever imagined possible. In the report of the conversation between us that I give herein it is to be understood that I do not quote his language, but give the impression of his thoughts upon me in my own language, and the best I have been able to do, I am sensible, forms a very inadequate dress in which to set off the beauty of his sentiment or the strength of his reason.

When my visitor had finished whatever arrangement he was making with his car, he turned partly around and I saw he had in his hand a small spool of copper wire, two strands from which connected with the car. Next he performed some slight manipulation with his coil of wire, the nature of which I could not make out, but which produced the surprising result, that the car slowly rose from the track continuing upward till stopped by the wire, then my visitor drew it gently to one side and pushing a stout iron pin into the ground, he attached the spool and coil to it and left it there, picketed out, precisely as a cow-boy pickets his mule, except that the car floated in the air gently pulling on its tether. I had for some moments been casting about in my mind for some appropriate manner in which to address my singular visitor. The more I observed his actions, the higher my opinion rose of his character, abilities and position in the scale of existence. Royal and aristocratic titles, such as Your Majesty, My Lord etc., are very awkward in the mouth of an American and seemed by no means sure to be apropriate in this case. Then I thought of our American titles, General, Colonel, Major, Judge, Squire, Governor, none of which of course would do. But the surprise and curiosity excited by this performance of picketing the car in the air would in another minute have overcome the tension of diffidence and doubt and I should have addressed him as **something**, even if no better title than plain **Mister** occurred to me.

But he saved me this necessity, by opening the

conversation himself. He seemed to know what I had been thinking of.

"A title of address", said he, "should be significant of facts. It is ridiculous to call a man Honorable, because you have sent him to the legislature, or to congress, or another person 'Majesty' whose understanding is below mediocrity. You may call me, 'Sir,' which title as you know means simply an older person and I will call you by some title, that means young—if it means quite young, it will still be very appropriate, eh?"

This was accompanied, by a queer, but decidedly jolly and good natured expression of the eyes and a gentle poke with his right middle hand described above.

"Then," said I, "you think you are the older. The fact is, I am so well preserved, that almost everyone rates me ten or fifteen years younger than I am, and perhaps you do."

"I am nineteen," he said.

"Why," I exclaimed, "I am more than three times that old."

"Nevertheless, I am very much older than you," he replied.

"You talk in riddles," said I, "I don't understand you."

"Well, I will explain. You understand, that every race is made by its environment and the same is true of each individual of the race."

"Certainly, that is my pet theory."

"Well, the environment of the race is in reality, the environment of every individual in it, for every individual inherits the impress made upon the race

during all past ages. For this reason a human infant just born is a being of far greater experience than a mature elephant; the experience of the race is his and it is expressed in the structure of his brain and body. In like manner an individual of our race has the long life of his race behind him and is older at birth than a human being is at 80, because our race has a vastly longer history and experience than yours."

"Your idea is ingenious, but yet it must be admitted that a mature elephant knows more than a new born human infant."

"That depends on what you mean by knowledge," he replied. "The most knowing person has no knowledge when he is asleep, but he possesses the potentiality of getting it when he wakes up, and when he is awake, his knowledge extends only to the things about which his brain is active for the moment, while as to other things, the most that can be said is that, he may possess the potentiality of knowing them when the activity of his brain is directed to them, by appropriate stimulations. In like manner the potentiality of all the knowledge belonging to his race, slumbers in the new born infant; and as he gradually wakes up in the process of his growth and development, this knowledge, upon proper stimulation of the brain, flashes into view. Therefore everything depends upon the race to which one belongs. Our race had already reached a high degree of cultivation before your's was distinguishable from four footed beasts."

My disposition to generalize, unwittingly influenced no doubt by my early Sunday School educa-

tion, here led me to make an observation, that a moment later I perceived to be crude and ill considered. It was to the effect that this great age to which his race had attained, had made their superior mental development possible and had given the time necessary for their physical evolution through and from the human form.

His answer to this was a loud and prolonged, ha ha ha! That is to say, I heard nothing quite like that, but was impressed by a sensation that his mental state exhibited in human expression would be laughter loud and long.

Said he; "the conceit of the human race is the laughing stock of all our people, but you are a very young race and you will know a great deal more when you get older. Individuals of our race and kindred races have visited the earth, and allowed themselves to be seen. And descriptions of them have been attempted by some of your ancient seers. *

The human race having become dominant on earth, they have entirely overrated their importance and not only fancy that they will some day own the rest of the solar system, but imagine that they will sprout wings and develope into beings like us; but any of you that have studied natural history and your new theories of evolution, ought to know that beings having twelve limbs could never be evolved from a race having but four. The only possible evolution by which your race could ever possess wings, would be the conversion through use and habit of your arms into wings, which has actually occurred in the case of your bats and birds.

The families on earth that are related to and

resemble us are the insect tribes. In fact we trace our origin back to an ancestry, which according to many of our best scientists is exactly parallel with that of your insects, and they alone of mundane inhabitants could ever expect to evolve a posterity at all like us, and they never will, for the conditions on earth will forever keep them in a subordinate position to the present dominant race."

During this speech, notwithstanding its intense interest to me I was becoming impatient and nervous with the apprehension that he might leave me without telling me where he was from and how he made that car of his disregard the law of gravitation. In the solution of this last riddle especially I could readily see a utilitarian outcome of overwhelming importance. I am afraid that my questions were put with an undignified eagerness and precipitancy, which no doubt he observed, for he first proceeded to say that he had much information to communicate to me and was glad to see me desirous of receiving it.

"You understand the law of the **attraction of** gravitation"—I nodded assent—"but you know nothing of the **repulsion** of gravitation." Indeed I did not. I had never heard of such a thing.

He continued: "All polar attractions are accompanied by repulsions. This you see in magnetism and in electricity, and it is equally true in gravitation. The force with which bodies fall toward each other consists merely of the **difference** between the attractive and the repulsive force. Ordinarily the attractive force takes hold of the **near** ends of the molecules of ether contained in solid or fluid

bodies, and the repulsive force affects only the further ends of the same molecules, so that by reason of the difference in the distances over which these two forces operate the attractive force always overpowers repulsion. But we have discovered a way by which the action of these forces is reversed, so that the work of repulsion is performed on the near end of the molecules and attraction on the further end, and then attraction being the weaker of the two, the body, as a whole, is repelled. We imitate in fact the action that takes place when the attraction between two electrified bodies turns to repulsion. Repulsion also takes place between the sun and the tails of comets. The comet's tail is attracted toward the nucleus of the comet and at the same time repelled from the sun. We have not been able to make bodies discriminating like that in their attractions.

"But," said I, "it must take as much power to make this change as the changed condition yields after it is made and I cannot see where you get the power; you cannot make something out of nothing."

"Very true," said he, "but the resistance to the change is in reality—very small, and it is accomplished, even by neuro-magnetism in a wonderfully simple manner. The proportion of force required to do it is no greater than that required to move the slide valve in the steam chest of one of your steam engines, by which the enormous force of the steam is alternately shifted to first one end and then the other of the cylinder. We can generate the force required for this, in our own tissues and it accumulates in electric organs possessed by us

similar to those of your electric eels. I will show you."

With that he reached out and touched me on the mouth. There was a flash and a sensation as if a coal of fire had touched me, and a smart shock passed through my limbs. I was easily enough convinced that he possessed large electric storage capacity, and he told me he could give me a shock 100 times as strong as the one I had received. I was willing to take his word for that. But I was by no means satisfied with his explanation of the reversal of the forces in gravitation. It seemed to me to involve a mechanical fallacy and I half suspected he purposely avoided giving me the true explanation. Although I have since given the subject considerable thought I have not been able to clear it up. Theorize as I might however, there was the fact that gravitation was somehow suspended, in the case of the car.

I said to him earnestly, that I would give anything I possessed to be able to understand and apply these principles as he did.

"I have no doubt at all of that", said he, "but it is our secret, and I could commit no more heinous act of treason against my people or our planet, than by divulging it.

"For goodness sake," I exclaimed, "tell me what planet you inhabit, and what harm could result from giving this invaluable information."

"My home is the moon," he said quitely, "and I have ever since wondered how I came to receive the announcement without the slightest degree of

surprise as if it were an every day occurence to meet people from the moon.

"The discovery you wish me to reveal to you, was made by our ancestors over a million years ago," he went on, "the population of the moon was then as great as the planet would support in comfort, and its regulation and maintenance had been reduced to a strictly scientific basis. It was seen at once and soon experimentally proved that our people could by the use of this principle easily visit the earth, and if the discovery should be communicated to the earth people, there would be nothing to prevent flooding the moon with an undesirable horde of adventurers, who would like a swarm of seventeen year locusts proceed to lay claim to everything in sight and seriously disturb the lunar peace and prosperity. And so the communication of this secret was forbidden on pain of the terrible punishment of projection."

My inquiring look showed that I did not understand this, and he continued.

"Projection is the extreme penalty of our laws. In it the criminal is locked up in a spherical shell of cast iron having two small glass windows and furnished with compressed air in alumina flasks, and food sufficient to last from a few days to two years according to the severity of the sentence, the larger amount of food going with the more severe sentence. After he is fastened in, the repulsion of gravitation is turned on and the ball instantly projects iteslf into space bounding off at a terrific speed. Yet no matter what direction it takes it can never come into collision with any body whether planet or

sun, but whenever it approches one it is instantly repelled, and thus it continues to be hurled from one to another forever, and the longer the criminal lives to perceive and reflect that he is an outcast from all worlds, the greater his punishment is supposed to be. Is it a theory of some of our scientists that a projected person continues to be repelled from sun to sun till at last he reaches the edge of creation and is hurled completely out of the universe. However this may be, the friends of a projected person never know where he is."

"I hope," said I, " that you are not often under the necessity of inflicting such a terrible punishment as that."

"No one has been projected for over forty years, but 500,000 years ago the punishment was frequently resorted to."

"In traversing the space between the earth and the moon, I suppose you will first move by repulsion from the earth?"

"Yes, I use repulsion for the first part of the journey. This gives me a rapid send off from the earth. My speed constantly increasing till I reach the distance of 216,000 miles from the earth, at this point the repulsion of the moon—which by the way is exerted against me from the time I leave the earth —is just equal to that of the earth, but the momentum acquired by that time carries me almost home, the moon's repulsions constantly diminishing the speed and at last bringing me to a stand still or sheering me off to one side. It is then necessary to turn on attraction, which causes me to approach

the moon with a speed which is easily checked and regulated by using repulsion when necessary."

"The terrific speed with which you travel or fall, as we might say, from one planet to another, I should think would overpower you—take your breath away."

"We have to guard against this, while we traverse the atmosphere, both at this and at the other end of the journey, but once clear of the atmosphere we fall through empty space without the slightest sensation of motion and realize that we are going only by the rapid decrease in the apparent size of the globe we are leaving and increase of the one we approach. It is impossible to conceive a more thrilling experience than is conveyed by the perception of the growth in a few hours of your earth from a ball six feet in diameter as it appears to us at the start, to the vast and illimitable expanse of variegated beauty it gets to be before we reach it.

On the journey, it is necessary to guard against the blistering heat of the sun's rays upon the side on which they fall, and the intense cold which we encounter on the shady side; and we must look out that neither ourselves nor any of the loose articles we carry in the car such as our flasks of compressed air, our food etc. are repelled from the car and allowed to fall to earth or moon by their ordinary gravity, for the change to repulsion only applies to the iron part of the car and not other things. It cannot be applied to wood or to animal or vegetable tissue etc. We guard against all these contingencies by having a stout cover over our car, supported by steel hoops, when we are on an intermundane trip.

When we travel on the ground, this is folded up and not used."

Then I suppose the wheels of your car come into use when you travel on the ground, for I can see no use for them in your "intermundane" journeys."

"That is true. This car I have with me is my ordinary carriage at home. It is a railroad car as you see by the flanges on the wheels. Railroads with us are public free highways, built and maintained by the state. They have from four to twelve tracks. Every person who is qualified by his education and training to manage a car is furnished with one by the state. The propelling power is nothing but gravity either in attraction or repulsion, the former being used on down grades and the latter on up grades, the car having rollers that hook under a flange at the top of the rail to prevent the car from rising bodily from the track.

The surface of our planet is very rough, but still the grading for roads is light, as it is possible to ascend grades of 100 per cent or even steeper. Level grades on our roads are always avoided, and in districts where this cannot be done, we use electric roads.

The cars are so constructed that different parts are electrically insulated from each other, by which means a part of the car can be placed under the influence of attraction and the rest under that of repulsion. This is done on down grades. The weight of the load and of part of the car pulling down and the weight of the rest of the car holding back. It is always arranged to have the car heavier than its load, and the driver can regulate the force used by

balancing one against the other, so that a car of many tons shall press on the rails with the weight of only a very few pounds. Thus the wear and tear on road beds and rails is almost nothing and the roads are practically everlasting.

CHAPTER III.

The Moon and Its People.

"I am amazed," said I, "to learn that the moon is inhabited and by a race apparently more advanced than our own. Our astronomers have assured us that the moon is a desolate played out barren world without air or water; totally unfit for inhabitants."

"The astronomers could only report what they could see, and the side of the moon visible from the earth is as they describe it, but they have never seen the further side and never will, for that side is always turned from the earth. But the population of the moon is not far from half that of the earth and the people live in greater comfort. But there is no population living on the surface on the hemisphere facing the earth—I see this puzzles you," he said.

It certainly did. "Do you mean that the Lunarians live under ground?" I inquired.

"I will explain. The moon is a much lighter body than the earth bulk for bulk, a cubic yard of it containing on an average only six tenths as much matter as an average yard of earth. The reason of

this is that a very large part of the moon's bulk is made up of interstices, caves and openings. Now it is a remarkable fact that the hemisphere of the moon facing the earth is much lighter than the further one, so much so that the center of gravity is 33 miles further from this side of the moon than from the further side. This fact has been suspected by some of your astronomers. The consequence of it is that the sea has all gone to the further hemisphere, and the near hemisphere is in the highest place, about 33 miles above the level of the sea. It is much as if a concave cap, the material of which is 33 miles thick at the center and tapers to zero all round the rim, were fitted on to a sphere. This rim is at the edge of the moon, as seen from the earth. Our atmosphere like yours, gets lighter as we ascend and is too thin to support life at a height of five miles, so that the great plateaus of our hither hemisphere are over 20 miles higher than any appreciable atmosphere. So you can see the impossibility of life on the hither surface of the moon if you reflect a moment what the conditions would be on a mundane plateau 33 miles above the sea level. Your highest mountains are only between five and six miles high, and you know the impossibility of either vegetable or animal life at even that altitude.

On the earth such elevations are regions of perpetual snow, and the hither surface of the moon would be such a region if it possessed water and an atmosphere. But while the surface on this side is uninhabitable, there are immense tracts of underground space, that have been converted into habitable territory. This underground country lies so

far below the surface that it is practically near the sea level throughout. It is approached at all parts of the rim of the cap just described, and there are many thousands of tunnels entering it all round this rim, especially in the equatorial parts of the moon. A great amount of labor has been expended, not only on these entrances, but on the internal cavities to which they lead; but compared with the work performed for us by nature, our own labor is but an insignificant item—hardly so much as the labor of your race in fitting up the earth for your residence. The entrances are all volcanic craters, and the vast cavities to which they lead, were excavated long ages ago by volcanic action. The material blown out of the volcanoes, mostly fell upon the hither side of the moon increasing the bulk of the cap; most of the volcanoes being on this side. But even the material thrown from the lateral regions was drawn this way by the attraction of the earth and after describing a longer or shorter curve, fell on the hither side of the moon.

Nearly all the moon's volcanoes are on the hither portion, the volcanic region occupying about two-thirds of the whole surface of the moon. The weight of bodies on the hither side is appreciably less than on the further side. These facts are supposed to be due to the earth's attraction neutralizing that of the moon and having resulted in building up the vast protuberance or table land (of light and porous material) on this side, the latter is often called, by us the "Mundane Hump",, in recognition of the earth's instrumentality in its formation. The interior continent is often spoken of as the "Pocket" by the

people on the further side; or sometimes as the "Chest", and the "Hump" is called its Lid.

The further side of the moon is called the Exterior Continent, but often humorously designated by the people of the "Pocket", as the Out-door Continent."

"But," said I, "what a strange life it must be in those underground cavities. I suppose of course you can have nothing better than artificial light there?"

"True," he said, "our light is mostly artificial, but it is made as bright as we can bear it. It is electric light, but it is regulated to be quite equal to sun light and it never goes out. There is no night in the underground country, as there is outside."

"This is wonderful!—But where do you get the power to furnish this light? Have you got waterfalls and coal beds down there?"

"We have many waterfalls, but do not utilize them to any great extent for their power and we have a considerable amount of coal, which however we do not use for fuel, but reserve for food purposes, to be drawn upon as may be required."

"Is stone coal what you have to eat then?" I here broke in. With exasperating deliberation, he gave me an admonitory poke with his right joker.

"One thing at a time—one thing at a time. You wanted to know where we get power to turn into electric lighting. It is the power of gravity. If one of your perpetual motion cranks understood the secret of the use of the repulsion of gravitation, he could contrive a perpetual motion in an hour and a half. We have many forms of such machines that

have been in use for ages. One of these is the pendulum machine. This consists of a pendulum weighing from a few pounds to many tons and so contrived that when it reaches the lowest part of its swing it automatically turns on the repulsion of gravitation, which reinforces its momentum on the ascending part of its arc, enough to compensate for the work done by it and the friction of the machine. Another machine is the oscillating balance. This consists of weights at each end of a beam balanced in the middle and so governed by an automatic shunting apparatus, that one of the weights is under the influence of attraction while the other is under that of repulsion. When the former has reached the bottom of its oscillation and the latter the top, the force is reversed in each and so the motion is perpetual.

Another machine is the Automatic hammer, which is a literal hammer though it may weigh many tons. The end of its handle is confined by a stationary wrist, while the hammer rises and falls under the effect of repulsion and attraction automatically alternated by shunting apparatus. Then we have the vertical parabolic railway; which consists of two steep inclined tracks, meeting each other at the foot. A car runs alternately down one and up the other on much the same principle as the pendulum machine. There are numerous other machines, but they all operate on the same principle, just as you have many forms of water wheels, all operated by the weight of water. So you see our power costs us nothing at all after the machine is built, except for the oil for its lubrication. As these machines

have been known and used by us for many thousands of years, you may readily perceive what changes we have been able to make in all those conditions of our planet, that relate to our comfort and general purposes. You may add to this, that any exertion we make relating to the movement of heavy bodies, is ten times as effectual as the same exertion made on earth. Water and air with us are only one-sixth as heavy as on earth, and the average soil and rocks one-tenth as heavy; so that our laborers handle wheelbarrows holding a cubic yard of material as easily as yours do their little barrows containing two or three cubic feet."

Here I interposed again. "You speak of your atmosphere being only one-sixth as heavy as ours. That agrees with what our astronomers have told us, and they have pointed out that even if there is such an atmosphere, on the moon, animal life like ours is not possible there, because the air is too thin."

"Your astronomers do not consider that animal life and activity depend, not on the amount of air the animal is surrounded by, but by the amount of it he can use. The fishes in your waters have less air to the cubic foot of space than we have, yet are active, but if you take them out of the water and surround them with ten times as much air as they had, they nevertheless die, because they have not lungs suitable for breathing it. But furthermore it is not the amount of air that is of such consequence to animal life, but the amount of oxygen. Your air consists of about 21 parts of oxygen to 79 of nitrogen, and mixed with it is a considerable amount of

carbonic acid and other impurities. In our air the proportions of nitrogen and oxygen are about reversed, and there is a far less amount of carbonic acid gas. There is also a much greater quantity of ozone, which as you know, is a concentrated and more active form of oxygen. And so on the whole, when I take a breath of air here on your earth, I get but a slightly greater quantity of oxygen than at home."

"Then you are not greatly inconvenienced in being transferred from lunar conditions to those of earth?"

"Well, not with respect to breathing, but when we are at the surface of the earth we are greatly oppressed by the weight of your atmosphere and by our own increased weight as well. Ten or fifteen minutes is as long as we can stand it at one time. But we can get speedy relief by ascending ten thousand miles or so, and when we have come to earth to make extended studies of things here, we are compelled to interrupt them by frequently going up and remaining awhile.

I had become not only intensely interested in the extraordinary information communicated by my visitor, but greatly fascinated by his person and presence; and his last speech made me painfully apprehensive that I was about to lose his company, and so I expressed the wish that if he felt obliged to go up stairs to recover himself, he would return and continue the interview as soon as possible. He replied that he would be compelled to return home as soon as he left me, but added that he would remain with me for a considerable time longer, observing

that he felt exceedingly glad to impart information to so willing a listener. I could not at the time reconcile his intention of remaining a considerable time longer with what he said about not being able to remain at the earth's surface more than ten or fifteen minutes at a time, as I thought he had already considerably exceeded that. But not wishing to lose time by having him reconcile his observations, I hastened to get back to the thread of his discourse, by asking what sort of food the lunarians live on.

"The Lunarians are exclusively vegetarians and live chiefly on grains and grasses and leguminous plants in some degree resembling those on earth, but of an entirely different habit, for they all or nearly all, mature in the period of one-half of a lunar month or about fourteen of your days. But this will not seem so surprising, when you reflect that we have continuous sunshine without night during the whole time. Of course this observation applies only to the exterior continent on the further half of the moon. Our plants were all developed on that side and became adapted to the seasons there, and they generally retain their habits of growth since their introduction to the interior continent, or Pocket. But in many cases, by changing the conditions of nourishment, new varieties have been developed, having a longer or shorter period of growth. Much more than half of our food products are produced under extremely artificial conditions. The artificial heat we require for cooking, for warmth etc., is produced by means of electricity and so is our artificial light; moreover, we do not allow any organic matter, such as dead bodies, dead trees or vegetables or any sort

of refuse or excrete matters, to rot either in the open air or in the ground, and the manuring of the soil is strictly forbidden. Our air therefore is very poor in carbonic acid as, (or carbonic dioxide), which constitutes almost the sole food required for the growth of plants. In fact about all that the air gets of this gas is that thrown off from our lungs in breathing. To use this up, we cultivate various air plants that grow with little or no roots and yet cover the ground with an agreeable carpet. Some of these are eatable. All organic matters, when they become refuse, are carefully collected in great air tight and powerful tanks, in which they are heated under an enormous pressure until their original organization entirely disappears. The dimensions of the tanks are reduced during this process by the gradual forcing in of the walls, which are made movable for that purpose, and when the contained material has become reduced to about the consistency and constitution of your ordinary lignite or soft coal, it is forced through a number of cylindrical holes on one side of the tank, by which it is moulded into round sticks of coal, and is then ready to be used over again. The whole process is an imitation of that by which mineral coal is produced in nature, both on the earth and the moon, except that it is accomplished artificially with us in about 50 hours, while nature takes thousands of years for it. The fluids and nitrogenous and other volatile substances pressed out, are secured and saved by proper absorbents. These together with the coal are used by our food growers in producing their plants.

The planting is all done in vats or chambers with

air tight roofs. The bottom of a vat is covered with a few inches of soil specially prepared and appropriate for the plant intended to be sown. After the seeds germinate the vat is covered and the inside is brightly illuminated with electricity and filled with carbonic dioxide, obtained by burning a proper quantity of coal in a retort, which is also accomplished by electricity. All the conditions necessary for rapid growth are supplied to the plants and they are forced forward to maturity without any pause or delay, such as takes place in the growth of plants on earth, through the intervention of cloudy or stormy weather, too much or too little moisture, too much or too little heat, the darkness of night etc.

The same method of cultivation prevails to a great extent on the exterior continent, although as the sun shines on that continent about 350 hours at a time, which constitutes the length of the day there, the vats are often merely covered by air tight glass roofs and the sun is the growing power instead of electricity."

"I understand now," said I, "what you meant by saying you reserved your mineral coal for food purposes. You draw on it only when the steady supply of artificial coal fails?"

"That is correct."

"But if you rigorously save every particle of your organic matters to be reconverted into food, I don't see why it should ever fail unless your population increases. But you have not informed me on that subject."

"The control of the reproduction of the population has been in the hands of the state from the re-

motest antiquity," said he; "and no increase in the total number has ever been permitted unless there had already been an increase in the means of supporting the population by the discovery of improved methods or new appliances. The tendency and policy has always been to allow the population to keep up near the limits of the means of support, and occasionally it has crowded a little too close. Then there are occasional losses by fire and a more or less steady unavoidable waste of food materials in their ordinary handling. Some are lost in the sea. But as long as there is a store of mineral coal to draw upon, no such losses can entail more than a temporary inconvenience. One thing that has a considerable effect on the food supply, is the change in fashions, that often takes place in a manner that the authorities cannot forsee or provide for."

"Then fashion holds sway in the moon as well as the earth! Well, I am surprised! But as your clothes appear to grow on you I don't see how fashion can interfere very much, or how it could affect the question of food."

"Fashion with us has nothing to do with dress. As you say, nature has provided us with a dress at once suitable and beautiful. Whatever faults we have, personal vanity is not among them. Our attention is but little absorbed in ourselves, but is constantly directed to others and to the service of the community. If anyone should betake himself to personal frills and ornaments, I fancy he would be told he was getting like the Earthlings, and, he would be advised to go up and live on the Hump, so he could be near the people he was trying to ape.

But there is much variety and change of fashion with us in the construction and ornamentation of our buildings, grounds and resorts, and the fashion prevailing in relation to the transmutation of the dead is making a steady inroad upon our total food supply.

I wondered what he could mean by the transmutation of the dead—but said nothing, awaiting his explanation.

"You may have thought," he went on, "that our dead were utilized and turned into lignite like other effete organic substances."

"Certainly," I said, "that disposition of a useless body is preferable to any method that prevails on earth. Here as soon as a man dies his presence becomes so intolerable to us, that we are obliged in self defense to consign him to earth. Even then the corruption resulting from dissolution is disseminated through the soil contaminating the water supply and starting epidemics of diphtheria and typhoid fever, besides occupying room that sooner or later is begrudged to him. Cremation is certainly an improvement on inhumation, but even that is a considerable expense, and when it is over, we have only a handful of raw mineral ashes left. The best part of the man has gone off in smoke and we have not three or four pounds of good coal left to show for him as you have. And then it ought to be a source of gratification to the defunct himself if he could know it, that his 'corpus' was turned to some useful account."

He here turned his vast eyes upon me with such a deep expression of mild and sorrowful reproach,

that I instantly felt as if I had made an exceedingly flippant speech and had said far too much or much too little, but he gave me no time to amend it.

"We are much more sentimental than that," he said; "our dead are not cremated in the manner practiced on earth, but are totally disintegrated by electricity, and turned into their component elements. No portion of their substance is lost or dissipated, but the material is all conserved and caused to form a new organism. The fashion originated many ages ago, to use the materials to grow some common sort of a plant or shrub from the seed, such as something resembling your grass or fern or some cereal. This was done in the garden vats I have described to you. Plants grown under these cirmumstances or any circumstances for that matter, very often sprout or grow into forms differing slightly from the normal. Taking advantage of this, our botanists have produced food plants having a wonderful concentration of nourishing qualities in small compass and accompanied by the least possible quantity of waste products. And in like manner our undertakers have developed a great variety of plants to be grown from the constituent materials of the dead. It was formerly the fashion to preserve only a portion of the plants, thus grown. A few leaves were distributed among the friends of the deceased and pressed in herbariums for preservation. But the growing veneration for ancestors and consideration for each other together with the prevalent belief among us that we are formed in the very image of the Deity, finally brought about the practice of preserving entire, the plants produced by transmu-

tation. Thus there is already a vast accumulation of these vegetable representatives of deceased Lunarians, and our economists point out that if this goes on, we will be compelled to constantly draw on our natural food reserves, and that finally these will all be consumed and everything eatable will at last become transmuted into these sacred and inviolable forms. In short the living race will finally become transmuted into dead dry plants. These arguments of the philosophers have as yet had no effect on the people and their priestly leaders. They denounce the philosophers as being unfaithful to the religion and traditions of the race, and as advocating cannibalism.

They say: 'you would reduce us to the level of the necrophagous Earthlings, who from time immemorial have consumed the elements of their ancestors and friends and enemies alike, with beastly indifference'."

"But," I interrupted; "you know they are mistaken in this opinion of us. Only a few savages on earth are man eaters."

"True," said he, "but what they mean is, that from your manner of disposing of the dead, when they become decomposed, their elements are dispersed in the air and absorbed by the soil from which they pass into plants and finally become your food. I have heard a Lunarian say he would starve rather than eat a grain containing a molecule of nitrogen or carbon, that had once formed a part of one of his ancestors."

"Well, I think that is the culmination of scrupul-

osity. I am glad such phenomenal squeamishness does not exist on this planet."

"I do not defend it nor approve of it," he replied, "any more than you do. But still I think your complacent congratulations of your own race rather out of place. You are quite as much under the dominion of indefensible ideas as we. For example, you have an ancient book whose doctrines and precepts you think you must accept and obey whether they are agreeable and suitable or not, although the men who gave them, have been dead two or three thousand years, while scarcely two of you agree as to what the precepts are and each generation has a different interpretation of them. You have a sect that believe that your Deity is mortally offended with all who do not submit to be immersed under water, while others think he will be satisfied with their having a few drops sprinkled on the face. You have sects that believe your Deity is greatly displeased to see people hopping around on their legs, or dancing as you call it, while one sect employ dancing as the most satisfactory mode of worshipping him. You have a sect that believe that pictures, music and ornaments, and coats with collars that turn down are offensive to the Deity, and who think he is best pleased with silent worship, while others think he likes to be flattered in loud speeches and louder songs addressed to himself, and that he is indifferent whether coat collars stand up or lie down. You have a sect that believe that buttons on the clothes are offensive to him and who therefore fasten their clothing with hooks and eyes. All these sects and many more equally absurd, get their various contra-

dictory notions from the same book, and they adhere to them with such tenacity that in many cases they would die rather than give them up and would if they dared, murder other people for not accepting them, and in times past have done so in thousands of instances. In former times it was a common opinion, that your Deity had an arch enemy called the Devil, who opposed, bothered and thwarted him in the most provoking manner, and among other things inspired and aided thousands of unattractive old women to turn themselves into wolves, cats and other beasts and to become witches, and in these conditions to attack and injure their neighbors and bring strange diseases upon them. For these offenses these old women were judged by your sacred books and were burnt by the thousand. And yet many of the men of this generation, while still holding to the sacred books, have not only repudiated witchcraft, but even the devil himself, and an attempt to burn a witch would now be met by an insurrection. Then you have a sect, or a nation rather, of people, who claim that they are the peculiar favorites of your Deity, who chose them from among all the nations and set them apart as his own, and ordered them to practice a certain peculiar mutilation on the bodies on their children as an evidence and seal of his promises to them. No one of these people would consider himself entitled to hold up his head if it were not for his mutilation. Notwithstanding the claims of these peculiar people are admitted by the rest, no people on earth have been so despised, persecuted and maltreated as they. For over 2,000 years they have been kicked and cuffed

about the earth, robbed, driven repeatedly from one country to another, and have never in all that time possessed the sovereignty of a single township. Then again your race believe they are made and formed in the very image and likeness of your Deity, yet you conceal that likeness with garments as if ashamed of it, and such are your notions of propriety that if a man should show this divine likeness in public, naked or even half naked, he would be sent to prison, or a mad house. And then consider the fashions of these garments. Those whose business it is to make clothes, constantly demand changes in the fashion, so as to secure more employment and profit for themselves, and whenever certain ones, who have appointed themselves to be the leaders, say the word, everybody feels obliged to procure new clothes of such sort as these leaders require, notwithstanding those they already have may be good, useful and becoming, and that those prescribed, may be hideous, unsuitable and unhealthful. Many of you are actually so infatuated with this bondage, that if you could not comply with its requirements, you would regard life as of no account."

During the delivery of this tirade, the flashing eyes of my visitor showed how much his feeling was enlisted in the subject and during the whole time I continued to reproach myself for having started him off on such a rampage, by an unlucky, if not impertinent remark of my own. I was made to recall the adage that people who live in glass houses, should not engage in throwing stones; and it was forcibly shown me how very much "human nature" the Lunarians possess, since while he was willing to

point out, criticise and condemn the follies of his own people, he would not allow an outsider to do it. I was greatly relieved when he paused and gave me an opportunity to change the subject, which I did with a precipitancy, that evidently amused him and brought back the good natured expression that habitually possessed his eyes. In fact I believe that the change I had observed was due to intellectual activity and was not accompanied by any real feeling of resentment or passion. Said I, "One of our wise men has expressed the opinion, that the people of the earth, are "maistly fules," and I believe that most other wise men agree with him. So I beg you will waste no more of your precious time in arraigning our race, but go on with your intensely interesting and instructive account of your own race and your remarkable planet." He thereupon goodnaturedly resumed.

"Organic existence must everywhere be to a great extent the same. The elements that enter into the composition of organisms, are subject to certain laws of chemical affinity, that demand their own conditions, and will not operate when these conditions are absent. The chief of these are furnished by the radiations of the sun in our solar system and no doubt by those of the stars in other systems. These radiations impressed upon organized materials become light and heat and where they are either in excess or deficiency organic development is not possible. These conditions obtain throughout the solar system, and no doubt in every system composed of the same sort of elements. But of the solar system

we can speak with some confidence, for we have been able to visit a considerable part of it.

The inhabitans of the different planets differ from each other in the same way that the various animal races of earth differ from each other. You have on earth four sub-kingdoms of intelligent animals; vertebrates, articulates, mollusks and radiates. These have all been evolved from a common worm-like ancestry, and each form possesses the potentiality of receiving an equally high development, both physically and mentally. The development of any of them in all cases depends upon the way they are impressed by their surroundings and the proper surroundings can develop high intelligence in either of the forms. On earth the highest development has happened to the vertebrate branch, but with us the articulates have always been the dominant branch, while the vertebrates have never attained to a condition above that of your salamanders and small lizzards. The ascendant race with us as with you has always contributed to keep the others in the background, by destroying the most advanced and aggressive of them and pursuing them till none but the smallest, weakest and most harmless of their tribe remain. Indeed until this is done, the position of the ascendant race is not secure. Your own race has had experience of this in the struggle with and subjugation of other races. In the early history of the earth, it was for a long time doubtful whether it was to be dominated by the human family or by a tribe of reptiles. At that ancient period, a tribe of reptiles had become developed that walked erect on their hind legs, and whose fore limbs supported

wings and terminated in excellent hands, having four fingers. There were several related families of these animals, some of which were almost or quite the equal of man in intelligence. The final triumph of man over these advanced reptiles, was due to his superior compact social organization. While they relied on their superior personal prowess and often fought single handed, men always fought in bands, and hung together in all their enterprises. The reptiles being finally vanquished and the tribes most advanced and most to be feared having been exterminated, the rest had two modes of escape. They could use their wings and thus by flight keep out of the way of their enemies or they could hide by crouching down in the grass and weeds and making themselves as small, sly and inconspicuous as possible. Some pursued one of these courses and some the other. The descendants of those that flew away gradually became developed into the birds as you now have them; while those that resorted to hiding and crouching down, were thus deprived of the opportunity to use their limbs generation after generation and so the limbs gradually became shrunken and useless, finally disappearing completely, or almost so, causing the body to come down flat on its belly on the ground, and thus were produced the serpents as you now have them."

"No doubt," said I, "the serpents originated in that way. They formerly possessed limbs, because many species still have the rudiments of them. In some cases these remnants show themselves like little hooks on the outside of the skin, while many others are covered up by the skin and are not seen

at all. But all that retrogressive adaptation by which they lost their limbs, must have been practically completed before our race possessed any semblance of their present form and condition.''''

''The earth,'' he proceeded, ''was full of contending races, and of course the backset that was imposed on the snakes, was contributed to by others, as well as men, but the latter were among the last and as regards the particular family of reptiles in question, the most formidable and effectual opponents. Some of your ancient traditions and literature contain allusions to this contest, the reptile being styled **Nachash.** You preserve an allusion to this ancient competition, in the legends of the Devil, who represents the reptile, and is often called the serpent etc. I recall this history, only to show you that the essential qualities of predominance do not inhere in any particular animal form. Your planet escaped the final domination of a reptile instead of a mammal, by only a little. As you have already perceived the dominant race on our planet is an articulate.''

CHAPTER IV.

Life In and On the Moon.

''I confess,'' said I, ''that you have demonstrated the possibility of a development among the articulates quite equal at least to that of mammals. You must have animals of some sort in your seas and lakes; what do you do with them?''

"We have some large soft bodied animals, something akin to your large mollusks and others having a cartilaginous frame, but we have no bony fishes. These animals are sometimes caught and turned into food products, the same as other organic refuse, but never eaten directly, as we are vegetarians. The amount of water surface on our planet is quite small compared with yours. The seas are narrow, but of immense depth. Indeed, some of them are known to have passages communicating directly through the planet and connecting the waters of the exterior continent, with those of the "Pocket". The fluctuation of the tides takes place bi-monthly, with enormous force through these "bores." When the moon is between the earth and sun the tide rises on the exterior continent, and when on the opposite side, it rises in the interior continent, the amount of the rise being very great in the neighborhood of these "bores," but inconsiderable elsewhere."

"Your climate I suppose is very different from ours—of course it must be."

"Yes certainly, and the climate of the interior continent differs greatly from that of the exterior. On the polar regions of the exterior continent, we experience the extreme change of seasons, that occur on earth, from a very cold winter to a very hot summer—all in the space of about 29½ of your days or 709 hours. In the equatorial regions, however, the extremes are greatly tempered by the winds, which always blow toward the position of the sun, by the great evaporation that takes place during the day, and by the fact that the air of the equatorial belt is both higher and denser than that in the polar re-

gions. In many cases, the upper air is charged with heavy clouds, that remain suspended all night or all winter, as you choose, and these prevent the land from becoming very cold."

"Vegetation must come on very rapidly during your little summers," I observed.

"Yes, it does. We have grasses that grow from the sown seed and mature their grains in eight days. But, we have others, whose habit requires that they be sown about midwinter, and they are harvested in midsummer. Other plants are annual, dropping their leaves soon after darkness sets in and putting forth new ones again as soon as daylight returns. Our food plants are, however, chiefly raised artificially in both the exterior and the interior continents. The farms are often immense buildings covering several acres and consisting of from ten to twenty stories, each story comprising a farm. As our space can thus be multiplied indefinitely, and as we can raise twelve or more crops a year in the same space, you see a single acre can be made to be equal to one or two hundred. It is not necessessary to use this degree of economy of room in all cases, and so, many farms consist of but a single story on the ground, and often on the exterior continent only the suns rays are employed instead of electricity to furnish energy for the growth of the crop. Even this method gives us about 13 crops a year. The artificial methods are generally preferred, however, as they are far more certain and reliable. In the interior continent of course these methods prevail exclusively."

"It seems strange," said I, "that the spaces in

the interior continent, should be great enough to hold any considerable population. We have on earth some large caves, but put them all together and they would not afford shelter for the inhabitants of a small city."

"The caves that are at present accessible to you, are small and due to the action of water. All springs, by carrying out mineral matter in solution from below the surface, are constructing caves, and much more extensive ones than might be supposed. But those formed by the action of volcanoes, your explorers have had little opportunity to study, and, but few probally have any adequate idea of the sizes of the holes left under the surface, by the ejection of materials by volcanoes.

Some of your scientists estimated that the volcano Krakatoa, in the East Indies, during a couple of days in August, 1883, discharged a cubic mile of materials. The volcano has had a great many eruptions in times past, and has thrown out a great many cubic miles. The materials composing the mountain itself, have all been thrown from its crater, and the same thing has happened in the case of all the volcanoes on earth, of which there are thousands. The spaces left in the crust of the earth by this process, have amounted in the aggregate to hundreds of thousands of cubic miles. Many spaces thus formed, have been filled again by melted materials pressed up from below, by the pressure of the crust upon the melted interior. But a vast amount of empty space yet remains and will continue to be added to for millions of years to come. As the earth grows older and colder, internally, the crust will become thicker

and more unyielding, so that as new subterranean spaces are formed by volcanic activity, fewer of these will be filled up again and the final aggregate of them will doubtless in time reach millions of cubic miles. The spaces comprising the "Pocket" continent of the moon, above the sea level, are estimated by us to amount to about 1,500,000 cubic miles."

"This then," I observed, "must give you a continent in there of something like 1,500,000 cubic miles, supposing the space to be a mile high."

"Yes, but that is not the shape of the interior. The ground floor of our continent at or near the sea level is only about 800,000 square miles, and it consists of thousands of separated chambers, varying from a fey rods to many miles in extent, and of every conceivable shape, some being circular or oval, some long and narrow, and straight or crooked. There are a great many of the long narrow sort, extending in some cases as much as 400 miles, widening in some places to as much as ten miles and again narrowing down to half a mile. These are nothing less than cracks in our planet. They run in many directions, often intersecting each other, and they extend far down toward the center and upward in some places eight or ten miles before the sides arch together in a mighty dome. There are water marks high up the sides of these great chambers showing the sea level to have been much higher in ancient times than at present, and the action of the water on the sides has greatly widened the spaces, the materials being washed into the bottomless fissures, that extend toward the center of the planet."

"How do you account for the changes in the sea-level?" I inquired.

"As the moon cooled off, a great deal of water was taken up by the rocks, while crystallizing and thus chemically united with them, a great deal more was absorbed by them mechanically, by their pores, while a still greater quanity occupies large fissures and chambers, penetrating in all directions through the planet communicating with each other and connecting the interior waters with those of the exterior continent. The action of the water has greatly contributed, not only to the enlargement of the spaces in the interior continent, but to the creation of a pulverized soil and pleasing landscapes. The chambers that are inhabited, are of course all connected with each other, but besides these, it is quite certain there are great numbers of very extensive ones in the masses of materials that bound the inhabited chambers. Artificial tunnels are constantly being cut into these walls and so new countries are often discovered and connected with the rest and opened for settlement. In addition to those chambers that come down to the sea level the aggregate of the area of which I told you is about 800,000 square miles, there are vast areas situated at higher levels in the material, that bounds the sea-level chambers. These elevated areas are at all heights from one-fourth of a mile to four or five miles above the sea-level. There are known to be many above these, but they are not habitable, on account of lightness of the air. The elevated chambers are connected with each other, and with the lower ones, by means of sloping passages at all grades. In some cases

chambers are located directly on top of the thick roof of others and are reached by long and circuitous routes. In a number of cases, the walls of sea-level chambers, after closing in almost together to form an arch over them, widen out again above and thus form other chambers above, and sometimes these stories continue one above another until the surface of the hump is reached, where the openings appear sometimes as channels, and at others, as circular craters."

"No doubt," said I, "the craters that our astronomers see in such vast numbers on this side of the moon communicate with your interior continent."

"Yes they do."

"Then is it possible, that they sometimes see down to your interior habitations? They report some of these craters, as appearing to be many miles deep."

"They cannot see down to our habitations, for two reasons. In the first place, although the craters connect with the vast ladyrinth of passages and chambers below, with few exceptions they bend and subdivide into numerous dividing branches long before they get down to a habitable level. In the second place there are perpetual clouds standing in all those passages, that lead to the surface of the hump, at various elevations of from two or three to eight or ten miles above the sea level. Of course it is not possible to see down through these—nor up through them either—except when they are cleared away for a special purpose, as is done sometimes for the benefit of our astronomers."

"They sometimes look out through these craters

then, do they? How do they get rid of the clouds?"

"I will describe one of the craters used by the astronomers for an observatory. It is the shape of a funnel with a diameter at the surface of the hump of twenty-five miles. From there it tapers rapidly inwards till at a distance of about 29 miles below the surface, it has narrowed down to a mile in diameter. This is the entrance, down to what was originally a vast dome shaped chamber. This chamber is now filled to the roof on one side, by material poured down through the funnel, while on the other side the material consisting of volcanic ashes, scoria, rocks etc., slopes down for three miles, the overarching dome finally closing down to it leaving only a few narrow passages through into other chambers. Well up on this slope and nearly under the center of the great funnel, our astronomers established their observatory. This is for the special purpose of examining the earth, which is always in sight from this point, and as it rolls itself over every twenty-four hours, without apparently moving out of its tracks, it is seemingly on exhibition for our sole benefit. As we revolve around it every month we are enabled to see both poles alternately, while the whole of the equatorial parts can be seen every twenty-four hours.

We are thus enabled to make far more complete and perfect maps of the earth, than you have yourselves. We have powerful telescopes. The one at the funnel observatory I am telling you of, can bring the earth within forty miles."

"If it brought it eleven miles further it would

stop up the funnel and become invisible, wouldn't it?" said I.

His eyes expressed a slight gleam of humor, which I fancied was tinged by a shade of compassion, as he recognized this for a joke, and then he went on:

"As to the clouds—they are cleared away whenever we wish, by means of artificial thunder storms. Metallic conductors have been put in place up the sides of the lofty chambers, and at the proper heights are fixed with their poles pointing across the space, the positive on one side and the negative on the opposite. Heavy electric discharges are then made, the spark which is often one-fourth of a mile long traversing the cloud and speedily condensing it into rain. The observatory, I have spoken of, is too high to be often affected by clouds, but when the funnel is hazy, it can soon be cleared out. There are several observatories on this side of the moon situated like this one, and their chief business is the examination of the earth, which is our most interesting celestial object, and which can never be seen from the external continent, except at its extreme east and west ends, from which position it is seen low down on the horizon."

"It must be extremely handy," said I, "to be able to produce a shower whenever you wish. The formation of these clouds however presupposes great evaporation."

"Yes, evaporation takes place from the numerous sheets of sea water in the various chambers, the aggregate of which is estimated at about 120,000 square miles. There is more or less of this sea water in almost every one of the sea-level chambers. Besides

the evaporation from these bodies of water, more or less evaporation occurs from every one of the industries in which water is used, and so the aggregate is very considerable. But it is always nearly uniform in quantity, in the interior continent. As the suspended moisture comes into contract with the upper walls and roofs of the lofty chambers, it is being constantly condensed, and the fresh water thus formed trickles down the walls and slopes in drops, rills and brooks, and finds its way through the ground and porous rocks. Many underground streams are formed that find their way into the high-level chambers, which are thus supplied with pure water. The inhabitants of others have supplied themselves by tunnelling through into the upper parts of lofty chambers, that have their floors at the sea-level, and thus they tap the clouds themselves."

"Our astronomers tell us that some of the Lunar craters are 60 or 80 miles in diameter or even more, which indicates that an enormously greater amount of volcanic action has taken place on the moon than on the earth. How is that?"

He replied, "Our opioion is this: The volcanic action in the moon toward its close and final cessation, was enormous. The planet had already been completely honey-combed by former convulsions and the seas had poured themselves into the underground openings, until there was almost as much water below the surface as above. This water kept up a continual contention with the melted interior, resulting in still greater explosions, sending out enormous quantities of volcanic matter, forming cones in some cases twenty-five miles high and over 100 miles

in diameter. The enormous weight of these volcanic cones in many cases proved too great to be supported by the crust, that separated them from the interior cavities their materials had been blown out of, and so they broke through—that is the central part of the cones broke through, leaving a margin of their bases all around, standing like the walls of a crater. But these are not the original craters, as you can see. If they were, they would be on top of elevated cones of enormous hight, which they are not."

"This view appears to me very plausible and I feel the more interested in the subject, because the idea constantly impresses itself upon me, that the earth is repeating the history of the moon. According to our theories of evolution the two bodies separated from each other, when they were in the condition of hot expanded gases, and as the moon contained only 1-81 part as much matter as the earth, it cooled down and became a habitable world, many millions of years before the earth. Since you have been talking to me, the impression has constantly grown upon me, that your moon history is really an anticipation of our own, and it becomes the more interesting on that account."

His eyes expressed extreme satisfaction, as he replied that he was glad that I had seen that point.

"We have in one of the provinces of the interior continent, an immense university, devoted to the study of mundane affairs, past, present and future. The duty is assigned me of holding a professorship in this university, in the college of 'Mundane Prognostication'. As this college has been in operation for

over 100,000 years, we have had abundant opportunity to verify our system of prognostication, and you would be surprised at the accuracy with which our predictions have been realized in your history. Of course, we could have done nothing, but for the basis our own history gave us to work on."

"Well," said I, "I can't say that I am sorry to know that my time will be out long before the earth reaches the conditions that makes it necessary for the inhabitants to retreat underground. These spaces below must indeed be queer places to live in, for it don't seem like they would be exposed to storms, as if out of doors, and yet not cosy and homelike, as if in a house, and I don't see how they can be otherwise than cold damp and glommy—that is, viewed from the stand point of earth. Am I right?"

"No," he replied, "you are not. Those abodes, as we have them fixed up on the moon, you would regard as more delightful than anything you have on earth, and as equalling your dreams of paradise. There are as you suppose no storms and no extremes of temperature. There is always a very light breeze blowing, half the time in one direction, and half in the other. This is caused by the action of the sun on the external continent, as it progressively passes over it from east to west. There is always fog and cloud at all the entrances to the interior continent that prevent the radiation of heat and help preserve an even temperature within. All the inhabited chambers are made as bright as sunlight by immense and numerous electric lights, which are placed with reference to the best, effects both from a utilitarian and an artistic point of view. They are generally

placed at great elevations, and are often arranged to imitate the constellations of the heavens, so that looking up, one may see a portion of the sky as he would see it from the external continent, and by traveling about among the various interior provinces, he can see the whole of it. In some of the chambers, the lights are made to represent the members of the solar system and each one is caused to make the movements properly, belonging to it, the whole constituting a planetarium on an immense scale—in some instances—several miles in diameter and three miles above the floor."

"I can well imagine the glory of such scenery and such possibilities," said I, "but I do not see by what mechanism you can accomplish such results."

"You must remember," he replied, "that we have resources, that your race does not possess. With you a great many things would be practically out of the question that with us are very easy. In the first place, we are a flying race as you see, and this means a great deal on the moon's external continent, and still more in the internal continent, where on account of the attraction of the earth and the hump, our weight is much reduced without a corresponding reduction of strength. The fluttering and flying about of crowds overhead is one of the pleasing features of our life.

In the second place, the power of neutralizing the gravity of metals, as I have explained to you, enables us to erect works miles above the ground more easily than you do at the surface. In fact the works erect themselves and the most we do is to tether them at the proper height to keep them from

going too far. When motion is required to be given them, the globes of light are sometimes attached to a car that is made to run on a single rail elliptical track, which may be suspendid at any elevation and reduced to a minimum weight by proper adjustments of its gravitation, the light globe being either suspended from the car or floating above it. The elliptical orbit is inclined enough to enable gravity to propel the car. An automatic shunt turns on repulsion when the car reaches the lowest part of the orbit and it is then forwarded on the up grade portion, shunted again at the top and so on perpetually. Another machine often used is a hollow cylindrical stem suspended from the dome, having a series of wheels, concentric with the cylinder, one above another and caused to revolve horizontally at different rates, by clockwork inside the cylinder. Globes of light are suspended by long wires to these wheels, which by their revolution, at varying rates, cause the globes by centrifugal motion to describe large or small orbits as desired. All sorts of eccentric and peculiar motions are imparted to the globes by variations in the regularity of the revolutions of the wheels, the spheres falling toward the center when the motion is slow and flying outward when it is fast. The mazes of a cotillion, are often imitated, and the performance is called the 'dancing of the spheres'. This is also accompanied by music, sometimes by local bands situated on the ground playing in concert with the movement, at other times by immense instruments operated by the same machinery that drives the spheres.

It is not difficult for you to imagine the beauty

and grandeur of some of these overhead scenes. Of course the power used is electricity, and it is used liberally and freely since its cost is merely nominal. Heat as well as light is supplied through the same means and used for all purposes, domestic, industrial and public. Our houses are very tasteful and often highly ornamental. The architecture is light and graceful and suited to a mild and quiet climate, for we have the pleasant air of your tropics without their storms or excessive heat. A slight sprinkle of rain is all we ever have in the shape of a storm in any part of the interior continent, and these sprinkles are rendered periodical by artificial means. There are no wide agricultural tracts with us, nor densely populated cities, but the population is distributed in towns, and continuous villages line the roads, each of which is devoted to some principal productive industry. There are principal streets that run miles, passing through and connecting these towns, and often bending so as to make a complete circuit. The streets are wide and we are always furnished with a number of rail tracks, and paved with a hard smooth material—sometimes stone and sometimes iron or alumina. The only vehicles used on the streets, besides the rail cars are light, private and pleasure carriages, propelled by storage batteries. The roads that unite the various internal provinces to each other and to the external continent, are chiefly the gravity roads, that I have already described to you. In some cases to save room, the roads are built in stories, one track above another. The work shops and farms, are situated conveniently near on streets parallel to the main thorough-

fares, and their products are conveyed from them, and their materials to them, on roads laid on those streets."

"I should like to know something about your social and political arrangements, your industrial economy and your form of government," said I. "If the government controls the increase of population, I suppose it must control labor and production; and consumption too—how is that?"

"The sort of control, which the government exercise is almost exclusively advisory. There is no government control in the sense of the term as used on earth. All productive labor is expended for the creation of common property, to which, when created, every individual has equal title. Not the slightest compulsion however is put upon labor, nor the least prohibition upon consumption."

"Do you mean to say that nobody is obliged to work, and yet everyone can take what he wants from the common stock?"

"Yes."

"Then yours is an angelic race, truly. We have not anything like that on this earth, and I reckon, we never will have."

"The human race, as a whole, is not yet like it, although the tendency is certainly that way and it would be rash to predict it never will be, but there are other and older races on earth, that you overlook. Consider our relatives the Bees; did you ever see a lazy bee or one that wanted more than a reasonable share of the common property?"

"Yes," said I, "it has become instinctive with

them to work and their wants are likewise, only such as instinct dictates."

"Instincts," he replied, "are only crystalizations of reason. They are habits become hereditary to such a degree that the person is liable to fall into them with little or no teaching. I know that the people of the human race pride themselves greatly on the assumed fact that they act from reason, while other animals act from instinct, but the fact is, that 99 out of every 100 good acts that human beings perform, are done through instinct or inherited disposition to do them, while only one is reasoned out. And your teachers appear to understand that your instincts alone are to be depended upon to produce good actions, since they always depreciate and throw suspicion on good acts not done from the "heart" that is, not done from instinct. They give little or no credit for such actions, and strive by cultivation of the emotions to substitute disinterested impulse or in other words instinct, for mere calculating reason. Now we Lunarians have long since passed this stage. Lazy Lunarians are as impossible as lazy bees. To work is instinctive with us and so is consideration for the rights and dues of the rest, and as everyone can be relied on to obey his instincts, it is not necessary to watch any one to keep him from plundering the public or shirking out of his duties."

"There have often been socialistic communities with us," said I, "that have endeavored to live on the principles you speak of. But their lives have been of the most monotonous dead level sort. There is no chance for individuality or for the develop-

ment or exercise of the superior talents, which some are certain to possess in a higher degree than others. They are merely little despotisms and endure only while their leaders are people of exceptional ability. We do not regard such a state of society as desirable even if it could be made permanent.

"With us," he replied, "the greatest liberty is accorded to the individual, but so well grounded is our predisposition to work for the benefit of the community, that no one has any fear or suspicion that another is not doing what he ought, or is able to do for the common good. There are extensive colleges for art, literature, science and invention, accessible to any according to their several tastes. If a person thinks, for example, that he has the conception of a valuable invention, he is admitted to the college of invention where there is very facility and appliance for developing the idea and constructing the machine or instrument. In these colleges there are depositories of models something like your patent office, and professors are on hand familiar with physics, chemistry and kindred sciences to advise and assist the inventor. As they are all working for the good of all, the inventor is not afraid his idea will be stolen, he finds the assistance he gets invaluable, and is often saved the useless labor of doing something that has been done already or attempting something in contravention of the principles of physics and therefore impossible. An invention, when made, is the property of the public, and if it lightens labor in any

direction, it allows it to take on greater activity in some other direction.

All articles that can be produced in quantities by machinery are distributed to everybody desiring them, but individual works of art as great pictures and statuary and rare and curious things, are placed in public art galleries, libraries etc., accessible to all."

"Well," said I, "this is extremely pretty and no doubt it works all right with you wise Lunarians, but I cannot help imagining what sort of a mess we should make of it on earth, if we adopted the same policy. I admit that many of us are workers by instinct or at least a semi instinct, that controls us after some habit got by practice, and it is also instinctive with us to care for the young and those who are helpless from disease or old age, but there are plenty of people with whom it is equally instinctive never to do a lick of work if they can help it, and at the same time their instincts allow them to help themselves to the proceeds of the labor of others without any limit, except that of forcible restraint."

"The trouble with you," said he, "is that you have no control over the production of your people. You are like the civilized Indians, that once inhabited some of the western parts of your country, who were constantly threatened and invaded and finally exterminated by wild and barbarous neighbors, except that they were physically too weak to help themselves.

It is true your civilization is now in little danger from foreign savages, but you allow yourselves

to be steadily invaded by fresh generations, of them born in your midst, and the crudeness and injustice of your political and social conditions, are such as to give but slight encouragement to the development of the unselfish instincts in anybody. Wealth carries power and power commands respect. Your wealth is distributed without justice, sometimes by accident and to those who are merely lucky, at other times to those who are simply selfish greedy and unscrupulous, and generally least to those who create it, and so luck and greed become prominent objects for your attention and emulation. How very young your race is and how much you have to learn!''

CHAPTER V.

''Mundane Prognostication''—The Profile of Time.

''You said something about a college of ''Mundane prognostication,'' you have on the moon where you study our affairs and forecast our future. I should be infinitely gratified to know what your learned college has figured out for us —if it is no secret.''

''It is no secret at all,'' he answered, ''and I shall be glad to give you such insight in your future, as our profiles in their present condition afford.''

With this he drew from a receptacle something

like a pocket under his right lower wing, a cylindrical roll of paper three inches in diameter, and ten inches long, exactly resembling a roll of profile paper, such as civil engineers use in plotting the profile of a survey for a railroad. Familiarity wish such things together with the idea that he intended handing it to me, caused me almost involuntarily to reach out for it, but he retained it in his own hands and began with great dexterity unrolling it, holding the scroll in his right hand, while with his left he rolled up again the unrolled end. As he held these two rolled ends in his front hands a yard apart with that length of the profile open between them, he used his middle pair of hands to point out the various marks and lines on the paper to which attention was directed. I could not help observing what a vast advantage one has with four hands instead of two. When we hold a profile thus, there is nothing left to point with, but the nose.

In plotting the profile of a railroad survey, the engineer uses paper several feet long and 8 to 12 inches wide, covered with fine horizontal lines, running the whole length of it and ruled so close together, that there are from 20 to 50 lines to the inch. Then there are other lines drawn across the paper at right angles to the first, and one-fourth of an inch apart. These last represent distances of 100 feet each; or "stations;" while each of the spaces between the horizontal lines is called a foot. Having the survey of a line of stations with the relative height of each, ascertained by a leveling instrument, the line is plotted on this paper so that

its distance from the lower edge of the paper at each station corresponds with the height of the ground at that station. The irregular line thus formed is a fac simile of the surface of the ground with its vertical undulations and irregularities. The engineer then draws a grade line on this profile of the ground, that indicates the position of the surface of the road bed, as he intends it to be when finished. In some places this line is above the ground line and this indicates that here is to be a fill. In other places it runs below, and this shows a cut.

Now the profile that the Lunarian Professor of "Mundane Prognostication" held in his multiple hands (I shall call him the Professor hereafter) very much resembled in appearance that just described, except that instead of only one there were several profiles on this one strip of paper, one above another. In each one there was the irregular surface line accompanied with the more or less straight grade line showing cuts in some places and fills in others. The professor explained these profiles to be graphic exhibits of the state of various human institutions and conditions as they appeared during a continuous term of time begining in the past, and extending into a far distant future.

After examining these profiles a short time, I had little difficulty in getting the ideas intended to be conveyed by them. They will be readily understood without much explanation. Thus the line of "muscular development" is shown in the remote past as being almost up to grade, but as gradually falling below it in the course of time, then rising

again and coming almost to the grade line about the year 2500, but after that gradually falling away again. Selfish instinct, which has always shown heavy cutting, comes down nearly to grade, about the year 7200. While altruistic instinct that regards the common welfare and has been below grade, always, but at times higher than at present, is seen to rise and come to grade about the same time. Health has always shown a fill, often a large one, but gradually rises almost to grade about the year 2500. Crime has always been a cut, but disappears in the future about the same time as theology.

Peace, which is a condensation or composite of all the rest and the end for which they all exist, has always been a fill and always must be until human actions become absolutely instinctive and unconscious, which they never can do until men have been acted upon and molded by habit by every stimulation possible to their environment. Reasoned acts are those which arise from stimulations, that are new or unusual to us, and new stimulations will continue to come as long as knowledge increases or continues to be pursued, or to be thrust upon us. If the accumulation of knowledge should stop, actions would finally become instinctive, and unconscious. This would be complete absence of misery, and also absence of happiness, but perfect peace. So the grade line of Peace is a dead level. Above it is the ragged line of misery always a great cut, and below it is the line of happiness always a fill, somewhat lighter

than the cut above the line, and terminating in grade soon after it.

I inquired of the Professor, the principle, upon which predictions of the future were worked out. He replied, that the principles were exceedingly simple, although the actual working out of any scheme of the future involved the consideration of such a vast number of details and conditions, as to render it a labor of magnitude. "Prediction," said he, "is only past history, projected forward. If we know precisely what happened in the past, our knowledge will include the antecedent causes of the events. Events beget events, and they succeed each other as one generation succeeds another. Knowing the character and condition of one generation and the modifications that have been made in it by its environment, we have the principal data for estimating the character of its successor and so on. The principal uncertainty we encounter, is in the prediction of changes in the environment itself. Thus the invention of a self portable power like steam made the invention of railroads possible and the construction of railroads completely changed the environment of the succeeding generations.

Now it is difficult to forecast just what particular turn invention will take, but it is not impossible, because inventions constitute a race with generations one begetting another. Knowing all that is known to-day makes it possible to see what this knowledge will lead to to-morrow. The trouble is for one to know all that is known. As I have already mentioned, our own Lunarian history

greatly aids us in our study of your future, for we have passed through an experience, which, while it is different from what yours has been or will be, is parallel and comparable with it. And making due allowance for the difference in physical structure of the two races and considering that we are 500,000 years older than you, we have only to consult our past in order to get your future, or something much like it, for many generations to come.

"These profiles of your's Professor," said I, "are evidently the result of much learned detail work and they are of extreme interest and value to the philosophical and scientific student. But to common people the details themselves are more interesting, because they are more easy to be understood and come nearer to the common life. Could you not favor me with some of the future history of our planet and expecially of the United States and of the State of Minnesota. Any of the facts that you have prognosticated and from which you have deduced the generalizations that you embody in your profiles, would be of great interest.

He seemed a little disappointed at this request, as no doubt his habits of thought had made him familiar with and attached to the comprehensive and wholesale treatment of these questions, and he looked upon the detailed story as a means to an end and containing but little interest in itself. But it is easier to generalize from details, than to construct the details. However he complied, observing that he would be compelled to get these details in part from his memory, which however

would be prompted and refreshed by the general profile he held in his hands.

"I will take my stand," sand he, "at about the year 2,000 of your era, and then by looking forward and backward along these lines, I think I can recover the principal factors that have entered into their make-up. This will also allow me to give you the descriptions in the past tense as events that have been accomplished up to that time and from that date we will also look forward, for the events subsequent to it."

It occurred to me that he must be tired of holding the profile so long between his outstretched hands and so I offered to hold it for him awhile, or at least hold one end of it. At that he shifted the rolls from his front to his middle pair of hands, by which maneuver he gave me to understand that he had abundant resources for resting himself without outside help. How I did envy him that extra pair of hands.

He then began as follows:

"The close of the 19th century, was remarkable as being a turning point in American affairs and the beginning of a new era. Previous to that time the United States had been a nation very much to itself. It had kept aloof from the politics of the rest of the world and had no policy in regard to it except to prohibit European nations from meddling in affairs of the western hemisphere or acquiring any further possessions in it. But before the century was out public opinion was accustoming itself to the idea that the foremost nation of the earth ought to take a more active and

influential part in the general affairs of the world. The first thing designed to give weight to the influence of the country was the development of a powerful navy. It is power that inspires the consideration and respect of others. It was a favorite idea with many of the leaders of political thought that arbitration might become the last resort in the settlement of international disputes instead of the ancient plan, by which the contestants temporarily laid aside such civilization as they might have acquired, reduced themselves back to barbarism in murdering each other, destroying property, plundering commerce, and often spending more money several times over than the matter in dispute was worth. But even these statesmen saw that a plan favoring peace would come with much more force and authority from a nation having power to enforce it by war, and so all were glad to see the great navy built.

As the public lands became transferred to private ownership and prices steadily went up, attention was turned to the sparsely settled territories of neighboring countries, and the elements of a great party in favor of their annexation were developed in the ranks of all the parties, at the same time the theories of the land tax advocates received additional attention, especially from mechanics and the manufacturing classes. They reasoned that the increase in the value of land ought to belong to the state instead of to the people who had bought the land, and if the state had that increase, the interest on it would support the government and taxes could be abolished. The

enormous amounts raised by taxation came at last from labor, they said, part of it in the way of tariffs on goods imported and consumed by workers and part by direct taxation on the products of labor and even on the means and appliances—tools shops and factories—by which wealth was produced. This mode of taxation they said was, as far as it went, a ban placed upon industry and a penalty upon the creation of wealth. They proposed therefore to take all the taxes off from the products of labor and seize the rents of land or so much of them as might be required for the support of the government, in that way getting the interest on the increase in the value of the land that had taken place since it passed into private hands and which they denominated "unearned increment." This agitation began in your day—you must remember it."

The expression "in your day" had at first a singular effect on me. I had quite unconsciously but thoroughly entered into the spirit of the Professor's method and had gone forward with him to the year 2,000 and followed closely his discussion of things that happened 100 years ago—from that standpoint. The sudden realization that my day had gone by, was startling—"Yes," I said to myself, "that is so, 'my day' has gone by, my existence has been continued over a space during which I have not lived. Memory has nothing to say of it. It is as if I had slept it away. Well if one is asleep, one day to him, is as 1,000 years—aye, eternity!

What can hurt him who is asleep? Nothing, unless it wakes him up.

All this flashed through my brain in an instant and then my attention suddenly returned to what the Professor had been saying. "Remember it? Yes I remember it well. In my day there was a society in Minneapolis called, I think the Single Tax League, devoted to this agition. Their ideas were those of Henry George, as set forth by him in his able book called: "Progress and Poverty."

"Yes, well, to the labors of this persistent and aggressive society are to be attributed in a great measure, the radical change in ideas of political economy that soon came about. After much discussion, petitioning of the legislature, agitation in the newspapers, the organiſiation of auxiliary societies, the presentation of the subject in labor associations etc., the working classes in the cities and even the landless laborers on farms were persuaded that their interests lay in the abolition of all taxes, except those on land. It was not long before these classes constituted a majority by reason of the rapid growth of the cities. As soon as they found themselves in power, they proceeded to get the constitution of the state amended to enable the legislature to release all classes from taxation except those who possessed land. In your day, about half the taxes had been raised from land and the other half from the buildings and improvements on the land and from personal property. It was estimated that relieving the latter half, would simply double the tax on land and so make it about four per cent on its valuation. It was argued that

the farmer would experience no change at all, because the additional tax put upon his land would no more than equal that taken off his houses, barns, stock and tools. The only persons who would lose by the single tax would be the speculators, who held unimproved land and were waiting for the labor and improvements of their neighbors to raise its value, so they could sell out and get an increase in value which they had done nothing to earn. As these people were looked upon as a sort of parasites, they were not regarded as having any rights in the matter that need to be respected. All that was necessary in their case was simply to outvote them. The benefits of the new system it was expected would fall upon the industrial classes especially and directly, but would be shared by all. Manufacturing industries relieved of the repression of taxation, would bound forward like a spring suddenly released. Nothing would any longer artificially limit the production of wealth and the great stimulation it would receive would result in making even articles of luxury so common as to place them within the reach of everyone.

The land speculating class, while admitting that the rest of the people would be benefitted by the single tax, claimed that it would be done at their expense and unjustly. They had bought the land and paid for it and the state had got the money. With this money, and the interest on it, the state had built the university, the state capitol, the penitentiary, the charitable institutions and innumerable school houses. In other words, they had given the state the interest on their money and taken in

lieu of it the anticipated increase in the value of the land. Moreover, they had paid taxes on the land as they would have done on the money, if they had retained it. And so they maintained that the increment in the value of the land was not unearned. It was simply the interest on their money which would have brought a like profit if it had been invested in mining manufacturing, banking or steamboating. They admitted that in some cases this profit had been greater than that derived from other sorts of investments, but in many cases it was far less. They said the single tax meant a confiscation of the land and the resumption of it by the state that had once sold it; because it would very soon, if not from the first, take the entire amount of the rent which would make the fee of the land worthless to the owner. It would no longer be possible to mortgage it or to sell it and the owner would lose his investment and be reduced to a mere tenant, who could hold it only as long as he paid the rent to the state the same as any other tenant, and if it were unimproved, the owner would have no inducement to pay the rent and would simply abandon it. In view of that, they said, that the state should at least pay back the purchase money it had received with interest at the rates prevalent during the time that she had possessed it, or failing that, she should postpone so radical a change or make it gradual by annually increasing the assessment upon land and diminishing it upon other property, and thus consume at least thirty years in making the transfer complete.

The impatience of the tax reformers would not

allow any such postponement as this. They said they did not propose to wait a whole generation to have this wrong made right.

They said the state never had any right to sell the land in the first place. The people's ownership therein was inalienable and any pretended sale was void the same as the sale of the property of a minor for taxes, or the sale of a stolen horse. The real owner had a right to take his property whereever he could find it, without compensation to the pretended owner who happened to be in possession as a party to a fraudulent sale. So they held that the people could take possession of their land if they saw fit, but they agreed that it would be better policy, to leave the claimants in possession and merely take all the rents except a small percentage to be left in the hands of the claimants as compensation to them for collecting and paying over said rents to the state. These rents moreover were to be called taxes instead of rents.

The majority having without serious effort brought about a reconciliation between their logic and their interests, proceeded to put their conclusions into operation. The constitution of Minnesota was amended in due course and the new plan put into execution with much growling and protest on the part of the land owners, but without violence or serious trouble, all the rest of the country looking on with great curiosity.

The effects very soon began to show themselves. Nearly the whole tax being removed from shops and factories, profits and manufacturing became at once very considerably enhanced. This induced

numbers of manufacturers to emigrate from other states and from Europe to Minnesota, and so the population and wealth of the cities increased with unexampled rapidity. By the year 1925, the population of Minneapolis had reached 1,780,000 and that of St. Paul, was over half as great."

"Then," said I, "the cities must have grown solidly together and formed a continuous town."

"Not at all," he replied, "University and Como avenues, became continuous streets, with good residences. But both cities became compactly built up with tall and substantial buildings for offices, dwellings and factories. Nearly everybody that paid rent lived in flats. These buildings were ten to 16 stories high, fire proof, furnished with elevators, electric heat and light. In connection with many of them, were cook shops, in which the tenants could get their provisions cooked at cheaper rates than they could do it themselves, and save their own time for other employment. A great many women who in your day, would have been kept at home all day to cook the meals for a small family were enabled to seek profitable employment in various kinds of shops factories and offices, or had their time for recreation or leisure.

Cooking became a regular profession and people no longer cooked for themselves to any greater extent than they doctored themselves. Kindergartens were likewise attached to these great co-operative dwellings, in which those too young to go to school, were looked after in the absence of their parents.

As mechanics and people of moderate incomes

could live not only cheaper, but far better in these buildings, than in separate homes at long distances from the business and industrial centers, as well as enjoying far better opportunities for society amusement etc., they soon came to adopt that sort of life exclusively and separate residences continued to be maintained only by the rich. The growth of the cities continued for many years to be confined to the large spaces that in your day were left vacant far within the corportae limits. People owning such property, were anxious to get it improved so as to get their taxes back in the rents of buildings. Those owing suburban lands and lots soon found that it would be useless to improve them as people would not occupy them till all the more central lots were occupied. Much dispute arose as to the way in which such property should be taxed. At first the assessments of valuation on the lands were as high as they had been before the adoption of the single tax plan. But it was soon found that the land no longer possessed such value. The value had been prospective or speculative, and people had paid as tax far more than the land would rent for, and held it and paid taxes on it for what it was expected to bring in the future. But now so much of the speculative value was taken out of this suburban land that the owners refused to pay the taxes in many cases, and nobody would buy it at the tax sales because the tax was more than the rent for agricultural purposes, and to buy for the future was like leasing property and paying rent on it for some years before occupying it."

"But," I interposed, "the single tax people in Minneapolis disclaimed the intention of taking a full rental of the land in the way of taxes, but only enough to support the government, and thought that four per cent of its value would do that. As money was then worth 6 per cent and rents would average about the same the owner would clear 2 per cent. This they said would be sufficient to make the owner retain his interest in the property."

"Yes," he answered, "that was their notion, but the events turned out very differently.

When the tax was two per cent and the rents, six per cent, the owner got clear the equivalent of six per cent on two thirds of the value of the property. But when the tax was increased to 4 per cent, he got the equivalent of six per cent on only one third of it. Thus his net income being reduced to one-half of what it was, the selling and buying value of the land was likewise reduced one-half. This made no difference to the tenant paying rent, he still had to pay the same, but, two-thirds instead of one-third now went to the state. But within the corporate limits of Minneapolis, St. Paul and other cities, there was a great amount of unused land, that produced no rent. This unused land constituted about three-fourths of the total areas of those cities and represented one-third of their total land valuation. The very first assessment of the new tax was the signal for the reduction in the value of all this property, fifty per cent or more at once, and every acre was immediately thrown upon the market. By the time of the next

assessment the assessors were obliged to recognize this depreciation, and so all this land was returned at half or less than half of what it had been. The loss of tax money thus sustained had to be made up by a higher rate, and the second levy was placed at 5 per cent instead of 4 per cent. This worked a further reduction in the values of unoccupied lots and by the time of the third assessment these lots were estimated as having only the value of farm or garden lands; and so it became necessary to still further increase the rate of taxation, which was now established at six per cent.

In the meantime it began to be discovered that the owners of improved lots had lost all the money they had invested in them. A certain person who had bought a lot on Nicollet ave., for $40,000 and erected a building on it at a cost of $40,000 more, did not for two or three years discover any great difference in his tax, because although it was transferred from the building to the lot the whole amount was nearly the same. But after the tax assessment reached six per cent, the building was burned down just after the expiration of the insurance policy. The gentleman thought he had lost half of his property by neglecting the insurance, but in reality, he had lost it about all. He could not mortgage the lot for enough to build a house, nor even for enough to pay one year's tax. Nor could he sell it for one-tenth of what he gave. It was his only on condition that he continued to pay a full rent for it and this he could not do unless he could rebuild. Even if he rebuilt, his net income would be only the interest on the cost

of the building, he would get no return for the lot, or at best, but little. Thus the owner found himself no better off than a lease holder. He simply had the first right to pay the rent for his lot in the way of tax. And so it came about that if an owner could not immediately build something on his lot that he could rent to advantage, he simply defaulted on his taxes. The selling of vacant property for taxes became impossible except those lots wanted for immediate improvement, and not even those if several years' taxes were in arrears. So the collection of back taxes became impossible on all vacant porperty.

The effect of the single tax on farming land was much the same. Not over seven-tenths of the arable land in the state was under actual cultivation. Large tracts were held by nonresident speculators. When the increased tax came to be levied, these lands were all thrown on the market. The depreciation in prices of these lands at first brought a considerable access of population, but this soon became checked, because the farmers found that on account of the loss of taxes on these lands, the rates had to be increased and the additional burden fell on the resident farmers. These in almost all cases owned considerable land they did not cultivate, but were saving for speculation or for their children. Often a farmer owing 160 acres, cultivated, but 40. As the burdens fell heavier on this class, they commenced throwing up the uncultivated parts of their farms, so that from these various causes in a few years almost three-fourths of the arable land was without claimants,

and of course yielded no taxes. The farmers, then found themselves greatly reduced in wealth, the lands they had counted on as belonging to them, now being thrown out as commons; and even for the acres they cultivated they paid more in the way of taxes than would have been considered a fair rent in Wisconsin or Iowa. Their net wealth was in fact reduced to their buildings, live stock, and tools.

The lands themselves, they could neither sell nor mortgage. It was not practicable under these conditions to compete with the farmers in adjoining states, and so in a few years, the markets of Minneapolis and St. Paul came to be supplied chiefly from adjoining states. Many of the farmers ruined and disgusted, gathered up what they could and left the state. Others moved into the cities, which were booming, and went into other business.

There now began to come into the rural districts of the state, two classes of settlers or rather occupants of a different character. The first of these were drovers with herds of cattle from adjoining states. They drove their cattle about from from place to place, over the abandoned lands, but never settled anywhere and as cattle were not taxable, and they claimed no land, they paid no taxes. They also escaped taxes at their legitimate homes in other states, because their cattle were conveniently away at assessing time.

The other class of new occupants that came in, were poor squatters. These brought little or no capital, and no enterprise or ambition beyond enough to supply the essentials of existence. A

family of this kind would alight on an unoccupied spot, construct a cabin or a dug-out, cultivate four or five acres of grain and potatoes, and eke out the rest of a living with a few cows and pigs. Little or no tax could be collec from them, and of course little or no public improvements, such as schools, bridges, roads etc., were accomplished where they squatted in any considerable force. In short, it gradually came about that the inhabitants of the rural districts did but little more than sustain themselves. And the state ceased almost entirely to be an exporter of agricultural products. The cities however suffered nothing on this account. They got their supplies largely from the neighboring states, and they became large producers and exporters of manufactured articles, competing in that respect with some of the famous manufacturing towns of Europe; and they became enormously wealthy.

The question of taxation was however always a difficult one. The lands near the centers of the towns of course were the most valuable. But lands were never sold—only the buildings—and any given lot came to be valued by the kind of building and the amount of business on it. So assessments finally had to be fixed by an arbitrary rule—the rates decreasing at a fixed ratio according to distance from the center of greatest business activity. The rule had a tendency to verify itself by compelling the most valuable business to be done in the places subject to the highest rates, since the less valuable could not afford it. By this rule the rates in the suburbs were low, and since the buildings paid no

tax, it often happened that a millionaire living in a $100,000 house paid little, if any more than a laborer living in a $300 shanty. But in the course of time it came to pass that notwithstanding the general prosperity, there were many who were wretchedly poor, made so by bad management, ex-extravagance, indolence, ill health, dissipated habits, disappointment and ill luck. These became squatters in the vacant lands around the outskirts of the cities. They paid no rent and no taxes. It was found that it was useless to evict them as nobody could be found with money who could gain anything by paying their taxes, as long as there was plenty of unoccupied land. There also came to be a positive sentiment against eviction of the poor and so this non tax-paying class constantly increased and finally included many who were able to pay, but who shirked out, satisfying their consciences by the plea that the government had no right to discriminate, and exempt some and not others. These ideas expanded and finally crystallized into a political creed to the effect that a poor man ought not to be taxed for a spot on which to exist and bring up his family. Thus it came about that neither the very poor; nor the very rich whose property was chiefly in fine buildings, stocks, bonds and other personal effects, paid any considerable amount of the taxes.

The taxes were paid by such of the farmers as had still too valuable improvements to justify their abandonment, and by the mechanics and merchants whose business and whose residences

were packed in tall buildings on small areas of ground in the cities.

The great stimulation of the growth of the Minnesota cities, and their apparently great prosperity, attracted the attention of the whole world and aroused the spirit of emulation in the cities of the United States and of the northern states in particular. In most of the northern states, the city populations controlled the politics of the states, and there developed a violent mania for following the example of Minnesota. There was much opposition from the conservative classes, and the people were warned that a policy that might benefit a small section of the nation, was not necessarily good for all. But it was held by many to be simply a measure of self defense for cities to compel their states to adopt the single tax, since those where this was done, not merely flourished, but flourished at the expense of those who remained under the old method. For they attracted from them, their manufacturing establishments and this was naturally followed by their wholesale trade. The result was that in a few years, all the northern states and several of the southern states adopted the single tax. The effect was not so marked in those that came into the plan among the last; but the first experienced much the same stimulation and rapid growth that distinguished the Minnesota towns, so that in a few years the majority of the population had crowded into the cities. This effect was brought about by the action of two causes. The first cause was the superior attractions of the cities as places for profitable employment and as

places for the enjoyment of life. The cities rapidly became socialistic in their policy, and constantly extended the scope of the functions of the government. The municipality soon acquired the ownership of the lighting plants, the water works and street car lines. These were run at first as speculative enterprises, the cities selling light and water to private individuals, but the people soon demanded that these things should be free as the public libraries, schools, university and parks, were in your day. And this was gradually brought about, the cities furnishing at first so much water and so much light and so many street car rides free to each person, and at last taking off all limits, only making the citizen responsible for unreasonable waste. Then the populace demanded free amusements and entertainments and these were provided in the form of the concert, lecture, theater, circus etc. All these things cost money and the tax rates kept getting higher and higher. These were paid in the form of rents on the land, the buildings stood on and of course at once transferred to the rents paid by tenants for rooms, flats, shops, stores etc. Rents soon became higher than they had ever been known before the adoption of the single tax. To lighten these rents in the cities, it was now proposed to increase the rents of lands in the country.

CHAPTER VI.

Confiscation of Lands.

The former owners of these lands had now been practically dispossessed. Many of them had gone to the cities and engaged in more profitable business than farming. Many who were mortgaged had been sold out, bankrupted and ruined, and had settled down into the condition of peasants. The lands were now regarded as the property of the state. This process of the transfer of the lands to the state went further in Minnesota than the other states, because she was the first to adopt the new plan of taxation. After the other states adopted it, the advantage their farmers had over those of Minnesota was lost. Rents under the name of taxes were levied, farming rendered unprofitable and the uncultivated portions of the land abandoned by their owners. The few southern states that did not go into this new plan could not reap much advantage from their position, because their products were different from those of the northern states and could not replace those whose cultivation was repressed.

Agricultural products fell off to such an extent, that in a few years the United States ceased to be an exporter of them. The cities having gained control of the states, it came to be a political theory

that each state was a community, and that the lands abandoned or forfeited for taxes belonged to the Community and therefore came indirectly under the control of the cities. From this position it was an easy step to the idea that the taxes—or rents as they were designated—of the "people's lands" might be spent where most beneficial to the majority, that is, in the cities. It was attempted to be pointed out by the more conservative that this was class legislation. But the radical progressives replied that it was in line with the theory of the single tax which was class legislation if anything could be. And they asserted that the adoption of the single tax carried with it an endorsement of the principle of class legislation when demanded by the interests of the majority. Whether their reasoning was sound or not they carried the day, and a great stride was taken toward the centralization of power and population. It now happened that when more money was wanted it was raised, not by increasing the rents of city lots, but those of farming lands, and after a time the principle revenues came to be derived from them. Although the exportation of grain, flour, beef etc., had practically ceased, still the people had to eat and their food had to be raised on the land. The business of farming gradually took on entirely new features. Large operators took large tracts on lease from the state at prices determined periodically by appraisment fixed in proportion to the needs of the state. Lands taken on these terms were guaranteed to be kept free from the competition of squatters, so that the lands remaining va-

cant were cleared of squatters, or else the latter were restricted to a mere garden patch. Thus the country was no longer occupied by farmers residing on the lands with their families as in former times. The agricultural districts were inhabited only by a poor and thriftless class of peasants and during the summers by the employes of the large contract farmers who made their headquarters and resided with their families in the cities. In the winter, only such hands as were required to care for the stock remained in the country, the rest all flocking to the towns.

One result of the increased rentals charged for the agricultural lands appears not to have been anticipated. That was the great rise in the cost of food. Of course the rents of the lands were simply added to the cost of the production of grain and other foods, and finally were paid by the consumer. It came to be seen after a time that the public revenues raised out of the agricultural lands were finally paid by all the people in proportion—not to their wealth or ability, but to their appetites and the amount they consumed—so that a laboring man with a vigorious appetite paid more to support the state than a dyspeptic millionaire. And a poor man's family of six or eight ravenous offspring contributed many times as much as the scanty and sickly progeny of the exclusive aristocrat. It speedily became a cause of great dissatisfaction and disappointment when the poor and the working classes found out that the fine promises of the single tax had so far failed that instead of lightening their burdens it had increased them.

And that the confiscation of the lands of the farmers instead of adding to the prosperity of the common people had increased the already plethoric wealth of the rich. A school of politicians now arose who declared that the taxation of land was the taxation of the poor man's bread and butter and was all wrong. Instead of farming land paying the bulk of the taxes they said it ought not to pay any. Every facility and encouragement ought to be given for the production of cheap food. People ought not to be taxed on what they consume, but on what they save. Neither labor nor the laborer should be taxed, they should be made as free and unhampered as possible for the production of wealth. But when wealth was once produced then it should be taxed wherever found and a necessary portion of it taken as the revenue of the state. The laboring classes were in a mood to listen to this logic whether sound or not. The lands having passed out of private hands, however, there was no disposition to allow them to pass back to them again. And the new party advocated state superintendence of the lands and free occupancy by private individuals of such amounts as each could actually cultivate to advantage. As the population and demand for land increased, the amounts allotted to individuals was to be cut down proportionally, and a grade or standard of cultivation and quantity of production was to be exacted, and the state was to fix the prices at which the products were to be sold. Eventually it was proposed that the state should be the purchaser and distributor of these products so that specula-

tion in them should be prevented. The advantage possessed by some on account of their nearness to market would be equalized by the state paying a less rate for their products than for those further away.

Taxes for revenue were then to be levied upon every piece of personal property that could be found of every sort whatever including buildings. In the cities a graded rent for lots was to be assessed according to locality, beginning at zero in the vacant suburbs and increasing toward the center of greatest activity and demand. A thoroughness in assessment and the employment of methods that were called by their critics, "odiously inquisitorial," were to be adopted, but the fact was the mass of the people were drifting rapidly toward socialism in their ideas, and they asserted that the "inquisitorial methods" were alright. They said, it was high time to know how much wealth people had and how they came by it, and that reluctance to tell on the part of the possessors of it indicated that either they had acquired it by questionable methods, or wished to avoid the fair responsibility, that its ownership entailed. They went further and declared it was high time that more scientific processes were discovered and put into practice for the equitable distribution of wealth. A thousand men contribute to the production of $1,000,000 of wealth, all of which is gobbled up in a few weeks or months by the scheming of a single "financier." The board of directors of a railroad, a mining company or a manufacturing company, may issue to themselves certificates of watered stock for which

they pay not a cent, and which represent wealth having no existence, but which they are in a position to compel the public to make good. A gang of speculators may get up a corner on wheat or cotton or stocks of some sort and artificially raise the price while they unload at the advanced rate thereby securing wealth they never earned. Combinations and trusts in oil or sugar, screws, nails, coal, whisky, gas-pipes or binding twine, arbitrarily advance the price of the articles whenever they want more money, and thus take as many thousands or millions from that patient ass, the public, as they see fit without a pretense of returning an equivalent. All these things the politicians of the new school declared must be stopped. They said people should not be allowed to secure wealth without in some way earning it, and if they had managed to secure it without rendering an equivalent for it, it would be no more than right to confiscate it for the benefit of the public at whose expense it must have been acquired. The party advocating these ideas rapidly came into power and proceeded to put their views into practice. It was found after much discussion and some experimenting that people would not work and do their best unless they were paid better for their best than for their worst. The experiment of making the state the buyer and wholesale seller of all articles that could be made the subjects of combines and trusts was found to work well. The state did not at first undertake to manufacture or produce anything, but monopolized its transfer from producer to consumer. For example the producers of anthracite

coal were required to sell their product to the government, and it was unlawful for them to sell to anyone else. The price of mining, handling and transportation and the selling rate were each fixed by a board of arbitration and remained fixed till the conditions changed. There was no such thing as striking among the hands, for if they were dissatisfied all they could do was to leave and allow others to take their places. If no others were willing to do the work it was an indication that the rate was too low and the board of arbitration raised it. It had been settled before this that the mine owner had no royalty rights. These were regarded as the property of the state. So if the mine owners attempted to combine to raise the price to the state or from perverseness refused to furnish the amount required their properties were placed by the state in the hands of receivers to be worked till such time as the matters in dispute were regulated.

Other mining industries, and the production of coal-oil, sugar and other articles capable of control by trusts, were regulated and handled in similar manner by the state. As to railroad, telegraph and express properties, they all passed into direct government ownership before the middle of the twentieth century."

The Professor pausing here for a moment to shift his profile, I ventured to say that I had in my day anticipated this move on the part of the government, but many people had been unable to see how it could be carried into effect without simple confiscation, because they said it would bank-

rupt the country to buy the roads etc., and pay their value for them.

"There was no difficulty at all in the matter," the Professor continued, "the owners of the roads received for them all they were worth, and yet they did not cost the country a dollar. First the government had the roads appraised on a capitalized basis, in which account was taken of the actual value in cash of the property as it stood regardless of the amount of stock and bonds outstanding against it. Next, account was taken of its power to earn money.

The government now provided for the issue of consolidated railway bonds guaranteed by the government. These all bore the same rate of interest, three per cent payable annually. They were in five series, due in 20, 40, 60, 80 and 100 years respectively, an equal amount of each. They were in denominations of $20.00, $50.00, $100.00, and $1,000, with coupons for the interest attached, the lower denominations payable at the earlier dates.

These bonds were issued in exchange for the railway securities on the following terms. Bonds at their face value were allotted to each road to the amount of its estimated cash value, plus its net earnings for that one year next preceding the passage of the act of purchase. Many roads earned only enough to pay their running expenses, and these received only the amount of their appraised valuation. For the purpose of the distribution of the allotment of the purchase bonds to the holders of the railway securities in any given ease, account was taken of the market quotations of the

several sorts of stocks and bonds at a date one year previous to the act of purchase, and the value of each person's holding thus ascertained. Then the purchase bonds were distributed to the individuals pro rata to these values. When seven-tenths in interest of the proprietors of any road accepted the terms of the government purchase the other three-tenths were obliged to accede or lose their interests.

A few roads held out for a short time, but after the ice was broken they all at once became eager to transfer their properties to the governmet. The railway consols at once became popular and were rated above par, the government guaranty making them in reality national bonds. A new cabinet office—secretary of transportation—was created. All the employes on the roads from the superintendents of transportation down, held their places under civil service rules, and this branch of the administration never came under political conditions, but was managed upon strictly business principles like the post office. The income from the roads, from the very first year not only paid the interest on the railroad consols, but yielded a handsome surplus that was annually laid aside in safe investments to serve as a sinking fund for the redemption and cancellation of the bonds as they should mature. Before the end of the twentieth century one-half of these bonds had been retired and great reductions had been made in passenger and freight rates and the service had vastly improved over what it was in your day. Strikes, freight and passenger rate wars with their terrific

waste and demoralization of business were things of the long past. Many other leaks of railway earnings were stopped when the roads became the property of the government. Many small pieces of road became consolidated under one superintendence; hordes of directors, presidents, vice presidents, general managers, general agents, solicitors of business and other officials were dispensed with; many of whom under the former regime, not only drew salaries for supposed services, but absorbed besides in various mysterious ways, vast wealth that of right should have gone to the stockholders.

The total mileage of the railroads of the U. S. in 1893 was.....	173,370
Total capital stock	$5,021,576,551
Total bonds	5,510,225,528
Total actual cost $45,000 per mile..	7,801,650,000
Total earnings, one year	1,208,641,498
Total net earnings	358,648,918
Amount of the railroad consols to be issued in payment of the R. R...	8,160,300,000
Annual interest on same at three per cent	244,809,000
Surplus of railway income after paying interest on railroad consols to be applied to sinking fund....	113,839,918
Amount of sinking fund after twenty years to be used in the extinction of one-fifth of the consols.....	1,632,060,000
Net income of roads increased to.....	400,000,000
Surplus to be used in betterments....	41,351.082

(The above figures I have worked out to accord with the Professor's suggestions—as he did not give details. I have put the average value of the roads at $45,000 per mile which is much more than it would cost to replace them.)

"I suppose," said I, "that these bonds, especially those of the lower denominations would circulate to some extent as currency."

"They did, and those of the $1,000 denomination were used as the basis of paper currency. But now at the close of the twentieth century over half of these bonds have been retired and the currency based upon them withdrawn. The railroad, telegraph, transportation, express, and car companies have all disappeared and the entire business is conducted by the general government. All of the roads will soon have been entirely paid for and the rates for the transportation of passengers, goods and messages are reduced almost to actual cost of the service including wear and tear. You would doubtless be surprised by the schedule of prices. For example, passenger rates for ten miles or under three cents, 20 miles five cents, 50 miles ten cents, 100 miles fifteen cents, 200 miles 25 cents, 500 miles 50 cents and greater distances at the same rate provided it is a continuous ride in the same train."

"In my time," said I, "electricity was being introduced as the motive power on railways. Did it prove successful?"

"It did, eminently so, and entirely superseded steam locomotion, although steam stationary engines were used principally, throughout the cen-

tury. But when we come to look forward into the twenty-first century, we shall find some remarkable changes. But we have not reached that yet.

"I am curious to know how the currency question was settled. After the retirement of the railway consols, I suppose they fell back on gold or paper based on it, did they?"

"The use of gold and silver money was never discontinued entirely, and both were coined. Near the close of last century, the free coinage of silver was strongly demanded by the people and strongly opposed by the financiers. Finally they compromised. The government gave up the task of maintaining the parity of the metals at any ratio, but coined both.

The silver "dollar" with its fractions, half quarter and dime was coined in quantities to accommodate the business. Silver was made a legal tender for limited amounts. This gave silver the character of "fiat money," or money that is legal and current at inflated values. They made gold the standard of value. In this they were right. There could logically be only one unit of value. But the debtor class strenuously opposed the plan. They said it worked great injustice to them, because their debts were contracted at times when money bore inflated values; when for example silver was intrinsically worth only half as much as gold. These debts were therefore now payable in money twice as valuable and twice as hard to get as that for which they had gone into debt. In other words they paid back twice as much as they fairly owed and the creditor received twice as

much as he fairly loaned. There can be no doubt this is true of debts of long standing. But most debts were not affected materially by the rise in the value of gold, because they were not contracted at its bottom value, but at various grades of value while it was on the ascending movement. However as long as it was rising the creditor class was reaping an unjust advantage over the debtors. The government issued bank notes; some based on silver and some on gold; each kind redeemable in the metal on which it was based. The quantity of this paper money was regulated by the national legislature so as to insure a circulation in proportion to the volume of business. The extended use of bank checks has furnished a substitute for or supplement to the currency. When the currency question was finally felt to be settled, the conditions were practically accepted and the producing class was set to work, and in an incredibly short time, replaced the wealth that had been abstracted from them and more. Then came an era of speculation and the scattering of wealth. Obligations rashly incurred in flush times, had to be met when times became tight. This led to panics and the whole routine had to be repeated about so often. But panics could not be entirely eliminated by doctoring the currency, because currency is not the only factor. No matter how much currency a man has, he is not likely to buy articles he does not want. If mechanics have spent their time in the production of something the public do not require or a surplus of what they do ordinarily require, there will be difficulty in disposing of the product.

If two classes of mechanics each make things with the expectation of selling them to the other class, and they turn out to be such things as are not wanted in either case, there is sure to be stagnation of exchange and consequent suffering. Where all are working in ignorance of the requirements of others there are sure to be produced many things for which there will be no demand. This had been partially recognized by the government in your day and commissioners were appointed to collect statistics and make estimates in regard to the production of and probable demand for certain farm products. As the government became more intimately the servant of the people its services in this direction were greatly extended and inquiries covered many other departments beside that of farming. The government itself became a large consumer in operating its railroads, telegraphs etc. Additional mileage had to be constructed to meet the growing business besides the renewals on account of wear and tear. By the publication in advance of the probable demands on the various sorts of industry it became possible to estimate approximately what amount of and what kind of product could be disposed of. A still more fruitful source of financial trouble was to be found in the spirit of recklessness and extravagance with which people spent their money when times were prosperous or booming. It seemed so easy then to get money and to pay debts that many thought it hardly worth while to do it, if there appeared a chance for a profitable speculation, and so instead of paying old debts they were

very likely to incur fresh ones. But as the state became more and more involved in business affairs, it was able to advise what products would be in demand, when it was advisable to use caution and economy and when activity would be rewarded. The functions of the state as a medium of exchange between the producer and the consumer became rapidly extended, and before the close of the century it became the chief and in many things the only buyer and seller of the products in most common use, as well as the sole factor in all monopolies and in banking, insurance, and public amusements. It had not yet gone into manufacturing or farming except to the extent necessary to prevent combinations and private monopolies."

"I think I can see the advantage of this," said I, "they probably held to the principle that competition is necessary to keep men up to their best in exertion and industry."

"That is correct," he replied, "until work becomes an instinct it is necessary to stimulate exertion by the better rewards that extra industry can procure. The socialists in your day proposed no plan that calculated sufficiently upon the selfishness of the individual. They expected that everybody would accept the position assigned to him and work faithfully for the good of all. But it was too soon to expect this. Your race is very young. It is not so long since your ancestors ceased to depend on the spontaneous productions of the earth for their sustenance, and began to supplement them by their own exertions. With some of your races work is beginning to be instinctive,

but there are yet enough in every nation, who, by their hereditary aversion to exertion are ready to shirk out of labor and make the burden of the instinctively industrious intolerable. Your race is too young yet, here at the close of the twentieth century, to take on the purely instinctive socialistic conditions as we Lunarians have them."

"You think then that socialism to be sucessful must be instinctive as it is with the bees?"

"To be permanently sucessful it must be founded upon such an instinct for industry, that makes it more agreeable for a person to work, than to be idle, or to be merely amused. That is, the individual must love work for the sake of the work rather than for the reward that is to come after it. It is indeed true that only the stimulation of the reward at the end could ever have created or kept up the habit of work until it became instinctive, and it is true that if this reward at the end should habitually cease to be realized to at least some degree, the instinct for the work would in course of time become undone—unwound as we might say. The expectation of the reward if it is as constant as the work, would naturally become a part of the instinct. But there are often disappointments as to the reward, while the work itself remains constant, so that this part of the instinct learns to be satisfied with smaller and smaller results until finally the necessaries of painless existence in which the working apparatus is kept in proper operating order are all the reward that the instinct requires."

"Then," said I, "in this supreme ideal of social-

istic instinct, I understand you, that the individual lays aside all expectation of personal enjoyment, or the possession of anything in the way of luxuries or superfluities. It seems to me such an existence must be a very narrow one."

"The possession of superfluities," said he, "does not contribute at all to enjoyment of life. That is why they are superfluities. A luxury, however, is something that gives or is supposed to give unaccustomed pleasure, and it presupposes conditions or times in the ordinary life of the individual in which he fails to get perfect returns of happiness or satisfaction. But suppose there are no such times or conditions, and that he has no possible desire that his habitual work does not satisfy. Then his work is his luxury and no diversion to any unaccustomed function would procure so great a luxury. As to such existence being narrow, it all depends on the breadth of the work. If the work is circumscribed, the life is narrow. If the work is wide, diversified and conplicated, then so is the life, whether it be accompanied by the elements of contingency and uncertainty of mind as with you or the assurance of settled and triumphant success as with us.

All the same however true socialistic conditions are not realized to a nearly perfect degree up to this close of the twentieth century, although the advance toward them has been what the conservatives of your day would have regarded as alarming. In all cases where honest competition in the production of anything can be maintained, it is the policy of government to refrain from interference;

but if the articles produced are necessary to consumers or are required as materials in the production of other goods that are, and the manufacturers of such things form trusts or combinations for the purpose of increasing the price, the government appoints receivers for such business and has it operated long enough to ascertain the cost of producing the article. The price is then fixed by the government."

"But what if the parties decline to sell at the prices fixed by the state?"

"They do not decline unless they want to go out of business," he replied, "because when the state interferes in such cases it amounts to notice to the parties that the state is ready, as an alternative, to undertake the business itself, when it speedily destroys extortion by furnishing the required product at a fair price."

"It would seem then," said I, "that the state has become a large factor in the business of the country, and there has been a great centralization of power."

"That is true," he answered, "there has been a remarkable evolution and yet a perfectly natural and logical one. The very first principle on which a state is organized is the defense and protection of all—the weaker as well as the stronger members—against a common external foe. The second principle which is easily derivable from the first is the protection of the members of the society from each other. Under this principle the weaker will be protected from the stronger, first in his person, second in his property. It was the theory of many

in all former times that the functions of the state ought to end there. Some said, that to go any further would contravene the wholesome natural law of selection, and interfere against the survival of the fittest. Nature left to herself, would put down and finally exterminate the weakest of the race mentally and physically, leaving always the strongest and best to survive, and so constantly improve the race. But if that consideration were to prevail there should never have been any protective organization of tribes and states in the first place. If when a community were attacked each individual ran away or hid as best he could, the enemy would catch and destroy the less swift and strong and the less shrewd and wary, and so select the best for survival. But under the organization, they stand together, and if the enemy is beaten off, the weak and inferior members are saved with the best. The only consideration on which this is right must be that the weaker members of the society are worth more to the state than they cost, tnd therefore to the extent that they are protected by the organization they are selected by nature in this roundabout way for survival, for the benefit of the state.

The further defense of the weak against the strong within the social organization, must be on the same principle. And this principle having been admitted there is no logical end to it short of protection against every advantage the strong or the superior or the more wary can possibly take or attempt. In a civilized society the oppression of the weak is no longer so much from personal

violence or robbery, but it takes the more subtle form of absorbing their wealth under forms of law and business formulas, so that in such a society the weak and unwary are valuable to produce wealth, but are robbed of it, practically by a few.

If the state would get the benefit of the exertions of its members, it must protect them from these depredations, whether they are perpetrated under the forms of highway robbery or of the laws of trade. In short the protection of the individual by the state cannot logically terminate till it prevents everyone from acquiring property he has not earned and rendered a fair equivalent for."

"Then ought it not also to protect society against the extortions of anyone who would compel it to pay too much for something he alone could produce?"

"Of course that is included in the first."

"Well then, does not that imply also that the state shall insure a fair return for the work of every individual to himself?"

"No," said he, "that does not follow, unless the individual performs such work as the community wants. If a man is free to do as he likes, and he must be, he may sometimes choose to do something of no use to anyone else. Then of course no one else should be obliged to take the useless thing and pay for it. But if a man has nothing to do, the state should upon his application furnish him employment and pay him for his work when done under instructions."

CHAPTER VII.

Women's Rights.

"I suppose there has been a change in the position of women since my day?"

"In politics and in business, there is now no distinction on account of sex. A woman may be president or governor of a state, a senator or judge. Women are to be found in every department of business, and are fully as successful as the men. This materially disturbed the organization of the family, as it was before your time. The man was then the legal and often the actual head of the family, and both the wife and the children were supposed to be under his authority within certain limits. But as the sphere of woman extended and she became better educated, she soon passed the condition in which she was content to be subordinate to the man. She insisted upon and of course secured a position of equality as to legal rights and equal authority in the family. In your day the principal occupation of women was in domestic life, keeping the house and rearing the children. As women became interested in wider activities, many of them began to seek ways of avoiding family cares. Co-operative house-keeping was tried in many cases, kindergartens taking charge of the children.

The state had for a long time asserted an interest in the education of children, first providing the means of education, then making it compulsory. Finding that some were kept from school from the inability of parents to provide books, the state provided books to those who needed them. Then because the pride of those who accepted this bounty, was wounded by this advertisement of their poverty, it became necessary for the state to furnish books to all children, both of the rich and the poor. Next it was found that want of suitable clothes kept some from school that ought to attend, and so the state commenced to supply school clothes to them and by a similar process of evolution finally came to supply a school uniform to all children. It was also perceived that the interest of the state in the individual did not end when it had taught him the three R's and the two G's; in fact it had only fairly begun. It was all important to the state to know whether the child she had educated was going to employ his talents for good or for ill. It was expected he would carve his way and make his living, but if he were not given an opportunity to learn an honest vocation, was it certain that he would not drift into a dishonest one? It was seen to be the duty of the state to see that every youth of both sexes were given such opportunity to learn some trade or occupation. This became the more necessary on account of the trades unions and combinations amongst working men who naturally were anxious to prevent their ranks from being crowded and jealously threw obstacles in the way of apprentices, so the state found it neces-

sary to care for the individual until he had attained the equipment essential for his self support.

At first the state schools of trades were simply free to all; later they became compulsory, following the experience of the common schools. Scholars in the common school were educated with reference to the trade they fancied, and when they entered the trade school they were on trial for a limited period and were sorted according to their ascertained aptitudes. It became a necessary branch of the supervision of the state to ascertain the proper proportion of workmen required for each branch of business and when this proportion was being seriously disturbed by unequal selection by the scholars themselves, it was restored by state selection on examination according to aptitude.

So much of the care and education of the youth having thus been assumed by the state, the way was opened for more. It was said that half the people who had children did not know how to bring them up properly; and teachers often complained that the example in bad manners, deportment, language etc., that the children got at home to a great extent neutralized the good lessons in these things they received at school.

The kindergartens became by almost insensible degrees enlarged in the scope of their functions. At first, as in your day, they were merely stopping places for the children during the day, they going back to their parents to spend the night. As the mothers came to be more and more engrossed in affairs away from home, the kindergartens extend-

ed their care over the children, furnishing them their meals, then their lodging, then medical attendance as well as education and amusement, finally assuming all the care and expense of maintaining and rearing them. At first the expense was paid by the parents, but was gradually assumed by the state by degrees till it finally became responsible for all. The advantage of these public nurseries was at first of course most marked in favor of the poorer classes. But as their functions and scope developed, the care and training of the children became more scientific, their powers, tastes and aptitudes were more thoroughly brought out. The wealthier classes at first objected to having their children reared in association with the plebians. But the children of plebians were no longer plebian when removed permanently from the influences of their parent's homes; and they turned out a larger percentage of successful men and women than those of more comfortable position. In physical and mental ability they were superior, and in morality at least equal to the others. It was seen that these kindergartens were better adapted for the care of children than even the better equipped homes, and they received the patronage of a constantly increasing proportion of the people. At first there was nothing compulsory in this patronage. Parents left their children when it suited them, and took them away when they chose. But after a time this was outgrown. It came gradually to be understood that the state—that is the whole community—was really as much concerned in the destiny of the growing generation as the

parents; and it was said that it was better that the children should have the constant care and attention of those intelligently qualified and perfectly equipped, than that their development should be interrupted when the caprice of parents craved them only for pets and playthings. So the selfishness of parents in this respect was gradually outgrown in favor of the more important welfare of the children. But economy as well as sentiment supported this evolution. The cost of caring for the children by the state was vastly less than under the old system, and it no longer fell with such crushing weight on those least able to bear it; for it was notorious that the poor were the most prolific. With the better care they received the mortality amongst the children was greatly reduced and a far greater proportion reached maturity. Another important consideration in the state nursery system was the cultivation of the democratic sentiment amongst the children, and the destruction of exclusiveness and aristocratic ideas and feelings.

"From what you say," said I, "it appears that the state has undertaken to take care of the race during their age of helplessness, from infancy to manhood."

"That is correct," he answered, "the state takes the child as soon as it is weaned, sometimes before, and keeps and provides for it every day till it is prepared to be selfsupporting. Every one is taught a trade or a profession according to its bent and the demand for services in the several callings, it being the policy of the state to so reg-

ulate these things that the value of services is about the same in all callings."

"Then can a mechanic make as much as a doctor?"

"About the same. As soon as any difference is observed, more are encouraged to enter the calling that tends to the higher pay, and so made to preserve the uniformity."

"Well, if the state begins when the child is weaned, to take care of it, why should it not begin before—a long time before in fact? For antenatal influences are often of the most powerful kind; and when they are mischievous, no amount of subsequent education is able to neutralize or rectify them. That was all thought out in my day by the more advanced thinkers."

"O they have "maternity hospitals" and "Homes for Ladies" and all that sort of things—of course—but what you mean; not yet. That is still in the future—but we shall find it by and by in a way that will surprise you."

"Well it seems to me, to get even where they are they must have met and solved some rather difficult riddles," said I. "For example in my day there was a desperate struggle between Prostetants and Catholics in regard to the religious education of the children. The Catholics hated the public schools, because they were "godless." They insisted on having their children brought up in their own faith. They wanted a share of the public money so they could have schools of their own and mix their catechism with the rules of grammar and the rule of

three. How did they ever settle this difficulty—or did they settle it?"

"O yes," he said, "they settled it, or rather it settled itself. At first the Catholics and in some places the Lutherans and other sects of Protestants insisted on maintaining their own schools, kindergartens etc., but the state institutions were so far superior to what these sectarians could furnish, that the laity broke away from the control of their priests in this respect and followed their interests in putting their children under the care of the state. As however the state monopolized more and more of the pupils' time, it was conceded that if the whole population was not to become "godless," it would be necessary to allow religion to be taught in these public institutions in some form. So they compromised. The different religious bodies were allowed to hold Sunday schools and classes for religious instruction of the pupils in the creeds professed by their parents. The children were also taken to church according to the same rule. This was at first made compulsory if desired by the parents, but after a time compulsory attendance upon religious instruction was remitted at the age of 12 and the pupils were allowed to choose their religion. This arrangement preserved the proportions of the sects to each other fairly well, but in the meantime there arose conditions that made this preservation of small moment. These were such changes in the spirit and feeling of the members of different churches toward each other, and such a liberalizing of creeds that all were brought together and became not only

tolerant, but even cordial toward each other. The schools themselves did more than anything else to bring about this result, for as the older scholars were given their freedom of choice, it gradually became a fashion or fad amongst the pupils and finally a part of the regular curriculum to attend each other's meetings and interchange ideas and arguments. As the ability grew amongst all, both the young and old, to reason more justly and logically, all sides became less tenacious of the dogmas they found themselves unable to prove. When these were lopped off from the various conflicting creeds their professors found themselves all standing on practically the same platform of facts and plain human duties. The things they differed on were mostly mere hypotheses. They still continued to differ, but no longer regarded their differences of such vital consequence as formerly. It came to be generally admitted as absurd that the future post mortem condition of men should depend on their intellectual convictions regarding unprovable metaphysical theories."

"Doubtless the bringing together of the children of all creeds and educating them in each others notions had much to do with this liberalizing process; had it not?" I asked.

"It had of course, but the education of the children together, was itself a result of a liberalized public opinion. The fact is the human mind was constantly undergoing a process of expansion and growth. It could no longer be satisfied with the crude and childish notions of former generations, and was outgrowing them as children out-

grow the fables of the nursery. Until men got capacity, argument and logic were of no avail. Education in the great facts and discoveries of science and philosophy gave them capacity."

"From what you say, I should suppose there has been a great modification of creeds?"

"There has been. No church remains the same either in theory or practice that it was in your day. Several of the minor protestant sects have entirely disappeared.

In several cases two or three have united to form one. The whole number of sects is less than one-fourth of what it was. Creeds have become extremely simplified and in many cases practically ignored. The government among the protestant sects, is in most cases congregational and democratic. They no longer engage in missionary work for the conversion of the heathen, as there are no longer any heathen whose conversion is desired; and no organized effort is necessary for charitable work at home, because that is amply provided for by the state. But the church is useful as a social organization, promoting personal friendships and associations, providing intellectual and educational entertainment for its members fostering and fortifying the moral virtues and elevating and refining the manners. In many of these protestant congregations, the worship of God by prayer and ceremony is entirely discontinued, it being held that all worship is unworthy, and based upon a false notion of the relationship between God and man. Man they say cannot worship or serve God directly. God is not childish enough to want it.

All man can do is to help his fellow man and himself and that constitutes his whole duty."

"These," said I, "would probably have been called free thinkers or agnostics in my day. But what of the Catholics?"

"The Catholics," he replied, "are far more numerous than the Protestants. Forty years ago there was a great schism in the Catholic church, the American branch of it separating completely from the European, and setting up for itself as the "American Catholic Church." At the same time important changes were made in the interpretation of the doctrines of the church and radical innovations in its government. The latter is now largely republican in form and the laity have representation in the councils of the church and a preponderating influence both in its doctrine and its temporal policy. The tendency toward this development showed itself strongly in the beginning of the twentieth century, and originated from the general increase of intelligence and feeling of personal assertion and responsibility among the laity and the example of the freer people about them. The clergy instinctively resisted this tendency, and called upon the Pope and the European church to help them to stop it. The help they afforded only stimulated the movement. The interference of the Europeans was resented as impertinent; the exercise of the papal authority was looked on as a display of superannuated tyranny. The Pope asserted that the American Church by its liberal practices and tendencies was corrupting the church in other parts of the world, and declared they were doing

it more damage as members, than they could do as open enemies outside of its pale, and he threatened to excommunicate the whole American body. The immediate cause of the final act of separation was first the persistence of the laity in having the ownership of the church property in their own hands, represented by trustees of their own selection. Second, their demand to share in the government of the church, to which end they proposed a representative legislature composed of two houses, one composed of laymen and the other of clergy.

Third they asserted the right of private judgment without prejudice to their standing as Catholics, on all questions of mere faith, except the cardinal principle of Christianity, requiring only the observance of the sacraments and the practice of charitable works and a moral life.

They repudiated auricular confession. These innovations were not all consumated at once, but the controversy once begun, found no logical settlement short of these demands and the rupture of the church. Liberalized in this way in regard to creed and government, and freed from the domination of the Italians, but retaining much of the ancient ritual and the pomp of public worship, the American Church, became very popular, and soon received large accessions of membership from the protestant bodies. In fact the more conservative and spiritual protestants found the new catholic church more congenial to them than the new protestant. The former church advanced toward them as the latter drifted away into rationalism.

CHAPTER VIII.

Marriage and Divorce.

"You said that the occupations of women became varied and ceased to be domestic in a majority of cases; what effect did that have on marriage and divorce?" I enquired.

"Various causes tended to make marriage almost universal and celibacy became the rare exception. The chief cause was the assumption by the state of the care and education of the children. Another was the ability of women to support themselves. Men did not feel it such a burden to be married when they did not have to greatly exert themselves for the support of either wife or children. Women did not feel it such a burden when they were released from the care and responsibility of a household of children and servants. Marriage moreover has become less of a lottery than in your day, because men and women meet each other in business relations in which they act their natural selves. Neither is obliged to marry in order to live, and less art and deceit are used for the purpose of entrapping a partner. The property of neither man nor woman is affected by marriage, and neither acquires any rights over the property of the other except, that each is bound to care and provide for the other in case of sickness or disability. There are fewer conditions that are liable to

produce inharmony, because greater freedom is conceded to the parties, and there are fewer points on which absolute unanimity is essential. Marriage is on the whole much happier than formerly, and although divorces are easily obtained they are much less frequent. These conditions have had a marked effect on the increase of population as you might suppose. There is no longer any temptation to avoid the natural results of marriage, and those unnatural expedients women formerly resorted to for that purpose, ruinous to health and morals, are now almost unknown. The health and strength of women have vastly improved. Women dress sensibly, and live natural hygienic lives, and the terrors of childbearing have practically vanished. As Americans took upon themselves the furnishing of native born citizens to people this country, immigration from Europe fell off rapidly and practically ceased sixty years ago. But notwithstanding this, the population has more than doubled three times, and for the territory that formed the United States in your day it is now over 600,000,000,"

"Six hundred millions!" I repeated. "What an enormous number! It takes my breath to think of it. Is it possible so many people can be supported in that territory? Nearly all the really valuable land seemed to be taken up when the population was but 70,000,000."

"Aye," said he, "six hundred millions are easily supported, and supported in greater comfort than when the population was but 70,000,000; and they may even double several times more before the capacity of the country is exhausted."

"I am amazed at what you say," said I, "but there must be a limit. Let me see, if 600,000,000 are doubled three times it will amount to 4,800,000,000. Is it possible the land could produce food and clothing for so many; and yet from what you say about the rate of increase that enormous number of people will be in this country before the end of the twenty-first century."

"We will not cross that bridge till we come to it," he answered, "we will explain that when we come to look forward into the twenty-first century. It is true we shall find a limit. The breeding instinct of any race of animals, not excepting man, would if unchecked and unopposed in the course of time absolutely fill up the earth till it could support no more. Man has for many ages been the dominant animal of the earth. Yet he has failed to stock the world to its capacity or anywhere near it for reasons you can easily supply yourself. In the first place the profession of arms or the art of keeping down the population by war has always held the most honorable rank among human employments; second the human race has been the absolutely helpless victim of pestilence and plague. Hundreds of different kinds of microbes, vibrios, bacteria and zymases have from age to age apparently whenever they saw fit, or thought men were getting too numerous, unseen and unsuspected, planted their colonies in their vital organs, and swarmed in their blood, living at their expense and sweeping them to death by myriads and millions. Next, men were at the mercy of the elements both on sea and land. When-

ever a crop failed from drought or flood there followed a famine, and millions were periodically swept away by gaunt starvation, because there was no way of conveying to a needy district, the superabundance that might exist in another. But even where all nature was favorable, and nations happened to be at peace there was always the native and hereditary stupidity of the individual that blinded him to all rational ways of taking care of himself or his dependents and made it impossible for him to rear to maturity more than one out of five of his children. Thus many causes conspired to kill people off almost as fast as they were born and sometimes faster, and many times to prevent them from being born when they ought to have been. These inimical causes have all practically been eliminated. The destructive agencies supplied by nature for limiting the increase of the population having been set at defiance by art, it is evident that art must likewise find a way for limiting the increase of population, or else sometime in the future that increase will by its very success put a stop to itself, and the brutal methods of untamed nature again assert themselves. After all, art is only a subdivision of nature. It may modify the action of nature as to details, but cannot set aside the principles that govern it."

"You spoke a little while ago of the territory of the United States, as it was in my day. This would appear to intimate that the boundaries have changed since then, is that so?"

"Well yes, you will think so, when you know that the United States of the present day covers

the entire Continent of North America, and embraces besides, New Zealand, Australia, the English Colonies in South Africa, Ireland, Cuba and most of the West India Islands, and numerous islands in the Pacific ocean. I see this astonishes you and I will proceed to tell you how it happened. If we begin at the beginning, it appears to have been very largely due to the construction of railroads in Asia by the Russians; that is it, would never have happened if these roads had not been built. The great transcontinental Siberian road was completed from St. Petersburg to Vladivostock on the Pacific ocean in 1904 and formally opened with a great flourish by the Rsusian emperor. The Russians were not entirely satisfied however with this road. It was essential as a military road, and as a means of settling a vast extent of fertile country in Siberia, but as a commercial line it did not meet their rather sanguine expectations.

Their ambition was to monopolize the trade between China and Europe. The new road by going around the east side of Mantchooria instead of through it to Pekin, imposed on that trade an unneccessary transportation of 1800 miles. They saw directly that they needed a line to Pekin and Teentsin, from Irkutsk. They obtained a concession from the Chinese government and built this line for commercial purposes. Then, later, they found it desirable to build another line west of the first and reaching the ocean at Shanghai. They also tapped the western part of the Chinese empire by a line from Bokara.

From these lines others soon grew, commanding the business of the country and mostly owned by the Russians. In no long time jealousy of the enterprising "foreign devils" on the part of some of the more conservative and reactionary of the Chinese, led to outrages on their part which furnished a good pretext for military occupation of the country and finally to its conquest and annexation by the Russians. These encroachments of the Russians had been bitterly, but ineffectually opposed by the English. Their opposition provoked the Russians to place England on the defensive with regard to her Indian possessions so they pushed their railway line through Tartary to the very borders of northwestern India and threatened it with a large army of invasion. The Hindoos who had for years been waiting for such an opportunity to throw off the British yoke now revolted. They had been taught the art of war by their masters and now practiced it upon them, turning upon their teachers the weapons they had put into their hands and taught them to use. The very soldiers that were counted on to repel the Russians took their side against the English. Between the Russians and the Indians the British power in India was totally crushed, and several independent kingdoms were set up under Russian protection. France also assisted Russia in this war, especially on the ocean. British commerce was almost destroyed by Russian and French cruisers. After the war was over these two nations almost monopolized the Indian trade under discriminating commerce regulations, the Russians

by land carriage over their railway and the French by sea. In the end the Russians became masters of almost the whole of Asia. Turkey was dismembered, the city of Constantinople and all Asiatic Turkey falling to the Russians."

"Professor, in my day there was a great war between Russia and Japan, which you have not mentioned. Was it not a factor in the settlement of the Asiatic questions?"

"No, it did not assist in making a settlement, for none was made, its only effect was to postpone a settlement. The events I have narrated were greatly to the advantage of the United States. The destruction of England's commerce largely involved her manufacturers also, and in like degree made room for and stimulated those of the United States. Her trade with all the British Colonies soon eclisped that of the mother country herself. As the tremendous natural resources of the United States became more and more developed under the energy and skill of the most enlightened methods, the contrast between America and England enforced itself on the attention of all.

Treaties looking to the abolition of war, and the settlement of all international questions by arbitration had already been adopted between the United States and Great Britain and her Colonies, and there had been a strong feeling and agitation for a closer political union of all the English speaking people. The aggressive foreign policy of England stood in the way of this. But to her, this aggressive policy appeared essential. She had held India, Birmah and large territories in

Africa, by conquest, and her trade to these countries depended on her continued military control over them.

After the war with Russia and France in which she lost India, her commerce, and her prestige, England still felt her only chance for retaining her importance as an influential factor in the politics of the world, to be in cultivating her interests in Birmah and Africa. She could colonize neither of these countries to any great extent. All she could do was to conquer and rule them and compel them to trade with her on terms that turned all their surplus wealth into her coffers—as she had done in India. Her misfortunes had soured her temper and made her more truculent and bulldozing than ever. Her manner towards her colonies changed. They had been of little or no assistance to her in her struggle with Russia, and had but little sympathy with her foreign policy and the truculent and aggressive bearing towards weaker nations that had made her to be thoroughly unpopular in some parts of the world. England now began to resent the cold attitude of the colonies toward her, and to talk of the duty of the daughters towards the mother. She began to be sorely pinched for money. The war had doubled her already enormous debt, and halved her resources. The number of her unemployed at home had greatly increased by reason of the diminution of her trade and the foreign demand for her manufacturers. Taxation enormously increased and the rich were reduced to poverty in providing for the poor. Millions emigrated to America and to the

colonies, generally people of the thrifty and productive classes, thereby reducing the resources of the country without diminishing her liabilities. She now proposed to the colonies to tax themselves for her benefit. This they were not inclined to do. They were all comparatively poor. They needed all the money they could raise for public improvements in their own settlements. Most of them were heavily in debt. Canada was hopelessly so, practically bankrupt in fact. Finally the colonies all declined to be taxed for the benefit of the mother country. The condition of affairs in the British empire gave a great impulse to the idea of confederation with the United States. The plan gained favor rapidly with the colonies. No nation on earth was so prosperous then, or possessed of such vast resources as the United States. The country was out of debt and enormously wealthy.

Her army was small, but she had a powerful navy. She was respected by all the world and had great influence, as much from her fairness and justice to other nations as from her known reserved power and ability to enforce justice to herself. The British felt the need of an alliance that would place them in the front rank of nations again, and all the branches of the empire appeared anxious for the consolidation with the United States. This country was desirous of obtaining Canada, and this made it the more ready to adopt the union, because it was supposed it must be with all or none. As this country was by far the most populous number of the proposed union, it was conceded that Washington should be the capital

of the new empire. The constitution of the United States was taken as the basis of the new government with certain modifications. The President and Vice President were to be elected by direct vote of the people, a plurality to elect. They were to serve six years only. They could not both be from the same continent or state. The President was not to have the veto power. The Representatives were to be 600 in number apportioned among the states according to population. The senate was to consist of 100 members elected by the people. The term of office for both houses was to be two years. Each natural division as a continent or island or group of islands was to be divided into senatorial districts following state boundaries when practicable, but throwing together small states or fractions of large ones when necessary to give the proper quota of population. All bills were to originate in the House of Representatives, but were also to pass the senate before becoming laws; but that body could not alter or amend—only veto or approve, and the House could pass any bill in spite of the senate by a two thirds vote. The President was to appoint his cabinet with the approval of the senate, but all or any one was to be required to resign upon a vote of "want of confidence" by the House of Representatives. Both the President and Vice President could be removed from office by a two-thirds vote of both House and senate and a new election ordered to fill the unexpired term.

There was to be free trade amongst all the states under this constitution and also between

these states and foreign nations except that a tariff on importations might be imposed when ordered by a three-fourths vote of the Congress. The general revenue was to be collected by the County Commissioners and Treasurers of the counties of the several states, such officers being for such purpose, officers of the general government, and levying such rate of tax as ordered by the law of Congress in addition to the taxes ordered by hte state, county, city, ward, or school district authorities.

Suffrage was to be restricted to men and women who could read and write the English language. Foreign immigrants were not to be permitted to settle in colonies in any of the states or to maintain public schools—except high schools —in which any other than the English language is used.

No state could engage in aggressive foreign war, but might repel invasion. Only the general government could engage in war.

This scheme of government was prepared by a joint commission appointed for the purpose, and submitted to the people of the several countries interested, the British Colonies, each separately, England, Ireland, the United States and Scotland. All the colonies, the United States and Ireland voted for the plan; England and Scotland voted against it. They were dissatisfied with the provision prohibiting them from going to war. They had always enjoyed this luxury and were loth to be deprived of it. They had hoped the plan of union would allow them to pursue their schemes of set-

tlement and annexation as before with the right to call on the confederation for succor in case they were hard pressed by foreign enemies. They argued indeed that actual active assistance would never in any probable event be required, because with the mere moral support of such formidable backing they felt sure that almost any nation would put up with any amount of insult and injury rather than resent it against such odds.

It was supposed by many that the failure of Great Britain to ratify the general constitution would defeat the whole scheme. But the colonies and Ireland had become very much in favor of it, and hated to be balked by what they termed the selfish action of the mother country; and they demanded her consent to the union, of as many as might choose to join it without her. She was in no condition to resist their demands if they should choose to enforce them. But it would have been folly to have come to blows or even to words over such a question. The colonies had never been a source of profit to England, but rather a bill of expense. She traded with them, but did not possess a monopoly of their trade, and paid their tariff dues the same as other people. The United States enjoyed a larger trade with Canada than she, and had almost driven her out of the trade with several of her own West India Islands. Whatever the position might be that she held with reference to this commerce, it would not be made worse by this proposed union, but rather better, for free trade would take the place of tariffs. She would also enjoy free trade with the United States, which

alone was worth to her a dozen colonies. The union of England with her colonies was chiefly one of sentiment. They governed themselves according to their own ideas, and were practically so many independent nations, which she was in sentiment bound to protect when they got into trouble, but which had little or nothing to give her in return for her maternal solicitude and worry. Their relationship to her tended to make them impertinent and presumptuous in their intercourse with other nations. Canada in particular by her bumptiousness had more than once come very nearly involving her in ruinous war with the United States, in which her loss would have been the destruction of her commence, and her only gain, the loss of her pert colony. All these points were discussed by the English. It was urged that if Britain tried to keep the Colonies against their will, the time would surely come when she would have to give them up against hers. They recalled the Controversy with the United States and reflected how much better it would have been for England if she had permitted them to go off as friends rather than enemies. And they averred that if she should give her cordial approbation to the new union and send off the colonies with the maternal blessing to join their big brother Jonathan, it would go far toward curing the unfilial, but not entirely causeless feeling of bitterness he had entertained for her since 1776 and 1812.

As a result of all these reflections and many more of the same sort, the conclusion was finally reached and the parliament gave its solemn sanc-

tion to the new State, but with characteristic foresight exacted one promise to which all the states acceded before the final act was consummated, and that was, that the said new nation should forever be the friend of Great Britain and in case her existence as a nation were threatened it should be bound to interpose in her behalf, and if necessary take up arms in her defense. The name proposed for the new nation was the "Pan Anglic Union." When England failed to ratify, "Pan" was dropped, and the name became simply the "Anglic Union." But it was playfully nicknamed the "Lion's Cubs," the "Old Hen's Chickens" etc.

"When did these things happen," I inquired.

"They were finished by the year 1950," he replied.

"Did not the various states have to do considerable remodeling of their forms and precedure to fit them for this consolidation?"

"Very little, their governments were all much like that of the United States. Like this country, they had already turned over to the control of the state all monopolics, such as railroads, and had reached the same conclusions as to money, the suffrage, taxation and most other questions. They had their legislatures and executive and judicial branches of government, all about alike. Ireland had for a decade or more enjoyed home rule. She came into the new Union as two states, Ulster and South Ireland. These were soon afterward reconsolidated into one—Ireland—the causes that led to their separation, viz, religious jealousy and the teaching of religion in the schools having been

eliminated by the severance of all connection between church and state, which the new constitution required.

The new nation had hardly got settled down to business, before new annexations and consolidations were proposed and after much hesitation and reflection were agreed to. Mexico, Central America and Japan proposed to come into the Union, and shortly after Chili and Argentine made application for admission. The fact is that in forming the "Anglic Union" the promoters were building far more than they realized. Time had without their knowing it reached a new epoch, and was about to turn over a new leaf. Men were becoming educated and mentally developed by strides instead of inches, by moles instead of molecules. In forming the "Anglic Union" they had given expression to a new feeling into which mankind was just being born, a feeling of human brotherhood, a new instinct that drew men together and acquainted them with the fact that they were all the result of common natural causes and animated by common loves and hopes and fears. It showed them they were not naturally and necessarily enemies, but might and ought to be friends and mutually helpful to each other. It was the beginning of the end of war, the epoch of peace and good will.

When they began to think of taking other than English speaking nations into the "Anglic Union," it was at once perceived that the name was inadequate, and so was the constitution. The name was changed to "The Great Union" and the constitu-

tion was amended in regard to the official language so far as the non-English speaking nations were concerned. English however was to be taught in these nations and it has gradually superseded the other languages. Schools have everywhere been established, and the church has been rigidly separated from the state. The state protects the church, but contributes nothing to its support, nor does it compel any unwilling citizen to contribute to its support by the exemption of its property from its due proportion of taxation."

"Have any other nations joined the Great Union up to the present time besides those you have mentioned?"

"None others have been admitted into full membership as equal states, but all the states of South America have been taken under the protection of the "Great Union." They are being settled and developed by northern people and the native population gradually educated up to the required standard. The equatorial climate is naturally unfavorable to enterprise, and development proceeds slowly. The church has been a serious obstacle, claiming time and attention of the natives that ought to be devoted to business and education. The country is being covered with railways by northern enterprise. The most important of these is the great international road extending from the city of Mexico through Central America and the isthmus of Darien and traversing the whole length of South America, even into Patagonia. Branches from this trunk diverge toward all important points and enormous progress has been

made in agriculture and mining. The resources of this continent furnish a vast support to the teeming population of North America.

Mention of these railways led me to inquire of the Professor concerning the progress of transportation, and commerce and whether any radical innovations had been introduced.

"All the old methods of transportation," said he, "have been greatly improved upon, but none of them entirely superseded. Flying machines have been brought to a reasonable degree of perfection at the expense of much thought and many experiments, many fortunes and many broken necks. But they cannot take the place of the freight car or the steamship. They are more rapid, easily making 100 to 150 miles an hour, but they are as yet of limited capacity carrying light letter mails. and a few passengers, but at too great an expense to compete with the improved rail and water carriage of the present. Besides most people would rather be near the ground in case of accident. I mentioned to you the greatly reduced cost of railway transportation in North America where all the lines are operated by the state. In most of the South American states, the roads are merely controlled—not owned—by the state and there is active agitation in favor of the annexation of these states to the Great Union, in anticipation in part of the advantage that will be obtained by the state control of roads that will follow.

The most beneficant service that the flying machine has rendered is its potent contribution toward the abolition of war. Men have indeed been

rapidly educated out of the spirit and habit of war, but the flying machine simply prohibited it. Without it, an age of peace would undoubtedly have been reached in the future, with it, the age of peace is here. International warfare is at an end and probably forever."

"I don't quite see how," said I,

"It is very easy. One of these machines can carry enough dynamite, gun cotton and other destructive explosives to devastate a city of 100,000 inhabitants. It can at will, fly over any place and drop its deadly stuff precisely where it will do the most execution. It can select the palace of the king, the houses of parliament or congress, the barracks, the citadel, or the magazine, or the thickly peopled camp of a great army. It can do this with little risk, deliberately, in broad daylight, poised two or three miles above its victim out of reach of practical gunnery; but in the night it can drop death upon defenseless and unsuspecting sleepers without a moments warning. Battle ships are equally useless. A charge of dynamite dropped from a flyer being able to reduce the greatest ship to scrap iron and send it to the bottom in a moment. As personal armor became a useless encumbrance, when gunpowder was introduced, so the armoring of ships has entirely passed away in the presence of the flying machine and naval warfare is no more practicable than war or land."

"I should think," said I, "that the "flyer" could be converted into a dangerous instrument for criminal use. What's the reason pirates and robbers could not sail down upon a community

small enough to be overpowered by them, and then sail off again with their booty to some inaccessible or solitary place?"

"That has been done," he answered, "but it is no longer easy. Whenever a fresh emergency arises in human affairs, a fresh remedy is found to meet it. It often brings its own remedy. The flyer is as great an agent in the hands of the police as it is in the hands of the criminal. As to solitary places, there are very few left on earth that are habitable, and there is not a spot that has not been seen by men, and that is not subject to police surveillance."

"Then," said I, "they must have discovered the north pole."

"Yes they have, and the south pole too," he replied. "The first trip to the north pole was made from Cape Prince of Wales in Alaska. The party flew in a straight line from that point. in midsummer, north over the pole and continuing in almost the same direction to the south, reached Hammerfest in Norway a distance of 3,000 miles in forty hours without stopping. Parties have gone from Minneapolis by way of the north pole in an air line to the town of Tomsk in Siberia a distance of 5,500 miles, stopping at the pole twelve hours, and finishing the journey within four days. These trips have often been repeated and many similar ones made. It is possible to make the circuit of the earth in twelve days by means of relays at certain continental points and on some of the Pacific Islands; but it can also be made by rail and water with only four changes, two to rail and

two to steamer in fiteen to seventeen days. Railroads run to Alaska reaching Bering Sea and the Pacific at several points, and are met by corresponding roads on the Russian side. The water carriage in summer is only across Bering Strait, but in winter on account of ice the passage is made further south and is longer."

"Why don't they tunnel Bering Strait," I inquired, "or bridge it?"

"They will in the future tunnel it part way and build a dam or embankment the rest of the way," he replied, "and utilize the enormous power of the current passing through there to drive the trains 1,000 miles on each side of the strait, but the time has not yet arrived. A bridge would not stay there, it would be swept away by the ice."

"Isn't there danger of collision between these flying machines?"

"Many fatal collisions took place when the flyers were first introduced. It was found necessary to regulate them by government supervision. The routes between all points have been carefully laid out and the going and returning paths separated by a wide and safe space.

"You mentioned the abolition of war. I hardly see how it could be while there were any uncivilized nations on earth," I observed.

"I said international warfare was abolished." he returned. "After Russia had taken possession of Asia and settled its ownership, and Africa had been divided up amongst the western European nations, the governments of all nations were civilized. The regulation of such barbarous subjects

as they might be responsible for, was simply a question of policing, not war. An insurrection by them could not succeed against the destructive weapons held by the government. But as international affairs are now settled, there is no excuse for any responsible body of men to resort to force. The principle of arbitration first adopted between the United States and Great Britain was subsequently extended to all civilized nations. Later there was framed for the guidance of Arbitrators of international questions, an international constitution or law of nations agreed to by treaty between the principal nations and finally ratified by all. This constitution described the boundaries of all nations, which it was agreed were not to be disturbed except on consent of all the parties concerned, thus doing away with wars for conquest.

A criminal code was enacted, by which all crimes between subjects of different nations were to be tried, and an international court was established, composed of Judges from every nation. When a suit is brought before this court, those judges appointed by the nations parties to the suit, are excused from serving, and the case is tried by the others. Questions of damages by one nation and its decrees when finally reached are acquiesced in without hesitation, besause it is keenly recognized that any settlement even when not entirely satisfactory, is preferable to war. In fact war is not recognized as a practical method of settling anything."

"If war is at an end, what have the European

Nations done with their great armies," I inquired. "In my day most of the surplus wealth of those nations went to support their vast armies, and the masses of the industrial classes were kept in poverty, because their earnings were so largely diverted to that purpose. And yet there appeared to be too many workers, for their wages were very low. If the soldiers were set to work at peaceful occupations and married and raised families, the population must have increased and the wages gone still lower. How was that?"

"Well, not quite like that," he replied." "The more workers the more wealth, provided they have plenty of raw material to work on. The abolition of war gave a great impetus to the production of wealth in Europe. A great demand was created for raw materials, such as wool, cotton, timber, iron and other metals and for food stuffs. A large part of these supplies had to be furnished from other countries. The United States furnished vast quantities. This increased commerce, and as the population increased, emigration was stimulated. As the United States filled up, the emigration was diverted from this country to South America and to Africa. The products and exports of these countries correspondingly increased. The equatorial regions are most prolific in all the products of the soil. The temperate zones furnish the most vigorous people for consuming these and turning them into wealth. The relations between these two regions are reciprocal and complemental rather than competitive. Free trade was first established in those directions and it soon forced itself in

others, until it became the rule the world over. The history of western Europe during the twentieth century, is bound up with the development and settlement of South America and Africa, especially the latter. Modern Africa is as much a child of Europe as America is, and the native races and tongues are being rapidly displaced by the European. Population in Europe naturally increases in a more rapid ratio than ever before, due to the suppression of the ravages and waste of war, the more scientific treatment of disease, and control of epidemics, the greater comfort and prosperity of the people. But with their increased possibilities for comfort have come, an increased standard and expectation of life, so that it cannot be said that the people are any better satisfied with life than they were before. The struggles are as intense and the disappointments as stinging as ever. The incentives to emigration have not diminished while facilities inducements and flattering prospects to the immigrant are vastly greater than ever.

Europe is the great breeding ground for Africa, as it was formerly for North America. And the human inundation that formerly poured itself into the United States is diverted chiefly to Africa, but in four fold volume."

"Surely," said I, "the capacity of the earth for supporting the human family must be almost exhausted. It is sickening to contemplate the suffering that will be entailed in the struggle for existence that it seems to me must inevitably come soon. Evidently from what you say, Europe must

be about as full as it will hold. I suppose the great migration you speak of represents the surplus crop of folks that the continent must get rid of in order to let those that remain live in tolerable comfort. When Africa and South America get to be as full as Europe and the United States, so that they can no longer receive this tide of emigration, then what is to be done? For anything I can see famine will have to sweep away some of the race in order that the rest may exist, and after all is that any better than war?"

"At any rate," said he, "we have not reached that yet. We have now reached the beginning of the twenty-first century. The population of the earth has reached the very considerable number of 4,000,000,000 or almost three times what is was in your day. Yet we concede a three fold increase of that figure before starvation or some other repressive agency will be necessary to stop the increase of the population and that will only be reached by the year 2070."

He here pulled out a pencil of curious make and with his middle left hand dashed off some strange looking characters on a blank space on the profile. He was evidently figuring, for in a moment he went on to say that he found that when the 40,000,000 square miles of habitable land on the earth were divided equally between 12,000,000,000 of people they would have about two acres each.

" I ventured to say, I did not think two acres enough to furnish an individual with food, taking his chances of bad seasons from droughts, floods

etc. Besides men could hardly live without timber and they could have none if all the land were cultivated. Moreover, they must have animals to furnish leather, wool etc., and land would be required for their sustenance.

Land must be also devoted to cotton, flax hemp and so on for clothes etc. When you allow for such things as these, I said, I thought the area devoted to the production of food would not be much over one acre to the individual by the year 2070, if he was right about the number of people there would then be.

"You are only thinking of the crude methods people had in your day of getting their food from the earth," said he. "They were at the mercy of the uncontrolled action of natural forces and accidents. The rain and sunshine naturally falling on an acre of land enabled them to raise so many bushels of wheat or beans or carrots or beets. But if the rain did not fall or the sun failed to shine or there was too much rain or two much sunshine or the weather was too cold or the wind too boisterous, the farmer was at the mercy of the fickle elements and his crop a failure. In a few places irrigation was practiced, men got a partial control of the conditions, but these places were limited, and the control incomplete.

If you will call to mind the information I have given you of the artificial production of food and other necessaries of existence among the Lunarians, you will readily see that the resources of the earth to sustain its population do not depend altogether on the amount of land surface that men can culti-

vate to beets and potatoes—the amount on which the sun shines and the rain falls. Surface you must have of course for people to live and to move on. But when you learn how to utilize it there is material under every acre on an average, more than sufficient for the sustenance of all the people that could stand on it. The soil in which you plant your seeds is nothing but the disintegrated rock of a thin layer of the surface of the earth. Below it are rocks of the same sort in quantities enough to make millions of such soils. If you knew how, you could make your food products out of the soil directly instead of waiting for the growth of plants in it, and if the soil should give out you could make them from the rocks below."

"Yes," said I, "but will mankind ever find out how to do this? Will you wise and experienced Lunarians show us?

"No, it is not necessary that we should. You will find it out fast enough yourselves. Your chemists even in your day had begun to take lessons in chemical synthesis, and as time went on, and the necessity increased, their efforts were stimulated and constantly became more successful until now they can produce a number of artificial foods from the original elements without the necessity of raising vegetables or animals by the action of natural growth. Looking over into the twenty-first century, we see that they will easily be able to produce food from the elements as fast as required. Their abilities and facilities will keep pace with the population. This implies that the race will not have to be checked in its expansion

by lack of food. The feature of evolution and selection of the fittest by means of a struggle for food will be entirely eliminated. The matter will be entirely in the hands of the people themselves."

"How about clothing," I asked, "will they produce that too by the aid of chemistry?"

"Yes they will. Sheep will not be required for their wool any more than their flesh. A substitute will be found for leather as well as beef. Better and more durable clothing will be made directly from minerals than were produced in your time from vegetable and animal substances. Metals and artificial mineral products began early in the twentieth century and even before, to supplant wood in buildings and many other structures. So at present the use of wood is greatly reduced and during the coming century it will be almost discontinued; a great many things are now made of Alumina that were formerly made of wood, and that metal has become cheaper and more abundant than iron. Glass is also very much used, and methods have been discovered of giving it any desired temper, so that it is made flexible and tough like pewter or firm and elastic like steel. It can also be made fibrous and soft as cotton and can be spun and woven into textile fabrics."

"But what are they going to do for power and fuel?" I asked. "If there is to be such an increase of population, an enormous consumption of fuel and power will follow. Of course they will use the coal while it lasts, but the supply of that is limited, and if that is the only dependence, all

industries will sooner or later be brought to an end."

"The coal," said he, "was an excellent make-shift for temporary use until a more enduring supply of power was discovered to supersede it. But even now it could if necessary be almost entirely dispensed with and yet there are still vast deposits of it untouched. In the long distant future the time will come when the coal will be regarded as a deposit of food for your race as it is now with ours, but it will not be consumed for its heat or its power except in that way."

"Have our people then learned how to get power as you do from the use of the principle of the repulsion of gravitation?"

"Indeed they have not," he answered, "and they are very unlikely ever to find out how to do it unless instructed by us; and that will never be till the Lunarians become lunatics. The new power that has been developed and already brought into considerable use and which will soon become a substitute for all others and endure as long as the earth is habitable is simply sunlight; and the discovery that is to prove by far the most valuable ever made by your race is the direct conversion of its force into electricity, which can as you know be conveyed hundreds of miles and applied to any sort of machinery required. When coal is used to produce electricity, the process is after all an indirect way of utilizing the force of the sun's rays. Ages ago these rays created the vegetation that afterwards became coal, and in burning the coal now, the force of the sun's rays consumed in its

production is again brought into action in heating the water, that expands into steam that drives the engine, that turns the dynamo, that creates the electric current. It was seen long ago that if some process could be devised by which the force of the sun-light could be consumed in the creation of electricity directly, the suns rays of today could be utilized in the production of power instead of using up the coal that was produced by them in former ages. .It was discovered in your day that sun-light falling upon the metal selenium is turned in part into electricity. Acting on this hint your scientists experimented with that metal and others, and tried hundreds of combinations and alloys. They have discovered many compounds that possess this property, which is found to depend on the sizes and shapes of the spaces between the molecules of the metal. The impact of the undulations of the ether that give rise to light, striking into the ether confined in these peculiarly shaped spaces impart to it the sort of motion these shapes make it competent to take, which is the new form of motion, electricity. They were largely assisted and guided in their investigations by spectrum analysis. The apparatus for the production of electricity in this way is necessarily of large dimensions presenting large surface to the sun, and as yet is rather expensive, but once made, it lasts forever and produces electricity whenever the sun shines. Improvements are constantly being made that reduce the cost and increase the efficiency. These machines are arranged to turn automatically, a certain face to the sun, revolving on a horizontal

plane diurnally and changing their declination vertically to follow the north and south movement of the sun through the seasons. The electricity is transmitted to storage batteries and a surplus thus accumulated during sunshine to be used at night and in cloudy weather or carried off to be used elsewhere. These machines yield especially good results in tropical latitudes and in localities where clear weather predominates, such as southern California, Arizona,, northern Mexico, the Sahara desert, Egypt, Arabia, Tartary, Central Australia etc. In all such countries railroads are operated at nominal expense.

Stations at intervals transmit the power several hundred miles on either side. As there is practically no limit to this power it has come to be used for the accomplishment of undertakings that were hardly dreamed of before. The irrigation and development of deserts by means of artesian wells and by streams brought from a distance, followed by the construction of roads, settlement and cultivation are being vigorously prosecuted in all parts where the climate is not too cold. Large tracts notably in the Sahara and Cobi deserts and in Arabia and Tartary, have already been made productive and populous. This power can be conveyed to great distances from the point where it is developed, and made to do work in places practically inaccessible to any other form of power. Excavation of canals, railway cuts, tunnels and mines with the transportation of materials for embankments is prosecuted with tremendous energy. Innumerable mines are being pushed far into the bowels of the

earth and the interior explored and honeycombed in many directions. This work is however destined to be of vastly more importance in the distant future than at the present. But I think you can now see that with practically unlimited power and unlimited raw materials for the construction of the human race placed in the hands of the race itself your fears that the increase of population will ever press uncomfortably on the means of subsistence are not well founded."

"Yes I do begin to see that," said I. "It is all very wonderful. What a career the race has before it! Why it has hardly got out of its cradle yet. What a misfortune that I was not reserved to be born two or three centuries later so I could see some of these future glories!"

"Nay, nay," he replied, "that is a vain wish. You may be as happy in your own time as you could be in the future. In all the ages of the past, people have been found expressing a poor opinion of their own times, extolling the golden age that was past or the millennium that was to come; and it will be so in the future. If you were to live two centuries hence you would see as many defects and shortcomings, and anticipate as many still future improvements and achievements as you did in your day."

"Well, I suppose, that must be so; and yet with such an apparently absolute control over the earth it would seem that mankind might make themselves comfortable and contented."

CHAPTER IX.

The Problem of Over Population.

"Notwithstanding all that has been and will be accomplished by your enterprising race," said he, "there are some things about the earth that they will never be able to control or improve. There are two in particular of essential importance. One is the area of the earth's surface, which your race can never increase no matter what its necessities may be; the other is the slow but very certain refrigeration of the earth's climate by which we may be sure that a time will be reached in the long distant future when the habitable surface shall gradually be reduced till at last no part of the earth's surface will be tolerable to any living creature. So in effect while the demand of the race will be for more room it will constantly be required to put up with less."

"But," said I, "isn't that a good ways off? The extreme refrigeration of the earth is a process involving millions of years according to our scientists."

"Yes, it will be a long time before any important reduction of area can take place, but not long before the present room will become very much cramped. Only a few moments ago we reckoned that by the year 2070 there would be about two acres to each of the 12,000,000,000 of

inhabitants, on which to live and move and produce the means of subsistence. If the race should then be doubling every thirty years, in 2100 there will be but one acre for each; and if they keep on increasing in 2130 a half acre; in 2160 a quarter; in 2190 an eighth, in 2220 a sixteenth; in 2250 a lot thirty-three by forty-one and one-fourth feet, which in 2280 is reduced to thirty-three by twenty feet 8 inches and this in 2292 four hundred years after the centennial of the discovery of America by Columbus that was celebrated in your day at Chicago, will be reduced to thirty-three by sixteen and one-half, or two rods by one. If the population should get to be as numerous as that the entire earth would be a city inhabited twelve times as densly as the city of Minneapolis was in your day. This of course is the average. Some places are more desirable than others and these would be more densely packed. Already at the close of the twentieth century many of the pleasanter parts of the earth have become uncomfortably populous, not from want of the means of subsistence, but from want of room to carry on the business and pleasures of life. And yet the growth of population may be said to be just fairly commenced. It is obvious from what can already be seen that it will very soon be necessary to place some artificial restriction on the increase of population or else there will be such suffering among men as will of itself operate to keep down the number of people by killing them off faster and shortening the average duration of life. These questions are already being seriously considered by the phil-

osophers and wise men, and many plans are being discussed.

There are some pessimists who declare there is no remedy. They say it was an egregious blunder on the part of society to attempt the banishment of suffering. It was suffering that had in all ages kept down the population, so that the world remained roomy enough to live in with some comfort. They hold that suffering is a necessary concomitant of comfort and we are bound to have it both before it, as a necessary antecedent and after it, as anecessary consequent. It is the law of nature and it is vain to try to evade it. By banishing war and want and disease, and reducing the problem of life to an easy pleasant certainty, society, they say, has caused herself to be invaded by fresh innumerable hordes of human beings that step into the arena of life from the secret caves of non existence as if attracted by the feast of good things that she has provided for herself. When the repressive hand of suffering is lifted a little the human species breed and grow like rabbits until they feel its hard pressure again.

Nature, they affirm, is no sentimentalist. Her ways are all direct, hard, cruel and brutal. She is extravagant and wasteful of effort and parsimonious of results. She creates a thousand seeds of grain or grass or tree, only one of which will become a grown plant and reproduce its kind. She is even more prodigal with the spawn of fishes destroying millions for one she brings to maturity. There is nothing to show that she cares any more for the human race than for fishes. When men get

too numerous she destroys them as ruthlessly as if they were so many herring or clams. They assert it is impossible to evade or even to improve upon the methods of nature. They point to the teeming multitudes that have swarmed upon the earth during the last century in such comparative security and comfort as to invite a still greater inundation during the century to come; and they declare it to be one of the characteristic stratagems of nature, only restraining her grim and malicious humor in order to make it the more tragic and appalling when she does give it play. And they aver that it would be better even now to drop a large part if not all of the artificial stimulations to the expansion of the population that have by insensible degrees been grafted upon state policy during the last century. Let every tub stand on its own bottom, say they, let natural selection secure the survival of the fittest, and let the unfit be quietly eliminated by whichever of the numerous methods nature finds most applicable. In opposition to these are the optimists who hold that the human race is nature's pet. If she could be said to plan anything or to have any preferences in favor of anything, it was the human family. After making trial in succession of the Trilobite, the Orthoceras, the Shark, the Megalosaurus, the Pterodactyl, the Mastodon and others, she put them all down and brought forward man and placed him over them all, and made him master of the earth. He was a frail insignificant helpless creature without weight power or dignity. Other animals could beat him swimming diving, flying, running, fighting. There was only one

thing he could do tolerably well and that was to climb a tree. That was his capital, his stock in trade as one might say, for it developed his hands and quickened his senses. Nature took this unprepossessing, unpromising creature, educated and developed him in her stern school and by her untender methods, put brains into him, civilized him and fitted him to control the world and finally to govern himself. This last lesson he has not yet perfectly mastered, but he is learning more of it every day. Progress, say they, never takes a back track. The pessimistic theory that nature's plan is to let every fellow look out for himself and the devil take the hindmost, is no longer true. The race has passed that place and the new ideal is; every fellow for all the rest, and no one left behind. Until this is practically realized they say the race will not have fulfilled its destiny, and retreat is impossible. Moreover it is not necessary; for the new departure is after all as natural as the old way, and is in fact only a continuation of it; a turn in the road as it were; and it may quite as well be depended upon to rectify all the difficulties of its own creation. If the principle of mutual succor, sympathy and assistance leads to over population, the same principle must furnish the remedy. The optimists admit the contention of the pessimists that this trouble is looming up, and the philosophers of all schools are beginning to feel serious. They are discussing such figures as we had before us a few moments ago and endeavoring to fix the date at which a halt will have to be called, and the means devised by which it is to

be accomplished. Some say the population is dense enough now. Others point out that with the increased means of subsistence there need not be anything uncomfortable in a population of 12,000,000,000 which they estimate will not be reached till 2070, or 70 years from the present (A. D. 2000.) And they are hopeful enough to believe that by that time, human wit will have discovered some way of controlling population without violence to human happiness. All agree that if society is to be maintained on the present scale it is high time to settle the manner in which the great question of population is to be met and handled. It is the most difficult question that has ever demanded human attention.

In your day there was already beginning to be some discussion in regard to stirpiculture and the scientific regulation of the family and rearing of children. But it did not at that time reach a practical stage. No scientific conclusions on the subject of marriage have yet been able to displace sentiment and instinct. But soon, as I have already told you, the rearing of the children was undertaken by the state and removed from the caprice of sentiment and ignorance greatly to the advantage of the children and of course the race. But the question of marriage remains the same sentimental business it was in the days of Jacob. And with the increasing independence of women it has become even more a question of the feelings than it was in your day when women often married for a home and men sometimes for money. As the problems of life, marriage etc., have become ques-

tions of state, inviting and even requiring ample and public discussion, the squeamishness and false modesty with which they were approached in your day have entirely disappeared. The public interest and the rights of the state in the question of the perpetuation of the race are freely admitted and discussed. The public mind has been gradually prepared for this by the gradual assumption by the state of the care and education of the youth, and by its experience in the treatment of criminals. Where the treatment of all the youth is uniform and some after all, turn out to be criminals as they occasionally do, the cause is looked for in their parentage. The state is in condition to keep track of ill born children, and after leaving the schools they are still kept under the eye and guiding advice and restraint if necessary of a special department of the police service. In this way the criminally disposed are known in advance, and much crime is no doubt prevented. The criminally disposed are regarded and treated as mentally diseased.

There has been much discussion pro and con of this mode of punishment, or—as some prefer to express it—mode of treatment. But it is now generally conceded that society is entirely justifiable in employing this mode of defense, especially since capital punishment has been abolished, and this is the maximum penalty that is corporally inflicted. The public mind having had before it the operation of this treatment as a sort of object lesson is the more ready to listen to the proposition that is now being discussed to use this same treatment for the

defense of society against herself. The question is one that must be approached with the utmost consideration and tenderness as well as fairness and justic applied after the most careful and expert selection and with due regard to the character and physical and mental qualities that are due to be expected from such conditions. It is natural selection they say, artificially applied without the circumlocution and tedious delay of nature's ordinary methods. Left to herself, nature in the long run provides for the survival of the fittest. We now propose say they to make the same provision in the short run. We are now approaching one of those crises in human affairs in which something has to be done, and if men have not the wit to do it themselves, nature takes hold and performs it in her hard way with small tenderness for anybody's feelings or notions of propriety. If we are competent, we will find some way out of this difficulty without losing our civilization; if we are not, nature will put us back in the primer of barbarism, to learn it all over again as she has done a dozen times before. We have it in our power, and it is our obvious duty to reduce the population, or to stop its increase, and to do it in the very scientific manner that is at our disposal, by which the best blood is selected for transmission and the poorest is quietly eliminated without shock or pain to the individual or to society. Not only can the best blood in general be made exclusive, but any particular brand of best blood can be picked out to receive special encouragement. We can preserve a class of talent inval-

uable to civilization that nature could not be depended on to select for preservation in the hard struggle for existence—the gentle, the unselfish, the intellectual worker and the poet. Nor can she be depended on to eliminate the ruffianly, brutal, criminal and selfish members whose room is better than their company. Rather these are the very ones she would be likely to save.

This is all in our hands, say they, and if we have the nerve to carry it out, we can make the earth a perpetual paradise. All we have to do is to disqualify in their infancy the stirps whose posterity we prefer not to see."

The Professor paused here and changed the profile to his 'jokers' or middle pair of hands and proceeded to roll up the 20th century and expose the 21st.

"I believe," he resumed, "that we had better step forward another century, take our stand at the year 2100 and survey the century retrospectively, as we have done the 20th. It seems more natural to speak of it in the past tense since we have become accustomed to that way."

"All right," I answered, "consider it done. I am already there."

"Do you not remember," he went on, "that a little while ago you expressed a wish that it might have been your lot to live say 200 years later than you did, so as to share and experience the glory your race would have attained by that time? Well you are in effect now there, and while you shall never experience it in your own person, you shall

have a close glimpse of it and be able to compare your anticipation with the reality.

We are now celebrating January 1, 2100. As you look around, you see very much that is unfamiliar and miss many things you used to see. Take a map of the world and examine it. You will find only three general governments on earth. First is the "Great Union of Free States, which you have heard of, but now comprising all America, the Pacific Islands, Japan, Australia, New Zealand, South Africa, The West Indies, Ireland and Great Britain, Denmark, Norway, Sweden, New Guinea and the Philippines. Thus you see the principal change in this government during the century consists in the full annexation of all the South American States north of Chili and Argentine, and the Annexation of England. Scotland and Wales and the Scandinavian states. The language of this great empire is almost exclusively English, which however, has been greatly corrupted, some say, or enriched according to others, by the incorporation of a large number of foreign words, mostly Spanish, due to the intimate relations between the English speaking peoples and those who used the Spanish and Portuguese. South America has been settled and cultivated and is the most productive county on earth; a fairy land, a paradise. Nothing can compare with it except some of the finest portions of the Sahara desert, which has been developed by the French; and some of the East India Islands.

Next is the Russo-Asiatic empire that comprises Russia in Europe and all Asia except Arabia. It is styled the 'Russasia.' The government is a lim-

ited monarchy, very much like that of Great Britain in your day. The Russians in Europe and Siberia are represented by a parliament, which is the supreme legislative authority for the entire empire. The Asiatic States are governed by governors appointed by the emperor at St. Petersburg and most of them have local legislatures that regulate their local affairs. All China and parts of India, Persia and Tartary, and Afghanistan are divided into convenient sized states possessing this local autonomy. All of this territory is being developed by the combined enterprise of the Russians and the Chinese, the latter scarcely second to the former. Mongolia and Mantchooria have been supplied with railroads and settled by both Chinese and Russians. The Chinese have also migrated in great numbers into Tartary and settled up what used to be the western end of the Chinese empire. They have even settled in great numbers in Russia and in western Asia. A great change came over the Chinese after their war with Japan in 1894—5. They perceived that they were beaten by western methods, and they suddenly conceived a respect for the ways of the foreign devils as extreme as their contempt for them had been before. They had always been on good terms with the Russians while they disliked the English, French and Americans. Having determined to adopt western ways, they selected the Russians for their instructors and welcomed their capital and enterprise in the introduction of railways, opening mines, improving their water ways, introducing western machinery and manufactures. When the Russians in order to pro-

tect their interests began a military occupation of the country, they were not opposed, but rather welcomed by the progressive party. The Chinese were not a military people, and were really in need of a coalition that would enable them to resist the aggressions of the nations of western Europe, and the Japanese. The remodeling of Chinese institutions under the tutelage of the Russians advanced rapidly. Probably the most radical and important innovation was the introduction of the Russian alphabet and the phonetic spelling of the Chinese language by its use. This enabled the Chinese youth to learn their own language much more easily, and it led directly to the study of the Russian which became very necessary to a large extent, on account of the intimate intercourse between the two people, and on account of the new ideas, processes and things, the names of which were Russian without Chinese equivalents. This finally led to the universal use of Russian by the educated Chinese.

After the formal annexation of China, the Russian became the official language, and the Chinese language has gradually fallen into disuse and is now almost extinct. The Chinese say of their ancient tongue and the bug marks and turkey tracks that constituted its written expression, "we were little children when we used that language."

The Russian has also to a great extent superseded the Tartar, Turkish, Persian and other tongues current in Central Asia. In doing this, however, it has become considerably corrupted itself.

The third great empire comprises all the territory not included in the other two, and embraces all of Continental Europe except Russia and the Scandinavian States, and all of Africa except that part south of the 10th parallel of S. Lat. and Arabia. It is called the Euro-Afric Confederacy. Tremendous activity has been displayed by the Europeans in the settlement and improvement of Africa during the past two centuries. The whole continent has been gridironed with railroads, all of it has been civilized and the most unpromising part—the Sahara desert has been made a vast garden.

The French have been most active in the northern part, the Italians in the eastern part, the Portuguese and Germans in the central portions, the English in the southern. The Congo and German States being open to free trade, they came to be frequented by merchants from all Europe and these were soon followed by permanent settlers. After a time these people became tired of being governed from Europe, and set up for themselves, declaring themselves independent, much as the United States did in 1776. But in this case there was no opposition for the principle of free intercourse and unrestricted trade having been firmly established, the mother countries did not care to superintend the internal affairs of the young states, and readily consented to their independence. But this independence proved to be the forerunner of a more extensive union namely the Euro-Afric Confederacy. It was the last to be formed of the three great empires that now cover the world. The states comprising it are mostly republics. But a

few in middle Africa, Guinea and the Sondan, are limited monarchies. The native races of Africa are rapidly being displaced by the Europeans and will totally disappear in a few generations as the North American Indians did in your day. A large migration of Negroes took place from the United States to Africa during the 20th century, but they did not thrive, and the race is vastly reduced both in Africa and America."

"That is strange," said I, "for in my day the negroes were very numerous in the southern states —a majority in some places—and the question how they were to be disposed of constituted one of the questions of state of that period."

"True," he replied, "but up to that time there had been no very severe competition for the means of living. But it became more and more difficult from that time on to make a living, and wherever there is strong competition between men, the strong positive, vigorous and hard, are sure to crowd the softer and weaker out, and take the prize they are struggling for. In your day the negroes were generally content, in fact were compelled to be content, with such humble employments as the whites did not care to engage in because there was enough of a more ambitious sort to employ them. But when the whites found it necessary to compete with the negroes for the work they had before monopolized, they easily beat them. The defeat of men in the struggle for life affects them in two ways; it discourages, worries and exhausts them mentally; and it destroys their vigor through want and starvation, physically. The latter of these effects

tells at once in shortening the existence of the present generation, and both of them tell on the general force and vigor, the deterioration of which is seen in the reduced numbers and virility of the succeeding generations. Wild animals newly domesticated, fail to breed through mental strain and worry. The same is true of savages when the mental burdens of civilization are too suddenly laid upon them, and the same principle holds in civil life when from any cause the burden of life becomes too heavy—as, to the poor man when he struggles against odds for bread for his family, and to the rich when he struggles doubtfully for the superfluities required by fashion. The negro race is not extinct by any means even in the United States, but its extinction is only a question of comparatively short time easily estimated from the advance in that direction already made."

"But it seems to me," said I, "that there can no longer be such a desperate struggle for existence since the means of livelihood are within the reach of all, and the exertion required has been so much lessened by the state's care of the young etc.

"The means of mere existence," he said, "are, in most of the states of the "Great Union," within the reach of all, and no one need go hungry or naked. If he is able to work, the state will give him employment if no one else will, and if he is not able he will be cared for anyhow. But the style in which a man lives depends altogether on his ambition and ability. If his ability is equal to his ambition, he obtains what he wants and is happy and contented; unless, as often happens his am-

bition grows by what it feeds on and excites him to fresh exertions by a new allurement after every success. And so the wearing struggle may go on forever. People are mimics and none of them more so than the negroes. In imitating a stronger race they give out and gradually succumb. While they were slaves they were free from this competition, and rapidly increased. The African tribes were also free from it. But both have now been exposed to it for six generations and it has told on them heavily."

"It would appear then that competition and selection go on under the present conditions of life almost as much as ever, for the law must apply to the weaker whites as well as to the negroes."

"So it does, and always must, as long as men are competent to discriminate between the costly and the cheap, and continue to prefer the former, to the latter."

"The reason for such preference," I infer, "must be that more enjoyment of life is found in the possession of the more costly things. Is that your view?

"It does not follow at all," he replied. "Costly things give a fictitious enjoyment in anticipation while they are being pursued, but after they are obtained they give no more enjoyment than if they had been cheap. The possession of many things that have cost great worry and exertion frequently leads to nothing more than a perception of their vanity, and the uncovering of a new perspective of something bright and equally illusory beyond. From time immemorial your philosophers have

sounded the praises of contentment. Contentment is nothing more nor less than happiness, and it is little to the purpose to ask a man to be happy unless the suggestion is backed up by the conditions of his environment. When people have absolutely nothing better to look forward to, they can almost always settle down to a comparative degree of contentment with what they have. But with an environment constantly showing chances of preferment, wealth, distinction, etc., and examples of the attainment of these things by others, contentment is constantly being unsettled and happiness always deferred to the future. A guest taking his dinner 'out' will reserve part of his appetite for the unseen, but commonly expected, desert of pudding and pie, but if he is informed that he "sees his dinner" before him, he will make himself quite satisfied without the desert.

The fact is, the absolute contentment or happiness that your poets dream for you, and your priests sell to you in their heavens and nirvanas, is absolute satisfaction with whatever is. It can only come to an instinct in perfect harmony with its environment. People can never be perfectly happy except in a finished unchangeable state of existence. They may approach it under conditions in which change is very slow and slight."

"Is our race likely to attain it or anything like it on earth?"

"Things on earth to-day look far more unsettled than ever before, and yet they are getting into a shape that promises peace and permanence in the not very distant future. When the earth gets as

full of people as it will hold and they learn how to live by moderate exertion and above the fear of failure and want, the millenium will have come to the extent that it can come."

"Well from what you said a while ago, I suppose the world must already be as full of people as it ought to be, and if everything is in equilibrium, the milennium ought to have already dawned. But you have not told me whether this equilibrium has been made secure and stable. For evidently if means have not been found to keep the population uniform and steady at its maximum limit of comfort, even a perfect equilibrium would soon be disturbed by its increase and the millennium set back again.

You told me the stirpiculturists in the 20th century proposed to accomplish the two objects of restricting the race and at the same time improving it, by select limitation. How did the plan succeed?"

"It did not succeed at all," he replied. "The population increased more rapidly than before. A state of society something like a corrupt and clandestine polygamy supervened. The tone of society instead of being elevated was distinctively lowered. Thus both of the objects they so hopefuly set out to accomplish, disastrously failed. When it was definitely given up by the progressive party that they were defeated and obliged to confess they were on the wrong track there was a fearful revulsion and upheaval of society, as there always is when opinion is forced to fly from one extreme to another. Many persons felt

they had been wronged—treated as criminals when they were only unfortunates .

"The danger from this class was now imminent, and they had the sympathy of many in the better walks of life. But the time soon rolled round that drove people to think of nothing but themselves. But this was one of those deliberate movements that nature seems to delight in dealing out to us. She dangles it over us like the sword of Damocles. There was time to think; before the thread snapped, if there was only the wit. It was a time of common danger, and there was no inclination nor profit in recrimmations between the parties. In the presence of an appalling calamity they were both awed. They no longer contended with each other, they were both at their wits ends, and in fright they rushed into each others presence to consult not to fight; and trembled alike at the disaster that overwhelmed them both; like tigers slinking into the presence of their human enemies when threatened by a common danger; as an earth-quake.

All admitted, the disappointment and failure were complete.

"It seems to me that might have been forseen," said I,—"what did they do next?"

"They were in a great quandary, and did not know what to do, many wild propositions were offered and discussed. The pessimists although as largely interested as anybody in the success of any plan aiming at the public welfare, were really pleased at the failure of this, because it fulfilled their evil predictions. They now said there was nothing to

be done but to return to the ancient plan of nature in which every one looked after himself and his children.

If one failed, it was nature's sign that he was not wanted, and he had no business to have children. But the optimists declared it to be impossible to return to the barbarous conditions that prevailed in ancient times among savages. Nature, said they, has evolved civilization and altruism, and these are therefore as natural as barbarism. But nature preserves a certain congruity of relationship between things, that we cannot easily set aside, and so if we are going backward in regard to the care of our young we shall lose the advantages that we have gained in the improved quality of the citizens, we have made out of them. For if we throw all the responsibility on the parents, while we cannot depend on a reduction in the number of the children, we may be sure of a deterioration in their bringing up and education. If we go back to barbarism we must take all that barbarism imposes. The human race they said was born to luck. Whenever it got into a tight place, some lucky turn of fortune's wheel always supplied its need and brought it out of its troubles, and they avowed their faith that something would yet turn up to tide the race over the present crisis. In the midst of these discussions, a great discovery was made or accidentally stumbled upon that gave confirmation to this hopeful philosophy, and relieved the fears of those philosophers who were in the habit of taking the destiny of the race very much to heart and who felt more or less responsibility

for its future. That was a discovery of nature's secret of the determination of sex. It enabled people to control the sex of their children, a power that had been ardently wished for ever since the days of Adam and scientifically sought after, at least as far back as the time of Aristotle. They thought that in this "option of sex," as they styled it, they at last possessed the infinitely important power of the control of population. They had seen before this, that no restriction could succeed, not founded on the support of all. All discussion in this direction was brought to a sudden termination, by this timely discovery. All felt as if the great problem was solved in the most acceptable manner, not only in accordance with refined sentiment, but with the pressing requirements of society, because this vital condition that so intimately concerns us all is taken up by the state and administered for the benefit of the whole race.

In your day you doubtless remember that generally boys were in greater request and more welcome by parents than girls. And there continued to be such a feeling until quite lately—for no very good reason, except the habit of heredity—since men could hardly be said to have had any advantage over women for the last 100 years. At any rate this prejudice assisted the state in the policy it adopted of reducing the proportion of females, and within two generations the census showed a reduction of fifty per cent in the number of females while the total population remained the same without increase. This result was peculiarly gratify-

ing to the political economists and philosophers, for as they declared the state had now complete control of the population and could on a tolerably short notice increase or diminish it as the comfort of the race might demand."

I interrupted the Professor here to express with some pardonable enthusiasm my congratulations that this vital question had been so successfully and thoroughly met. I said I always had confidence in my race and now more than ever. I felt proud of the honor of being an humble member of it; and more to the same effect; to which he listened with some impatience and then proceeded.

"There were some results that were not anticipated, that followed from the practical operation of the "option of sex." One was the very rapid elevation, almost defication of women. As there was now but one woman to three men her value and importance rose in the inverse ratio; and it became the habit to say that women were worth three times as much as men. They were in fact worth a good deal more than that, for they soon perceived that they held the key of power and the destiny of the race and were able to construct the conditions of life to suit their own whims and caprices. They became in fact the ruling sex. They demanded for themselves and easily obtained all the easy and profitable positions in business and official life, and remanded men to those least desirable. The wholesome civil service principles that had become pretty well settled in the law, thought, and practice of the country were now habitually

evaded or openly set aside in favor of the sex. Nothing they asked for was denied them and hardly anything was good enough for them. In your day the women in America were extravagantly petted and coddled, but the attention and reverence they received then was nothing compared with the adulation and servility that has of late been rendered to them. Such a condition of things could not fail to encourage tryanny and arrogance, and to create them where they had not been before. Sentiment and favoritism became the controlling forces and business principles were ignored.

There were three candidates for every woman's hand, two of whom were bound to be be disappointed, and so one-half the population—two-thirds of the masculine part—were doomed to a life of single misery. They did not accept the situation with fortitude or resignation. There was no end to quarreling and personal antagonisms and violence between rivals, and there arose what there had not been for several generations, and that was a "dangerous class." It became unsafe for married people of either sex to appear on the streets unguarded. The "social evil" that in your day was so sore a question had long since under the conditions of universal matrimony, died out, and had practically ceased for a century and a half, now came again into existence in a more virulent form than ever. All classes felt the relaxation of the former restraints, and immorality became frightfully prevalent. Divorce which had become almost obsolete, now came to be an every day occurrence, not often, however, upon the com-

plaint of the comparatively helpless husband, but upon that of the fickle wife who had succumbed to the superior attractions of a newer affinity. Divorce was now practically in the hands of the wife, and she dismissed her husband when he failed to please her, or when a more eligible mate presented himself. All women of course were not like that, but they all had the power to be, and a frightfully large proportion of them were."

"The wise men of our race," said I, "especially those of ancient times have generally regarded women as being not merely inferior to men physically and mentally, but as being essentially depraved and incapable of being good except under the stimulation and wise and pious discipline and example of men. Does the state of society you have described to me bear out this opinion? It seems that the women have broken loose from the wholesome restraints that were imposed on them in the former constitution of society in which men were supreme; and like a runaway team they are about to smash the wagon and dash out their own brains."

"No," he replied, "the state of affairs I have described does not at all confirm the opinion of the old blockheads you call your wise men. If they had been really wise they would have known that both women and men are created, formed, moulded and finished by their environment. Now woman constitutes a part of the environment of man and man constitutes a part, but in old times he constituted a relatively much larger part of the environment of woman. So it might be said, that if man

was better than woman, it was because her influence on him was better or at least less harmful than his influence on her.

But the fact is that under equal conditions the influence that each exerts on the other is equal, and they are mutually benefitted. The nearest to a golden age your race has ever come was during the one hundred years from the middle of the 20th to the middle of the 21st century, and that is the period of the most complete equality of the sexes in all respects—numbers, liberty, similarity of occupations and equal duties and responsibilities, and the total ignoring and rejection of the notion of any difference of 'spheres' for the activities of the two. The reciprocal and essentially exclusive functions involved are peculiar to each, but these do not essentially, and at the present, do not really interfere in any of the active employments people choose to engage in."

"Nursing the children is essentially the woman's business is it not?" I inquired.

"Not at all," he answered. "Mammary glands belong to the male as well as the female."

"Functionless ones," said I.

"Only functionless," he replied, "because they are not used. In your day there were occasional cases of well developed male mammac and professional male wet nurses, now they are common and it is doubtful if there are as many female as male nurses. There are and always were women who could not nurse their children, and these are more numerous now than ever. It is simply because there are other things they prefer to do, and so the

accommodating function suppresses itself just as it did in the male because he for ages suppressed its use. So you see that even in nursing and rearing the children there is no exclusive female "sphere" any more than a male "sphere." In the golden age I have just spoken of there was greater harmony and happiness than ever before, one of the essential conditions of which was the almost perfect equality of the sexes. But the termination of this golden age and the beginning of the social anarchy that commenced about the middle of the 21st century was traceable chiefly to the disparity in numbers between the sexes brought about by the operation of the "Option of Sex." If we are to charge it to the corrupt influence of one sex on the other it was the corrupt assault of the unavoidably unmarried of the male sex on the institution of wedlock. If the women were willful arrogant and naughty, it was only because there were men about them in the proportion of three to one—for which they were not to blame—nor the men either, but the limited capacity of this globe, and nobody was to blame for that. Thus whatever they are or do in either sex is traceable to their environment."

"Well," said I, "since there has been such a failure, I am glad after all that my day was ended long before these evil times came. But what is to become of the race now? Will they discover a way to hold their own?"

"There never was," said he, "a lack of wise doctors amongst men who were always ready with a sure cure for the ills that beset the race. Some

of them now proposed as a remedy for the social maladies a plan of life that was not new nor original, but which differed as far as possible from the hereditary notions of the western nations. This was nothing less than polyandry or the plurality of husbands. They said, let every woman have three husbands and harmony and peace will be restored, and vice be deprived of excuse. They said this was no experiment, but had been practiced successfully amongst some of the eastern nations from time immemorial. They referred to the case of the Ladaks a highly civilized, steady and religious people of the Buddhist faith, who inhabit the lofty and circumscribed valley at the head waters of the Indus. The place will support only so many people. If too many were born they could not emigrate to a lower country on account of the oppression of the heavier air. For a converse reason no immigrants ever attempt to settle there. But the population is kept uniform and steady by the simple plan of giving each wife three husbands. This has been successful for a thousand years on a small scale and there seemed no reason why it would not work on a large scale. But this scheme was promptly and emphatically rejected by the women of influence and authority, the moment it was proposed. They asserted there was no civilized relationship except Monogamy. That alone brought equality of the sexes and equality alone stood between the race and barbarism.

It was true that polyandry was already practiced surreptitiously to a certain extent in America, but it was the disreputable exception and they did not

propose to make it the honorable rule. They denounced the plan as being scarcely one remove from the "social evil" itself. Polygamy, they said, is natural, made so by immemorial usage. The race was brought up on that and is built with reference to it. But polyandry, No! nothing in nature so repulsive and revolting. That settled it.

CHAPTER X.

The Third Sex.

"It is a painful tale you have told me, Professor," said I, "I sincerely hope you have got a pleasanter sequel to take off its sting. Well, our race has always had its ups and downs. The one seems always to breed the other. So as it has received a check now, that must be a prophecy of better times ahead. After all I shall be disappointed if human wit has been so completely baffled by that problem of population that it has failed to find a way for its regulation without violation of the generous instincts of humanity."

"Your confidence in human wit is commendable from a patriotic point of view," returned the Professor, "but for this particular occasion it is not entirely justified. The fact is that not many years ago your race in North America and Europe had so crowded upon its conditions of comfortable existence that it was in imminent danger of a dis-

astrous, if not total collapse. The efforts then made to prevent this, resulted almost in the disorganization of society to such an extent that a collapse from this cause was seriously threatened. Your race and nation have been saved from such collapse and a repetition of one of its numerous relapses into barbarism, not, however, by human wit this time, but by the wisdom and generosity of the race I have the honor to represent."

"What! the Lunarians?

"The same. Our people saw the straits to which the human family was reduced, and willing that it should be spared the distress that they had been compelled to undergo before the discovery of the means of protection against themselves, they sent messengers to earth with the necessary facts and instructions."

"I am amazed, and gratified," said I, "for this signal proof that benevolence is not confined to any one world or race; but I am impatient to know what this wonderful and essential secret is, that defied the penetration of the wise of my own race."

"Our belief," said he, "is that it would not always have eluded them, but they would have failed to apprehend it in time to save the race from present disaster. The Lunarians have always taken a deep interest in Mundane affairs, and have given many hints to man, some of which have been acted upon with good results. But many others could not be properly acted on or even fairly understood, because the education of your race had not prepared them for it. We are often tempted to exclaim "what a stupid race." But then we re-

member how very young and immature you are, and we remember too that once we were in a like state of infancy ourselves, and so we exercise charity."

"But what was the secret you told us?—I am anxious to learn at once, lest some accident shall forever bar my opportunity."

"Well the secret is the simplest thing in the world, and your scientists have been reproaching themselves all over the earth for not having discovered it themselves. In fact, as they say, they did discover all around it when they lit upon the "Option of Sex." It is simply the conditions for the production at will of the **Third Sex.**"

"The Third Sex!" I echoed in amazement.

"Yes the Third Sex. I prefer that name, though some have called it the neuter sex, others name it the Double Sex, or the Epicene or Common Sex, others the Hermes-Aphrodite. In some respects it is all of these, or either, or neither. But it is at any rate Third. I am not going to give you the recipe," said he, "for if I do, when you leave here, and now and go back to the Nineteenth Century, you will be sure to let out the secret prematurely by two hundred years. But I can say that the development of the third sex is in reality no development at all, but an arrest of development, at a particular prenatal period. If you are informed in the science of embryology, you know that in the earliest stage of the embryos of all sexual animals, the sex is not determined, and at that stage there is nothing to distinguish whether the coming individual is to be male or female. It possesses possibili-

ties of either and therefore the germs of both. At a second stage the elements of the essential organs of both sexes are developed in each individual and then the individual is both male and female, but not fully matured or developed. At the third stage the organs distinguishing one of the sexes are carried forward to functional perfection, while those pertaining to the other, are not developed any further, and in some cases are partly undone again. Now if the developement of the embryonic sexual organs be arrested during the second stage of growth or before it, the individual will be neither male nor female, but will belong to the third sex. The manner in which this arrest can be accomplished is the secret we imparted to you 20 years ago, and by means of which the important problem of the control of population can be solved by you as it was long ago done by us."

"Then you have the three sexes in the moon?"

"We have had them for many ages, in fact, we would not know how to exist if we had but two."

"It is a wonder to me how you ever could have fallen upon so wonderful an arcanum—that nature seems to be carefully hiding from us."

"Nature dropped the hint in this as in so many others of our discoveries. There were occasional examples of the third sex produced by nature and born into life, as there have been in the case of the human race as you must know. These examples excited curiosity, which led to the discovery, that they were due to arrested development. Further investigation and experiment showed this arrest to

be due to deprivation of a certain class of food, or rather of food in a certain dynamic condition, that is, under certain electric tensions. This condition again depends on the molecular structure of the food elements. When the food is deprived of the constituent *plastidules required for the nourishment and development of the tissues composing the embryo organs of sex; these tissues do not mature. And since the emasculation or invalidation of the food does not extend to, or affect the process of assimilation of the same nourishment by the other tissues, such as muscle, brain, nerve, bone, etc., the individual is built up to a symmetrically sexless maturity. And the development of sex is said to be arrested.

If your people had been as wise as the bees they would have known how to produce the third sex simply as the bees do by supplying the appropriate sort of nutriment; for they, from the same sort of an egg, produce either a queen, a drone or a worker, the latter being of the neuter or third sex; simply by variations in the food and treatment.

It is said, that itwas by observing and following such hints as these that our ancestors learned how to produce the same results the bees have accomplished."

While the Professor was making this explanation, the question arose in my mind whether this discovery, surprising as it was, was sufficient to rectify the ills that our race had encountered. Would there not be some unforseen drawback as

* Plastidule is the lowest, or unit molecule of protoplasm.

there had proved to be to the other schemes, that would neutralize the anticipated benefits, or work another disaster as great as the one it was intended to cure. Was the third sex in itself a desirable or happy kind of condition to have. The contemplation of this subject, at first repulsive; when viewed philosophically becomes exceedingly interesting as one of the curious flights of nature. It is true that the specimens of these people she has furnished us on earth, we have commonly regarded as unhappy monstrosities.—But that is no doubt due to ignorance and prejudice, and to the anomalous conditions into which they are born. I expressed myself somewhat in accordance with these reflections, after which the Professor with some hesitation proceeded.

"In your day the family was spoken of as the basis and the bond of society; and by the family was meant a father and mother and a brood of children, all living together and working and caring for each other. The family was the laboratory for the creation and preparation of the citizens of the state. As an instrument for the education and development of the young citizens it was discovered to be, in civil life, inefficient and costly very unequal in its results and entailing an unequal and unjust distribution of its burdens. The state gradually assumed one after another of these former family duties and burdens in the rearing and development of the young, and in doing so, gradually disintegrated the family until there was nothing left of it except a pair of people, a man and a woman. But in this the state only consummated a

process that had been begun generations before by the invention of labor saving machinery. The family of your day was already a very much dwindled affair, compared with that of ancient times. Then the members of the family made for themselves their clothing and everything they required and they constituted a military body of which the father was the chief. But when machinery and gunpowder were invented, labor and employment, in both peace and war, became specialized, and in the division of labor that followed, families were gradually separated so as to use the labor of their individual components to greater advantage and new combinations were formed that crossed and obliterated family lines.

When the families gave up their children to the state to be brought up, it was a continuation of the same process in accordance with the eternal law of economy, and because the machinery of the state for the care of the young was so much better and cheaper than that of the family, that the latter could no longer compete. When this was accomplished the family had lost every function that had ever made it a nesessary or important subdivision of society.

In former times the state of celibacy was regarded as censurable and blameworthy, because the unmarried by failing to raise and provide for a family of children were considered as shirking out of a duty they owed to society. But when it was no longer the business of individuals to provide for the growing citizens, it became a matter of total indifference to the general public whether one was

married or not. It became unimportant to the public to know even of what sex any individual might be, and the ancient laws that required the sex to be advertised by their clothes, were repealed and everybody was allowed to dress according to the demands of their business or their fancy. All artificial distinctions of sex such as employment, civil rights and dress were abolished, and the personal pronouns and titles of address that recognized sex were of necessity dropped out of the languages. These things have already transpired in your country and in all the more advanced countries of the world and this has prepared the people to view the introduction of the third sex with philosophical interest and appreciation, instead of vulgar and unreasoning prejudice. You must make allowance for the advance people have made since your day in education and the comprehensiveness of their views. The third sex was looked upon in your day as a monstrosity, because it was rare. Did they regard a seedless orange or lemon or grape as a monstrosity? If you had ever seen a horse with three toes on each foot you would have called him a monstrosity, but the time was as you know, when the horse commonly had three toes and the monstrosity was the animal with only one. such as you regarded in your day as a perfect model of beauty and utility.

Your race will not regard the third sex with aversion or depreciation when they understand its relations and experience its value."

"Please tell me," said I, "what the relations of this sex to the others will be. I suppose of

course it will be subordinate to the others, especially the male."

"Well," he replied, "your experience in this matter will closely follow ours. As it is in Luna, so it is beginning to be on earth. You are greatly mistaken in supposing our sex to be subordinate to another."

At the expression "our sex," I involutarily gave the Professor a surprised glance.

"Then your affiliations are with that sex?"

"I have indeed that honor."

I was greatly astonished at this avowal and was greatly mortified to reflect that I had unwittingly said things that must have hurt his feelings, although he gave no sign of being in the least offended. I began an embarrassed apology, but he silenced me by a deprecatory wave of his right joker. He appeared amused rather than offended and evidently excused my unlucky observations as due to the ignorance and inexperience of the human race; which indeed, they were. I am now in doubt about the propriety of these masculine personal pronouns that I have applied when speaking of him but I shall continue to use them for I do not know what sort to substitute for them; certainly none of less dignity would seem appropriate to so dignified and noble a personage.

"In the moon," the Professor went on, "there is perfect equality between all individuals, regardless of the sex. But the third sex is numerically far the largest and in case of disagreement would easily dominate the other two. But there is and has been from time immemorial perfect harmony

as between the sexes, their functions being of necessity complemental and in no way antagonistic. The most responsible places in the state, and the leadership in education, in religion, in public works, engineering and architecture as well as almost all the common occupations, such as manufacturing and storing goods, agriculture etc., are in the hands of the third sex. They are preeminently people of affairs, and for most occupations are decidedly superior to the other sexes, because they are less liable to be distracted from their chosen occupations.

The males and females generally marry and then their first duties are to each other, otherwise they are employed like the third sex people.

Married people are desired to conform to the policy of the State Bureau of Population in regard to the distinctions required by it. Otherwise they are under no restriction or obligation. The population is thus kept uniform or increased or diminished in an almost exact and scientific manner. As I have already informed you, all Lunarians are by nature industrious and they take the keenest sort of pleasure in their work. Nevertheless they also play and amuse themselves, and devote much time to intellectual occupations. They have numerous societies and clubs, and the third sex people in particular are organized into associations for said purposes. So are the others also, but their club life is more or less interrupted and broken up by their connubial relations and duties. The third sex people are distinguished for their personal friendships which are very close intimate and tender and of life long constancy. These friendships

founded on compatibility of character, similarity of tastes and pursuits the subtile attractions of reciprocal intellectual and spiritual qualities, we regard as finer, more elevated, more noble, more exquisite and more absorbing than the unions formed on the basis of sexual attractions, and they are notably more permanent."

"Then," said I, "you have no jealousies of the other sexes—no envy?"

"Why should we have when it is plain we are as happy—we think happier—than they? We would not change places with them, any sooner than you would with a fish, because it can dive into depths you cannot penetrate, or a bird, because it can soar where you cannot. You know you would lose by the exchange. In a society where there are no artificial distinctions on account of sex it is not possible to find any one who would willingly exchange with another. Why should not a non-marrying sex be happy? Do you not remember that one of the great teachers of earth declared that in the kingdom of heaven they neither marry nor are given in marriage? Certainly the third sex is in a better condition to comply with this celestial regultaion than either of the others. The same great teacher was apparently so impressed with the superior conditions for happiness possessed by the third sex that he recommended to those of his followers who were able to receive it, to attach themselves to that sex by artificial means*, and not a

* The Professor probably referred to the instruction found in Matt. 19: 12.

few of them have from time to time attempted to do so. But there is a vast difference between the artificial and the natural, the spurious and the genuine. Those who are of the third sex by natural development, are formed symmetrically; the brain and the mind depending on it, with its desires and aversions are formed in unison and harmony with the other bodily parts and organs.

The same causes that suppress the formation of the latter also prevent the development of the corresponding pieces of brain and mind. There is therefore no clash between mind and body, no mental instincts that the body is physically disqualified from executing. The artificial imitation on the other hand is a mutilate. His symmetry and balance are destroyed because he retains a sexual brain and mind. He is out of harmony with himself, necessarily unhappy, and often a wretch.

Intellectually the third sex is superior to the others. It is less emotional, more cool, dispassionate, patient and rational. It is more gentle and sympathetic, yet more firm in its conclusions and persistent in its purposes. In size it is between the other sexes the male being the largest—as with you—and from the same cause, polygamy, which as in your case, was practiced by our ancestors. But our sex is physically finer, stronger, more wiry and tough, more skillful in all the arts of life and twenty-five per cent longer lived than the others. In short we possess all the good qualities of the others in an increased degree, as if the material that nature saved by the suppression of sex-

ual qualities, she used for the purpose of re-inforcing and augmenting the remaining ones.

You are I think now enabled to judge what your third sex is like, that is just now being introduced as an active factor in human affairs. Your race is now for the first time in its history, able in a perfectly scientific manner, to defend itself against its own encroachments. Your long looked for millennium dates from this very moment —the practical introduction of this new factor. The disorders of the past half century that seemed to many to mark the beginning of a chaotic anarchy in reality mark its termination. From this time farward, law and liberty will gradually grow together until, at a period long before the end of this millennium, they will precisely coincide. Things will not be perfect at first. Men will learn better every day how to live and every day will subjugate more and more of the energies and materials of nature to their own ends. The millennium that begins now will be succeeded by ninety-nine more before your race will have passed its high tide and begun its final ebb."

XI.

The Millennium.

The Professor here begun to roll up his profile. He was evidently preparing to leave, but as long as

he had been with me, and it seemed as if it were days, I was more loath than ever to part with him. My dread of the separation rapidly grew into a veritable panic, and I became so desperate as to beseech him, if he must go, to take me with him. He was evidently much amused, and I thought gratified as well, but explained that it would be impossible at that time, as his storage capacity for compressed air was only sufficient for one, and his car was in fact hardly suited to carry double.

"Then," said I, "give me a few moments longer if you possibly can. I do so wish to know something of our posterity ten millenniums ahead—twenty—a hundred. But no I am selfish—you are doubtless suffering now from your long stay and I ought not to ask anything more."

"Say no more," he said, "I will stay a few moments longer. I am not seriously inconvenienced as yet. But I cannot give you continuous history as that will take too long, but I will post you on a few prominent points that will interest you.

One thing you will consider remarkable in the beginning of the first millennium, is a growing disregard for the accumulation of great wealth. The day of millionaires passed away before the close of the 20th century. Legislation looking to the reduction of great estates and the prevention of such overgrown accumulations in the future, was enacted at the beginning of the century. But the spirit of greed was not outgrown until the creation of wealth became so easy and under such control by the state that more than enough for comfort and ease was placed at the command of

every one. No one was obliged to pay for anything, more than it cost, because the state would furnish all that was necessary on those terms, if no one else would. Speculative profits were abolished and the cost of an article was made up of wages only—the wage of the man in getting the raw material, the wage of the factors and the machinery in its fabrication, the cost of transportation, the wage of the salesman etc., all added together. The accumulation of excessive wealth was possible only when the speculator got hold of something it was necessary for other people to have, and who then made them pay for it much more than it cost him. This was all stopped as I said, before the close of the 20th century. But it was reserved to the beginning of the millennium to produce wealth in such abundance that it was not possible for anybody to have a single thing that it was essential for anybody else to have.

The material means of comfort and happiness exist on the earth as abundantly as the air for breathing. The education of the human race consists in their learning how to take and use them. Having learned this, the abundance of wealth is its security against the monopoly of the greedy, and so your millennium begins with available wealth so plentiful, that its surplus accumulation has no longer a sane object, and there is no more reason in a man hoarding it than in his eating the surplus food on the dinner table after he has had enough.

In your day if all the wealth of the world had been equally divided among its inhabitants there

would hardly have been enough for each person, to maintain him one year. The people lived from hand to mouth, and if the earth had failed to bring forth her bounty in crops for one year, half the population would have perished. Now if sun and rain should fail to mature the crops, the giant laboratories of artificial food can soon supply the deficiency. The tendency of the times is to depend less and less on the cultivation of the natural foods that are liable to the chances of unfavorable wind and weather, and to rely on the artificial products the creation of which is a matter of scientific certainty and accurary.

Let us now put ourselves forward again; this time one hundred millenniums, and look into the past as we have done before. We shall see that before the middle of the first millennium the principal articles of food are artificial productions identically like the natural foods formerly used such as milk, flour, meat, butter, fruits, vegetables etc. In addition to these many other foods were invented similar and equivalent to these natural productions. Later on the artificial products came more and more to consist of the proximate principles and condensed forms of food, fats, oils, sugar, and starch, gum, gluten, albumen, fibrin, casein, gelatine etc., directly from minerals, especially coal, or from cheap vegetation such as weeds that in your day were destroyed as worthless, sea weed etc., also from sea animals. Nothing came amiss, chemistry could produce rich and nourishing food from what in your day were the most unpromising materials, and at a merely nominal cost too, be-

cause power was furnished by the sun as I have explained to you. The constant tendency of chemical discovery was toward the production of foods in their purity, unmixed with the bulky residuum that goes with natural foods and that in the process of assimilation has to be rejected. As the foods thus became more condensed and pure a few spoons full became the daily food of a man, the pleasures of the table became less keen and protracted and gradually fell out of fashion. Other methods of recreation were more cultivated, such as music, oratory, the lyceum, theater, scientific lectures and experiments, games, etc. In many other respects the habits and fashions of life changed during the first millennium. The practice of walking was almost discontinued; flying machines having come into universal use. They reached perfection and were so inexpensive to operate, that they became a part of the equipment of everybody. Gentlemen went to their business, ladies went shopping, children went to school, with their flyers, as they formerly used to do to a less universal extent, with their bicycles.

The changes that took place in the habits of the people in respect to eating, walking and other things, reacted upon their physical development, slowly and imperceptibly, however, unless comparisons were made between people of several generations apart. The tendency as you know, is, toward the suppression of organs not habitually used. Use and habit keep all organs in good running order and develop them in size and health, whereas disuse allows them to become shriveled and re-

duced, and if it is persisted in for too many generations the organ will be reduced to an unrecognizable functionless remnant or disappear altogether. All animals including man have lost organs by ceasing to use them. Very many, as the ox, sheep, dog, deer etc., have lost toes, many have lost part of their intestines, some have lost a part or the whole of one lung. Most vertebrates including man were derived from ancestors who once possessed—but lost—an eye on the back of the head. The whales and snakes have lost their legs and feet in whole or in part.

You will not be surprised therefore to be told that the man of the second millennium began to be perceptibly changed from the one you knew in the 19th century. But when we come to the tenth millennium the change is astonishing. Let me describe him.

His average height is eight inches less. His legs are short and spindling, his feet are small, and his toes reduced to small nubbins or mere warts. He has no teeth and the males and third sex people have not hair enough to make a scalp lock, even among the young, and it all disappears before middle age. The females however still maintain enough for a few bangs and spit curls. The external ears are reduced to a low rim of cartilage around the opening, about one inch in diameter. The lower part of the trunk is small and weak. The upper part containing the heart and lungs is, however, very well developed. The arms and hands are well formed strong and symmetrical. The head is very large indicating large mental power.

All these deviations from the average man of your day became more pronounced with time, and if you could see a man of the one hundredth millennium you would have to inquire what it was. His stature now is but four feet, twelve inches of which is head, eighteen inches trunk, and the other eighteen inches legs. His chest is very broad, and very thick from front to back. His arms are stout and long enough to allow him to reach to his knees while standing. They are much larger and stronger than his legs. He is bald as an orange from birth. He has an immense mouth which he uses much in singing, laughing and speaking. He has not the vestige of an external ear nor any hair on any part of the body. No teeth of course and no sign of a toe. The foot is also much shortened and his walk is neither graceful nor vigorous. Foot ball is no longer his best hold, although his ancestor in your day may have belonged to the Sophomore foot ball eleven, of the Minnesota University. It would probobly astonish you to see him eat. If not, it would be because you did not know what he was doing. His food is a liquid, an artificial preparation digested and assimilated ready for absorption by the tissues. He does not take it in at the mouth, but by an orifice leading into the abdomen. This orifice is in the position of the navel, and is the opening of the umbilical cord through the outer wall of the abdomen to its connection with the vascular system inside.

In ancient times the umbilical cord through which the embryo received its nourishment became

pinched off on the outside after birth, while the part of it that remained inside of the body cavity became reduced to a mere string, a useless rudiment. But now that inside piece is kept in use from birth, the child being fed in the same way after as before birth. This opening by hereditary habit has developed wonderful changes for which, however, the long ages of use have furnished ample time for adjustment into a perfect adaptation of the parts and functions concerned. But really the changes are by no means so radical as they seem at first view. The change made in the mode of life of a new infant is in reality the same in effect now that it was in your day. The essential operation in both cases is the introduction of nourishment into the blood and it is accomplished in both cases by osmosis. The history of this evolution is interesting, but I can give you only a bare outline of it.

As the business of the world came to be done almost exclusively by machinery directed by men's brains, there was but little use for muscular exertion, especially of the legs and body. The use for legs in locomotion was also superseded by artificial modes of conveyance. Every road and street in the world was as smooth and clean as a parlor floor. On these were unlimited facilities for inexpensive transportation, public and private, the power being electric. Besides these were the flyers, also public and private. The life became almost exclusively a sitting life, even when in motion, sedentary in the most literal sense. This was, however, accompanied by the most intense activity

of the brain. These conditions were decidedly antagonistical to the old system of the nourishment of the body by the stomach and intestines, because that system had been developed in connection with an active muscular body, and could be kept in good health only by vigorous muscular activity. Formerly four-fifths of the blood went to support digestion and muscular activity, and one-fifth went to the brain to support the mind. Increasing mental activity diverted more and more of the circulation towards the brain, until now it consumes three-fifths, muscular work takes not quite two-fifths and digestion and assimilation almost none. The result of the changes that constantly pressed in this direction, was that the first millennium was an age of dyspepsia. The increasing disability of the stomach for digestion, encouraged the use of digested foods, and these by excusing the stomach from doing its proper work, increased its disability. Children at first were usually born with good stomachs, but these by middle life or before, commonly degenerated into instruments of misery. Finally they would not even tolerate digested food and it became neccessary to convey food within by some other means. Any method by which the nutritious matter properly digested can be introduced into the blood will support life. It became necessary to adopt hypodermic injections and other similar expedients. As this sort of treatment had to be applied earlier and earlier in life as time went on, even in some cases in childhood and infancy, they finally hit on the plan of using the ancient natural entrance of the

umbilicus and not allowing it to close at all during life. In this way the ancient system of support and nutrition for the body through the stomach has been entirely subverted. The chemical processes of digestion, selection and assimilation of food are all done outside of the body, by artificial processes, and the cavity of the body is no longer filled with a series of brewing vats, soap factories, gas works and receptacles for refuse filth and foul water. For we may truly say that digestion consists of processes of fermentation of several different kinds and saponification or soap making. Little or nothing that is now taken into the body requires to be excreted and the only excretory organs are the skin and lungs, for moisture and carbonic dioxide. This radical change was not all effected at once, but was extended over many generations, and was not fully consummated till the second millennium was well spent. But before that one was finished, the atrophy of the digestive functions was so far complete that cases of possible reversion to them were extremely rare. The people of the present time look back with amusement, commiseration and disgust upon the walking laboratories that constituted their ancestors."

"I think," said I, "that if the people of my day could see them the amusement would be mutual."

"Probably it would," he replied, "but if you should come to compare real advantages, I am of the opinion they would be entitled to laugh the loudest. They have decidedly the advantage of you in the simplicity of their construction and in

their reduced liability to get out of order. An autopsy of this latter day man would reveal a little shriveled up bit of parchment in the place where the stomach used to be, and another in the place where the bladder was, a handful of shoe strings in the place of the intestines, the total reduced in length at least one-half; some little fleshy nodules like so many beans and peas and hickory nuts to stand for the kidneys, the pancreas, the spleen and that ancient terror, the liver. It is strange that after these organs are thus discarded and atrophied, nature continues to perpetuate the remembrance of them by reproducing in every individual that is born, these odd and grim caricatures, like a miserly old woman that carefully hoards her cellar full of old tin cans and broken jugs, bottles and dishes—of no use to anybody.—But this is nature's way. Even in your day your scientists pointed out numerous remnants of played-out organs that your race then had about them, such as the coracoid bone, the tail bones, the vermiform appendix, the ear muscles, the pineal gland and many more. But now there are to be added, this fresh batch. They will be constantly reduced in size, one generation after another, but your race will hardly exist long enough to get rid of them entirely; but they may congratulate themselves that they have ended their mischief and are no longer functional.

There are also notable changes in the skeleton of the present man. He no longer has 33 segments or vertebrae in his back bone as folks had in your day, but only 23. The seven neck and twelve dor-

sal segments remain the same, but the five lumbar vertebrae are reduced to two, the five sacral and four tail bones are reduced to one each, much diminished in size, the tail a mere button. So he is much shortened from the diaphragm down."

"Professor," said I, "I confess I am disappointed in this man of the latter days. It is doubtless true as you say that he has been greatly improved by getting rid of his troublesome insides. I was somewhat shocked when you first told me of it, but on reflection I have no doubt, that although it seemed at first so strange and unnatural, it was all for the best. But his stature—I cannot get over that. He is nothing but a big headed spindle shanked dwarf. Our dreamers and prophets of the nineteenth century always pictured the coming man to us as a Hercules with brawny limbs and muscles of steel; he was never to be less than six feet high, and he was to be as graceful as he was powerful and all that. He was to be intellectual, too, of course; a Daniel Webster in brain. And they seemed to have the experience of the race in their favor in this prognostication, because it does not appear that the average stature of the race diminished any, but probably increased, during the 4,000 or 5,000 years before the 20th century. Now if it did not decrease for that period, why should it in the periods following?"

"During the 4,000 years or more you refer to, the conditions of life on which stature depend, did not materially change, for which reason stature did not. War and field exercises, tend to large stature. Sedentary employments, tend to reduce

the stature. The latter mode of life has prevailed for 100,000 years, and besides the general causes there has been the additional special one in this case, of the loss of function in a considerable portion of the trunk which would of consequence lose size in an increased proportion.

But after all it is not physical stature that commands respect, but mental stature. Many of your greatest men have been of small stature. You speedily forget one's size when attending to the actions of his mind. The most dignified presence is that which impresses itself as the strongest mentally. We consider that to which we are accustomed, as the most correct and proper, in stature as in everything else. If you had been most accustomed to people four feet high, you would regard six feet people as coarse unwieldy overgrown monsters, and when you become accustomed to the people of these times with their gentleness patience, industry, unselfishness, sympathy and kindness and unfailing good humor, their ability ingenuity, almost divine wisdom and learning, their stature and form will be transformed before you to become your standard of perfection. In the abstract, that is the most perfect form that admits of the accomplishment of the greatest ends. By this standard the man of this latter day is far in advance of all that preceded him, because in no other human form would it ever have been possible to properly sustain so great a brain.

It may interest you to know that the latter day man has almost entirely lost the sense of taste, the sense of smell was already much decayed in your

day. It is somewhat poorer now, but still fairly good. The sense of touch is far more delicate than formerly, hearing equally good, and sight better for near objects, but not so good for far ones. The telepathic sense has been remarkably developed and is one of the subjects of study and drill in the schools. The adult people of the third sex wear hats ten inches in diameter. The heads of the other sexes are somewhat smaller. The longevity of the race has increased to an average of 200 years, some occasionally reaching 300. The cause of this is due in part to the greater purity of their food and the smaller quantity of mineral impurities, such as lime, that is allowed to clog up the tissues and vitiate the circulation.

CHAPTER XII.

Universal State and Language.

Soon after the beginning of the first milleninum, the three great governments of the world were consolidated into one. This was found desirable in order to have equal and uniform laws regarding the regulation of population, education the administration of justice and the establishment of a uniform language. This latter object was accomplished by means of the universal state schools. A language was invented on scientific principles, as to its grammar, with words borrowed from different languages. This was taught, in every school

together with the native language of the country in which the school was located. This was kept up for 50 years, by which time practically everybody understood the new language, and then the others were dropped from the curriculum and only the new was thenceforth taught. There continued to be some differences of race however for several thousand yars, but it is now difficult to trace any race distinction.

The population of the earth is not now quite so great as it was in the year 2070. It has gradually been contracted to about 10,000,000,000. It was much larger during the first millennium, but the people were much given to flitting about, following the seasons like the birds, in consequence of which in some places the crowds became too great for comfort. Rather than make arbitrary rules to repress travel, they contracted the population by increasing the proportion of third sex children and diminishing that of the others. You understand no attempt was ever made to regulate the size of the family—that was left to nature—only its sex. The average number of children to a family has long been about 18, sixteen of whom are of the third sex. The people live mostly in cities, but the land is cultivated to such crops as clover, alfalfa, the grasses etc, the entire crops being chemicallly treated and the food principles extracted from them. Large tracts are, however, reserved for the public. They are beautified and adorned in every direction—and parks and flower gardens are everwhere, and here the people are fond of congregating in pleasant weather wheel-

ing their motor cars over the solid smooth roadways or flitting about in their flyers. As eating and drinking are no loger fashionable or practicable pastimes, there is a conspicuous absence of restaurants and saloons. Yet many of the people are supplied with little vials containing their standard food of which they partake if need be. But they have no stated hours for eating, no cooking, no cooks, no meals. Each one eats when his feelings tell him he needs it, and is not governed by the appetite of others. Yet, as a practical fact, most persons do fall into habits of some regularity. Nature is a stickler for habit."

"I suppose," said I, "the state furnishes many things that were left to individuals to do in my time, but how is the state supported? Who does the work?"

"Everybody works, but not much is required of anyone. The society is largely but not exclusively socialistic. The state makes everything necessary for existence, but no superfluities. In these necessaries it has the monopoly, and no one else is allowed to make or sell them. The state thus makes all food and clothing and clothing material builds all houses, makes all furniture, carriages, flying machines, furnishes heat, light and power, takes care of the young and educates them. Everybody works; is obliged to work in fact for his living. Eight tenths of the people work for the state, and not over two-tenths directly for other employers. In this two-tenths are included authors, ministers and priests, lecturers on new

and unaccepted theories, artists, some miliners, dressmakers etc.

The state fixes the wages it will pay according to the desirability or undesirability of the work, the undesirable of course being the best paid—the kind that would have been the worst paid in your day. An average of one hour a day of labor for the state will furnish lodging food and necessary clothing. So in five or six weeks one can lay up enough to maintain him a year, and have the rest of his time to do as he pleases. Notwithstanding the cheapness of everything, nothing is sold by the state except at a trifling advance upon its cost, which constitutes the only kind of taxation that is imposed. The surplus thus raised pays the expenses of state officials, courts, education etc. If anyone wants more than the modest living he can get by working at the rate of six weeks in a year; he can get it by working longer. By working steadily for a year he can accumulate enough to travel around the world. Or he can indulge in a fine painting or two, or a musical instrument or contribute money to some institution not supported by the state, as a church or philosophical society. Or he can lay up money in the state savings institution, until he accumulates a fortune for some pet enterprise or for use in old age. For several thousand years little or nothing has been spent on new public works. Everything really needed was long since built on principles of eternal durability, and repairs are light. Railways, canals etc., of course pay their own way. On the surface of the

earth almost everything may be said to be practically finished. The largest fields for discovery are under ground. Stores of mineral wealth never dreamed of in your day have been unearthed and utilized. Thousands of miles of tunnels have been constructed and some mountain ranges have been perforated in so many directions that their interiors are more familiar than their bleak and inhospitable surfaces. Enormous unsuspected caves and openings have been found, from many of which the contained material was ejected by volcanic action in ancient times.

In a great number of places tunnels have penetrated to regions of insupportable heat, and this heat transformed into electricity has been conveyed to the surface and its power distributed to great distances. This plan has been largely practiced in the mountainous regions of Asia and South America, Scandinavia, Alaska and other countries. In such regions heat can be reached without descending, and so the tunnels are self draining. This source of power helps out the sun in the rainy seasons etc."

"You mentioned something about state savings institutions just now; I suppose they receive the money of the people and pay interest on it—or how?"

"The state savings institutions receive money and take care of it, but they pay no interest. They do not loan it, so get no income from it and cannot pay any. In fact their fundamental ideas of business have undergone a radical change for these many ages back. They deny that it is fair busi-

ness to take a profit on any transaction. If a man lends his money to another he is entitled to pay for the time it takes him to make the loan and collect it, but he is not entitled to interest for use of the money. If a man borrows a plow worth ten dollars and wears it to the amount of one dollar, he should pay the owner the one dollar, but it is for repairs, not interest. If he borrows ten dollars in money and returns the full amount there is no wear to make good. If a man borrows ten dollars for which he must pay one dollar interest, then buys a plow and wears it one dollar's worth he is out two dollars. So he must charge one dollar above its cost, for his crop, when he sells it, and this is called profit. He does not keep it, however, but must pass it over to the capitalist. He might charge two dollars profit, in which case, he would keep one for his profit and give the other to the capitalist for his. In both cases they say, it is wrong and unsound as a business transaction, because it is getting or giving something for nothing. The idea of the legitimacy of profits and interest arose in ancient times in connection with the uncertainty or the gambling element that entered into all business. This was due to individualism or the practice of each one doing business for himself, taking his own risks and chances in a thousand ways. If one spent his time and money in making something to sell, he was not absolutely sure he would be able to find a buyer. And if one loaned his money to be used in business he shared the risks of it and could not be absolutely sure of getting it back again. Up to the amount

of the risks, profit and interest were under the conditions legitimate. But while under the individual system everybody charged for the risk of loss, the losses in reality fell on only a part, and so the rest got something for nothing. When insurance companies were organized to distribute part of the risks, making those who did not lose, contribute to make up the loss of those who did, the risks of all were diminished, and the profit and interest charges on that account reduced. If insurance with its distribution of risks had extended to every form of risk, and if the members of the companies or insured persons had embraced everyone in the community instead of only a part, then the special risks to each one would have been altogether eliminated, the insurance would have become a part of the cost of the goods to be added to their sale value, and profits above this no longer legitimate. For if one is entitled to profits so are all those with whom he exchanges and nobody gains; unless the profits of one are higher than those of another in which case someone is cheated or in other words robbed. Now when the state undertook practically all business and all transportation, and owned all houses, shops and factories, all risks of all forms were at once distributed to all the people, without the ceremony of insurance. If a building burned, or tools, or machinery became superseded by better ones, or goods became unsalable, or employes dishonest, or incompetent, the loss was fully insured, for it fell upon all, and there was nobody outside of this "all" to make it good. There could therefore be no possi-

ble honest end to be gained by profits; and interest on money falls with profits. As all the people work some time or other and receive wages, all have a bank account, for they are taught to be careful and economical, and they understand that one cannot spend a dollar and still have it."

"How do they encourage and pay for inventions and discoveries—or has everything been invented and discovered?"

"No, they are discovering something new all the time. A good many people who have got something ahead and have leisure find congenial employment in invention. If they produce anything valuable the state takes and uses it paying them for their time, and also distinguishing them by honorable mention and in some cases by decorations or medals. If the development of the idea requires the use of expensive machinery or materials, it is submitted to the judgment, of experts whether the would be inventor shall be furnished these things at public expense. If they think his idea not of sufficient value, he must either drop it or pursue it at his own expense, and take his chances of getting the glory and the pay when it is demonstrated, and these considerations seem to be enough to bring out their best endeavor in that line."

"Then it seems they don't value brain work any higher than hand work?"

"They value brains, but do not pay extra for them for the reason that they regard them as owing their best thoughts to the state. They say, that whatever one is, the state has made him, and

if he is above the average he owes more than the average."

"Did you say, Professor, that the houses belong to the state?"

"Yes the state has built houses enough to accommodate the whole population. In each town or city the houses are of uniform height for that place. Thus there are two story towns or four or ten story towns. A very large place may be twenty or thirty stories in the middle and lower further out. But no differences are allowed on any block. The roofs are flat and continuous over each block and connected with neighboring blocks by bridges over the streets. The flyers are all kept on the roofs and the flyers' entrance to the buildings is by a roof entrance connecting with the elevator. Wheeled vehicles are kept upon the streets. There are generally vacant apartments to be had if any one wishes to move from one city to another. But the population has its fads and whims and sometimes the popularity of some place will attract more people than the houses can accommodate. In that case the government will build some new houses. Houses are rented by the year for one per cent of their cost plus the one-fifth of one per cent for repairs. The latter sum is paid back to the tenant if the repairs are not required. Thus if a house costs ten thousand dollars, the rent would be one hundred, the theory being that its cost would be repaid in 100 years. But as houses last 1,000 years—in fact are indestructible except by an earthquake—the state has accumulated a large fund from rents of houses

that have long since paid for themselves, and this fund builds new ones when they are wanted."

"I suppose there is no woodwork used in building a house."

"They use what they call wood, but it is an artificial product made of mineral. It is almost as light as wood, can be cut and formed as wood can, but is much stronger and cannot be burned and never rots. By slight differences in its manufacture several varieties are produced imitating various sorts of wood. It has totally displaced wood and is used for all purposes from fine furniture to railway ties. It is the accumulation of indestructible things that makes existence so cheap in these latter days. The people enjoy the fruits of labor performed ages ago. And the things they make now are all made to endure. Even their clothes are made to last a life time—textile fabrics from mineral wool and mineral cotton. Even their food is provided for years ahead. It is put up in vials, and sealed up to keep a hundred years if required."

"What is it composed of?"

"It is in several modifications suited to different ages. In infancy and youth its composition is almost exactly that of a hen's egg. For mature and old people the proportions are slightly different, the lime is entirely left out for the old, and a larger proportion of phosphorus is used in the food of the middle aged and mentally active."

"If they can put together the material for a hen's egg," said I, "what's the trouble with hatching a chicken out of it."

"They can make all of the egg except the germ. That has been proved in this way. They take the germ out of a real hens egg, and put it into a shell filled with the artificial food, then apply the proper temperature and it is hatched in the usual time and all the food consumed. This is a common experiment."

"That is good proof that their food is the right material for chicks at any rate."

"Well there is plenty of scientific proof of the correctness of all the different modifications. Analyses have repeatedly been made of human bodies of different ages and their exact constituents with their proportions ascertained and thus it is known precisely what they require for food. And when this is taken with a sufficient quantity of distilled or electrically purified water there is no liability of being hungry and little of being sick. At any rate the general health and regularly increasing longevity of the people proves better than any theorizing the general correctness of their way of life. There is no longer any such thing as a patent medicine, a pill, or a powder, and there are no medical practitioners. There are surgeons; and there are scientific chemical professors, whose advice regarding the proper food is sometimes asked. But almost all distempers they are liable to, are rectified by self treatment; study of hygiene and the conditions of animal life being taught in the schools, not in a sciolous or smattering way but thoroughly and scientifically; for they say no knowledge is so essential to all people as this. It is by using scientifically adapted food that they

have succeeded in extending the average duration of life, and they claim that they will yet raise it to a thousand years. They are right in saying that decay and death from old age are due to the clogging up of the system with foreign matter that can neither be assimilated and taken into the tissues, nor ejected from the system. Their remedy for this is the prevention of the introduction of such substances by keeping them entirely out of the food. This they have nearly succeeded in doing, since the body is no longer the tenement of a chemical works to so very large an extent, as it used to be. Manufacture of these deleterious residuums inside the body is nearly stopped. The intelligent selection of the food then, with cleanliness and protection from cold constiute the principles of their treatment. Epidemic diseases have long since been entirely abolished.

The organic germs that caused these diseases depended on swamps, stagnant pools, and decaying animal and vegetable matter for nests in which to be cultivated, and from such places they were conveyed by the air or water and so reached the fluids of the human body in which their further cultivation went on, to the great grief of your race. Now there is not a swamp nor any such thing in all the world, and nothing whatever is allowed to decay. Everything that grows is either utilized or cremated. All refuse from the numerous chemical works is treated electrically and returned to the soil as a fertilizer. The water in their sewers is often not so very much worse than that which used to run in your water pipes, but

it is all electrically treated and the precipitated sediment returned to the land while, only the clear water is turned into the rivers.

"I suppose they no longer keep domestic animals," said I.

"They no longer keep them for use to any great extent, but they have preserved specimens of all the domestic animals, and some of those that were wild in your day as objects of curiosity. They also have some in the country as pets. There are a few wild animals in some of the large state parks that having never been disturbed have practically tamed themselves. Animal power passed out of use ages ago. The people are scrupulously nice in their ideas of cleanliness and so no animals of any sort, not even canary birds are allowed in the cities. In this respect they look back with unlimited disgust upon the people of your day with their filthy horses and dogs perambulating and befouling the streets, their stables, stores and meat shops full of the odors of decaying vegetable and animal matter, their accumulations of ashes and cinders and dust, and of filth and garbage in foul cess pools, barrels, gutters, vaults and sewers, their personal habits of eating and drinking with their sequelae and the necessary cooking and dishwashing, and their smoking and tobacco chewing and spitting. All this is done away with, and the people can hardly understand a mode of life in which it was included; much less necessary.

The streets of the cities are as clean as a drawing room, and it is easy to keep them so since there is so little occasion for them being soiled.

They use only electrically purified water or rain water, and far less than was consumed in your day. The houses are all fireproof and the fire departments have very little use for water, using chemical extinguishers. The factories for the manufacture of food stuffs, the mineral wood, furniture, vehicles textile fabrics etc., are usually placed in suburbs at a little distance from the cities, and the working people pass back and forth by the cars or flyers. The usual day's work is 4 to 6 hours and all sorts of work is paid by the hour. Manufactured goods are stored in the business quarters of the cities, and delivered where ordered as in your day, but by more exact and complete means.

There has not for many ages been any sexual distinction in clothes, and the slavery of fashion was long ago abolished. The costumes show the individuality of their owners and are extremely various; a mixed company looking like a congress of the nations of your day.

"How do they manage their political affairs," I inquired.

"They can scarcely be said to have any local political affairs to be managed. They have very large and extensive business affairs, and they are managed as business and not as politics. All the employes in the several business departments of the state are first taken from the schools where they have been educated and prepared for the occupations they wished to be qualified to follow. All vacancies to responsible places are filled on civil service principles. The foremen receive a

little higher wages than the common hands, but nobody receives any profits except the tax or tariff the state puts on goods it makes and sells.

The workers in each particular trade or occupation in any state form a society or guild, presided over by a board or commission elected by the members of the guild from a list of candidates who have passed examination for competency. There is another board elected by the whole people that has the general oversight of all business and the equalization of wages.

The guild board receives from the state the raw material it consumes and is charged with it. It sees to its distribution among the shops of the guild, receives and turns over to the state the articles made by the guild, certifies to the pay rolls, and to the cost of the articles made. It determines the amount of material required and the number of men that shall be employed, basing its regulation on the requisition of the general board for the goods which in turn gets its data from the store keepers who make requisitions on the board according to the public demand for the goods. The guild board determines the number of men it can employ and if it has too many the fact is reported to the general board whose business it is to find work for the surplus men in another trade. The guild board naturally anxious to preserve the credit of its own guild, always selects the least competent of their men for transfer. The general board is constantly posted as to the demand for labor in the different guilds and can usually assign the men to places suited to their capacity,

which commonly admits of more or less variety of employment, their school education being conducted with that view. If the trades are all full or if the men prove unfit to perform such skilled labor as is required, they are furnished laboring work not requiring skill of which there is always plenty in the procurement of raw materials for food, minerals, agricultural products, building materials etc. As most of the things produced including food can be kept an indefinite length of time, there is no objection to a considerable accumulation ahead. When this happens and it often does, the community is in a prosperous condition for it has more than enough. It is a sign that the workmen have saved their money instead of buying goods with it. They may knock off work and take holiday till the stocks are reduced. Sometimes the fashion changes, and the state has something on hand it cannot sell. Like any other manufacturer it must sell at a sacrifice for what it can get, and use better judgment next time. The general board looks out for that. This board also equalizes wages in the several trades, lowering the pay in those trades into which there is the greatest tendency to crowd and raising it in those that are deserted. Striking in a body is not allowed. But many or all the members of a guild may give notice of an intention to leave, and they are then allowed to do so, a small number at a time. The general board inquires into the cause of the dissatisfaction and rectifies it if possible. If the wages are high enough the fact will be proved by other workmen coming from other trades or other places to take

the job, in which case the disgruntled men must take such other work as the board can find for them or remain idle if they prefer to. If they are not high enough the vacancies will remain unfilled till the board raises them.

When men are idle, by no fault of their own, but because all places are filled, the state is bound to feed and clothe them. This is the theory, but it is very rarely put into practice. Since they prefer to let them work at something rather than be idle even if the work is not in great demand."

"They seem to have but little use for apothecaries and doctors, how about lawyers and courts?"

"There is no such thing now as the practice of law as formerly understood. In your day the lawyer was called an officer of the court. But in reality he was a partizan of one of the litigants bent on gaining a victory for his client regardless of the justice of his cause; and he often gained it when he knew it was unjust. Each town or district is supplied with a board of lawyers three, five or seven according to population, and these comprise the court. They are elected by the people from the law graduates of the state school, for a definite term. Any small case is heard by either one of the lawyers upon whom both litigants can agree, both sides being heard and witnesses examined by him. If either litigant is dissatisfied with his decision he may appeal to the full bench, whose decision by a majority is final on questions of fact. But if a minority dissents on points of law a further appeal as to the law is allowed to be made to the Supreme Court of the

state, the dissenting minority preparing the case for the higher court, and the majority preparing the counter case in defense of their decision. The defeated party pays the costs. These, however, are comparatively light, lawyers receiving no higher pay than mechanics. But as the position brings distinction there are always enough candidates for it. They are only paid as lawyers for the actual time spent by them, and often increase their income by other employment; for there is but a small amount of litigation.

The criminal procedure is almost as simple. A person accused of a petty crime is brought before a single lawyer who examines the witnesses for both sides and decides the case, if the accused is not satisfied he appeals to the full bench, and the minority of that bench may carry an appeal on questions of law to the Supreme Court. In important cases the legal bench may summon the bench of a neighboring town or district to sit with them in the case and share the responsibility. There is no criminal class and crime of any sort is very rare. It is regarded as an insanity and a family in which it is developed is at once prevented from going further in the hereditary transmission of it. There is no capital punishment."

"Well," said I, "they are an interesting people; they seem to have things about the way they want them and I reckon they ought to be happy."

"Yes," he said, "they ought to be, and they are; as much so as any intelligent creatures can be. You may know they are good natured, jolly and generous from the size of their mouths. The

size of their heads is a guaranty that whatever is knowable on earth they are pretty sure to find out, if you give them time enough; and renders probable the inference that they know that they are well off, and know enough to be contented. And as a matter of fact they are; and while they congratulate themselves, they never fail to call up in grateful remembrance the ancestors through whose martyrdom they have attained peace. Well we must now take our leave of this large hearted and large headed posterity of yours and return to the nineteenth century.

Ah! here we are!"

CHAPTER XIII.

Mars and the Martians.

The Professor at this point turned about, took hold of the wire that anchored his car and slowly pulled it to the ground. I saw I was about to lose him, but felt that I ought not to try to detain him any longer.

I thanked him cordially for the invaluable visit he had given me and told him I hoped it might be repeated. He nodded his head in acquiescence, by which I understood, I might expect him some time again. I went on to congratulate him on the happy home he was returning to and the long agree-

able rest that awaited him there after this fatiguing journey.

He smiled with his great eyes, and thanked me for my good wishes, but said he was destined to no such rest as I wished him.

"From the moment I reach home," said he, "I shall be as busy as I can be for a week, preparing for my journey to Mars."

"Your journey to Mars!" I exclaimed, "do you mean to say you go to Mars?"

"I have been there only three times myself; but our people have visited that planet for the last ten thousand years, and there is quite a colony of Lunarians permanently settled there looking after our interests."

"So you have interests on Mars! Well now this is interesting. I wish I had known this before. I would give anything for information about Mars and the Martians."

"Well it will take me a little time to arrange my car and I can talk to you while I am doing it. You see our folks first went there about 10,000 years ago. They found the planet inhabited by two bitterly hostile races that did little else than hunt each other."

"They must be like our race then," I observed.

"Yes," he said, "in respect to their warlike instincts, but not as to their forms. They are not human nor even vertebrate, but they are built on the radiate plan. In short they are almost exactly like your star fishes, but enormously bigger. I have seen them as large as twelve feet across, though their more common size at maturity is

six to eight feet. The difference between the two races is that in one there are six spokes or limbs radiating from the central body and in the other there are but five. These limbs may be called either legs or arms, for they serve as either and are sometimes one and sometimes the other. There is a fleshy disc that forms the extremity of each limb, around which like the petals of a flower are the fingers or toes, about like so many thumbs. There are six of these in the six legged race and five in the five legged. This disc with its thumbs forms the foot when the individual walks on land. Two of them are always on the ground when he is standing, while the other four are free to be used as hands, these thumbs being opposable and able to grasp tolerably well.

When they move on land it is always in an upright position, and they roll along edgewise like a wheel destitute of felloes rolling on the ends of the spokes. The central piece or hub constitutes the body including the stomach, heart, lungs etc., as well as the sense organs and brain. The shape of the body is like a short stout cylinder tapering to a rounded point at each end from one and a half to two feet in diameter, the legs radiating from the sides. At the center of one end of this body is the mouth, and the brain is located all round it in what we would call the cheeks. There is no neck. There are six eyes immediately around the mouth corresponding with the six legs, and just outside of the eyes are six ear holes with closable lips, but no outside flaps or shells. Outside of these are six breathing or blow holes lead-

ing into the lungs. The mouth is round and the lips pucker together when closing. There is no up or down to the Martian man, he stands equally well on any pair of his legs and handles equally well with any of his hands, and this is one of his greatest drawbacks. He has a thick horny skin which appears to have been the only skeleton possessed by his ancestors, but in addition, he has a light internal skeleton developed later by the practice of standing and running on his limbs, which consists of a lot of plates and hoop like ribs in the body, and what would pass for thigh and leg bones in each limb. These last are hung with ball and socket joints both at the articulation with the body and at the elbow and wrist. The limbs are thus remarkably supple and when the Martian has a mind to, he can walk extremely well sideways on two legs, that is, the head or mouth going forward. And this is the way he should walk as our people long ago pointed out to the Martians. He can walk on the same two feet continuously edgwise as the wheel goes, but to do this he must merely drag the rear foot up to the front one, and then throw the front one forward again, or else sling them around past each other alternately in an awkward manner as a cow does, for the reason that they are all on the same plane. They greatly prefer the rolling motion and roll off on their spokes with surprising speed, twenty miles an hour being a common gait on a good road while some of the gigantic twelve footers can if necessary reel off forty or more.

They are so extremely fond of traveling off

in this manner, that it is difficult for them to confine their attention to any sedentary employment. In order to attain a high civilization people must be settled, and occupy themselves in some definite and constant modes of employment. We pointed out to them long ago that they could never have well differentiated arms and hands, unless they set apart certain of their limbs to be used exclusively as arms, and never allow the hands thus set apart for handling, to be used as feet.

They objected, that, to confine themselves to two legs for walking would reduce their gait to five or six miles an hour. This would be a great draw-back in war, and give their undifferentiated enemies the advantage over them. This objection no longer has much weight, since war has entirely ceased among them, the five legged race having long since been defeated and practically exterminated, the few that are left being glad to accept the most obscure positions that will secure them a bare existence."

"They must have been terrific warriors."

"I saw a regiment of the six legged men drilling once. They were marshaled on a large plain in two ranks, and rolled backward and forward fast or slow according to command with great precision. They then were commanded to load and advance. Around the body in the spaces between the limbs they had artificial leathern pouches in which they carried their ammunition. When they received the command to load they took out of these pouches six stones one for each hand, and they advanced with them clasped between

their stumpy fingers. Then they were commanded to double quick and discharge, upon which they advanced at terrific speed and at a given signal let fly the stones one after another as the hand containing it came to the proper position for the most effective throw. The centrifugal force they acquired from the long revolving arms sent them with tremendous force, some going at least a mile. In real war they used cast iron bullets. They have plenty of iron on Mars and our folks taught them how to smelt and work it. The regiment then charged up to a hand to hand encounter with an imaginary enemy. In this charge they were armed with a heavy circular iron disc in each hand, the disc having a handle on the back side by which it was held. Then they charged with terrific fury the discs flying around like lightning, chopping into mince meat, (in imagination) any enemy that dared stand before them.

The government is a despotism, the king having about the same authority as the emperor of Russia, although he has a council of state whose advice he listens to, and then does as he pleases. Since the subjugation of the five legged race this king is the supreme ruler of the whole planet. In some districts the people have made considerable advances in civilization, confining themselves to the use of two legs, and walking sidewise instead of rolling edgewise. But the king does not want all his subjects to adopt these innovations, for he is very proud of his soldiers and thinks them more efficient on six legs than two. Besides, for cer-

tain kinds of labor, especially drawing wagons and carriages, the old way is the best."

"Why don't they use horses," I inquired, "or haven't they any?"

"There are no such animals on Mars, nor in fact any other sort of animals except radiates. There are many genera of these, mostly living in the water and all small, except the dominant race, which I call the Martians.

But there are great differences in the conditions of life amongst the people of this race, some being fairly civilized while others are only beasts of burden, and still others take the place of dumb machines. They are specially adapted to act as wheels for light carriages. The axles of the carriage are terminated at each end with a six pronged fork, the prongs arranged in a circle or cylinder so that when a man is to play the role of wheel, he is impaled on this fork one prong of it fitting snugly between each pair of his legs. A vehicle of this kind is specially adapted for soft roads as the broad disc like feet prevent sinking.

The king has a phaeton mounted on twelve foot specimens of these lively wheels, in which he dashes around at a thirty or forty mile gait when the fancy strikes him. He also has a royal barge propelled by the same sort of wheels, the legs acting as paddles.

The king is imitated in his fads by the nobility and gentry as far as they are able, and so one may quite often see these live wheel phaetons, and live-paddle boats moving about.

On the public roads, vehicles are used having

wheels such as you use, and drawn by these creatures, yoked together in pairs by the pronged shafts or axles like those I just described. From 5 to 10 pairs may sometimes be seen tugging at one of these heavy freight wagons. They are tremendously strong and their strength counts for vastly more on the planet Mars than it would on the earth, because Mars being so much smaller everything weighs very much less. I have seen some of those big fellows after rolling a few hundred yards with great speed give a leap from the ground and fly whirling through the air for two hundred feet before they lit."

"They are a wonderful race," said I, "but it seems difficult to connect intelligence with a tribe of star fishes or to imagine they could ever become highly developed. You know those we have on earth are very low in the scale of existence."

"Intelligence," said the Professor, "does not depend on the form. Any form on which it is possible for the forces of the environment such as light heat contact etc., to make an impression, already has intelligence; the ability to be impressed is intelligence. If any organism can be impressed, then if you give it time enough it can be impressed indefinitely, because each impression differentiates it and adds to its sensitiveness, that is, its ability to be further impressed. The reason why inferior races so generally remain inferior is the jealousy and hostility of the superior. The dominant race is always hostile to any other race that shows any intelligence, and proceeds to kill it off for fear it will become a rival. It is thus

that the race of man has no rivals that compare with him in intelligence, no "connecting links" between him and the monkeys. He was jealous of them and exterminated them.

On the planet Mars there were never any forms of animals superior to the stars so they have received all the development. Their differentiation would have advanced further if the planet itself had not been so backward. It has a great deal more water on it in proportion to its size than the earth. It is destitute of high mountains, and very much of its surface is but little raised above the level of the sea. A great deal of it is marshy. It is only in recent geologic times that it has become well suited to life on land. When it became so, the star fishes crawled out, and by degrees became accustomed to that mode of life as well as their aquatic mode. If there had been any land animals there to attack them when they first ventured to leave the water, of course they would have been prevented from ever rising. But there were no enemies and they gradually developed lungs by which they were enabled to live continuously out of water. At first they crawled about like spiders with all their feet on the ground at once, but after awhile they learned to raise themselves up on edge and finally to roll from one foot to another, and so gradually adopted a new and wonderfully advanced mode of locomotion.

They are still semiaquatic and amphibious, and they have both lungs and gills. They do not bring forth their young alive, but the female lays eggs in the water, the wealthy families having little

tanks kept at a proper temperature. The females of the poor and rougher classes simply go to the nearest pond and deposit their eggs and leave them to their fate. Nine times out of ten, however, the warmth of the water is sufficient to hatch out the tiny stars which swim around in the water without any care or bother to their parents. They then use only their gills for breathing, but in a few weeks their lungs are developed enough to permit them to crawl out on land and remain awhile. They do this daily and finally are able to remain out continuously. Some of the lowest classes, the savages as the are called, never lose their gills, but continue to be amphibious all their lives. They spend their days on shore and mingle with the rest, but at night retire to the water in which they sleep and eat, feeding upon a tender and nutritious grass that grows in the water and in marshy places. This grass also constitutes a considerable part of the food of the better classes, but they generally cook it. In winter time these savages burrow in the mud at the bottom of the ponds and marshes and canals and go into a sort of torpid condition and remain there till spring. The more advanced classes cannot do this, they remain out of the water continuously after they are fairly weaned from it, and lose the use of their gills so that they cannot breathe under water at all. So there is almost as much difference between different varieties of these strange people so far as civilization is concerned as between men and some of their domestic animals.

"Professor," said I, "a moment ago you men-

tioned the canals. Our astronomers have seen these and puzzled themselves greatly in regard to them, now you can tell me all about them I am sure."

"Yes, I intended to tell you about them, I understand their history well. That's where we sunk our money, or at least a great part of it."

"What, in the canals?"

"Yes—that is, in their construction."

"Do you mean that the Lunarians went and dug those canals on Mars?"

"I will explain. As I said awhile ago when our folks first visited Mars the people were in a very barbarous state, but still seemed to have some idea of bettering their condition. They were much impressed by the superiority of the Lunarians and were anxious to get their advice as to the best way of improving their own situation. The inhabitants then all lived along the shores of the seas while the interior of the continents were uninhabited and for the most part unexplored. The Lunarians by the help of their wings and their repulsio-gravitation cars were in a position to make the exploration and in a short time gained a general knowledge of the topography of the planet. They found high land over both the poles, but all the middle parts are low. There were numerous ponds and lakes of fresh water, with marshy outlets to the seas, which are very salty. There were no rivers except a few small ones in the high lands. As the Martians were amphibious and had always been accustomed to salt water, the Lunarians doubted whether they could live in

the interior where the water was fresh. But they saw that it would be necessary to scatter the people away from the sea shore, divert their thoughts from war by finding peaceful occupations for them, and to create artificial wants for them since their very few natural wants were all bountifully supplied with little or no effort on their part. The climate of Mars is much like that of the temperate parts of the earth, but its polar regions are never so cold nor its equatorial regions so hot.

In summer time these people had no use for clothes, for it was warm enough without them. In winter they had always gone into winter quarters under water remaining in a torpid inactive condition till spring. When they found the Lunarians never did so, they were anxious to imitate them. But they could not stand the cold without clothes and houses artificially heated. So some rude clothing was made of grass, and some huts built under instructions from the Lunarians and the king and some of the better classes undertook to keep alive, as they called it, all winter. They were quick to perceive that they could thus add much time to their lives, for the winters of Mars last some 300 days out of the 687 that constitute his year. At first it was hard to work into the new way, but after one or two generations had been kept from hibernating from childhood, it came to be a second nature to their descendants, and now all the better classes have outgrown it, only the savages, who are merely beasts of burden continue to go into the torpid state and not all of these. This change of nature in these people, made it essential to have

houses and clothes and also to secure food to be kept through the winter thus creating the wants that would compel the people to employ their muscles and brains, and so insure their cultivation and development. The chief food of the people consisted of the grass I have mentioned which grows only in water and at that time only in salt water. It grows in thick pulpy stems and is very rich in sugar oil and gelatine. This vegetable product was obtainable only along the sea shore in shallow water and in salt-water marshes formed by the sea. The new way of life demanded at least one half more food than the old for each person, and it also led to a rapid increase in the population. These causes made it essential to devise some way of increasing the production of food, the most obvious way being the increase of the area of shallow salt water. This the king undertook to do, but made small progress, for neither he nor his council knew anything about engineering, or the management of such works.

The Lunarians who had been observing matters and things, and studying the situation very closely and shrewdly, now came forward with a proposition for a very comprehensive scheme of public works—or rather several schemes in one.

CHAPTER XIV.

The Canals.

First was a plan for increasing the salt water area by means of a system of broad channels or canals reaching inland from the oceans with a view of extending them from ocean to ocean as soon as practicable so as to enable the tidal currents to flow entirely through, thus insuring sea water in the very interior. It was proposed to make these narrow at first, but to widen them as the population increased and greater area became necessary for cultivation. After the main canals should have become well advanced it was designed to build branches and intersecting lines in such directions as might be deemed most advantageous.

The Lunarians proposed to the king to have this work done by a great stock company, one-half the stock to be owned by the king and the other half by them. They were to make the surveys and direct the work and handle the funds of the corporation making use of their mechanical and executive ability and great experience in finance and engineering. The government was to pay a bonus to this company of 100 kiks* per acre for every acre made available for cultivation. The capital

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* A Kik is worth about 10 cents American money.

stock was fixed at 200 kiks per acre to be issued to the stockholders as fast as the work was completed, the king to receive 100 kiks as his share and the Lunarians the other 100. As fast as the canals were completed they were to be turned over to the state and become its property, and in payment for this the state was to guarantee an annual dividend or interest of five per cent on that portion of the capital stock owned by the Lunarians. The king was not well informed on financial matters and inquired the meaning of five per cent interest, and was told that it meant the payment of half a kik to the owner of every ten kiks of stock which such owner was to receive in lieu of all other profits and reward for his labor and investment and which he the king as the head of the government was to guarantee. The king was satisfied to do this—more than satisfied in fact.

He said: "Gentlemen, I am a great King! what care I for half a kik." Then with a prodigal wave of all his disengaged limbs he exclaimed "make it a whole kik."

But our Lunarians were not to be outdone in liberality by the king, and while admitting that five per cent was ridiculously small, modestly declined to take any more. The king then inquired why they did not include his stock in the proposed guaranty. "Why should not I be guaranteed as well as you?" To this they replied that they purposely left his out because, first, he was himself the government, and so he would simply be guaranteeing himself; in the second place, if his stock were not named in this guarantee he need

not be confined to 5 per cent, but could as well take 10 or 20. The king having been satisfied on this point they cautiously unfolded their next proposition which was that they should have security in the shape of a mortgage for the payment of the 5 per cent interest, and that in case of default on the payment of said interest it should become a lien against the state and thence forward be entitled to draw interest the same as the original stock. "O king," said they, "we sincerely wish you might live forever. If we were sure you would we would never think of asking security. But Martians and Lunarians all die when their time comes, while this great corporation will be immortal. Some time in the future a king may arise who, while enjoying the blessings and comforts of civilization will forget what they were due to and will refuse to carry out Your Majesty's contract, about paying this interest."

"Well," said the King, "what security do you want?"

They said they would be contented with a mortgage covering Faithless Jack and Blind Lucy, and the two frigid zones of Mars."

I may say here that the frigid zones of Mars cover the polar ends of the planet and extend 28°. 42′ from the poles. I understood this much, but did not know who were meant by Faithless Jack and Blind Lucy. The Professor proceeded to explain.

"Mars as you know has two funny little moons. Your Astronomers have named them Deimos and Phobos. But the Martians call them by names that

are equivalent to Faithless Jack and Blind Lucy. These names belong to an ancient mythical legend, which I will relate to you. In very ancient times there were a pair of lovers named Jack and Lucy. Lucy was reputed to be the most beautiful lady that ever walked on six feet. Her six eyes were quite unique, being alternately red and yellow—three of each color. She was over eight feet high when she stood up and was noted for the grace and dignity of her menners, and the captivating way in which she walked, her feet coming down one after another in perfect time and with a rythmic pit-a-pat pit-a-pat almost inaudible from the softness of her tread, but which was nothing less than inspired music. Her disposition was as charming as her person. She had a kind word for every one, and was always doing some one a favor.

Jack on the other hand was exceedingly ill favored. It could not be said exactly that he was the ugliest or the most disagreeable young gentleman in the community, but a great many were his superiors in every way, and how it happened that Lucy fell in love with him could never be accounted for, but she did, to an excessive degree. To look at the Martians you might not suspect them of being very sentimental or affectionate, but they are, and their form in a manner compels them to be demonstrative. When a couple walk together they cannot lock arms or take hold of each other's hands as you do, since their limbs are all employed in walking. But if they are friends they hold on to each others cheeks with their lips, which have a suctorial force like

an air pump and which would raise a blister on a skin less tough than the integument of a Martian. When lovers walk out with each other they apply their lips together in an affectionate kiss of most uncommon adhesiveness. Jack and Lucy they say could have been seen any day walking about glued together in that manner. As this was common it was considered proper, but under the circumstances was not altogether prudent, for it roused the jealousy of Jack's rivals to an almost murderous pitch. Jack was not so tall as Lucy by a foot, being only a little over seven feet high. This brought his mouth six inches lower than hers, and made it necessary for him to elevate himself on his toes (or fingers) as much as possible, and even then Lucy had to meet him half way by bending the limbs that happened to support her at the moment in a manner that detracted considerably from her natural grace. Some of the disappointed lovers attempted to relieve their chagrin by speaking of Jack contemptuously as "Tiptoes" and making ungallant remarks about Lucy. But this was small comfort to them, while the loving pair were so much devoted to each other as to be quite heedless of the angry and jealous comment they were causing.

At last Jack's rivals entered into a conspiracy to "do him up." They would beat and tar and feather him at the very least and if he provoked them by resistance they would do worse. So they planned, and one summer evening when Jack and Lucy were taking their usual loving promenade, these disappointed suitors took after them. But

the lovers stimulated by a panic of sudden terror made a miraculous race and distanced their pursuers. The latter declared that the lovers did not run at all in fact, but glided along in some miraculous way not touching the ground, but gradually rising and sailing off getting constantly higher and higher, they at last disappeared behind a cloud. And they all declared that there could not be the least doubt that they had been translated to the sky to associate with the innumerable stars that had gone before them. There was nothing at all incredible in this to the Martian people, because it was a cardinal principle of their religion that their great heroes in ancient times had all been transferred from Mars to the sky. The proof was patent to anybody that had eyes, for there they were to be seen without any change of form, some with six radiating limbs and some with five. And these two hostile races carried their resentments to heaven with them and often engaged in direful warfare, hurling at each other thunderbolts, meteors and aerolites as might be seen almost daily or nightly. The celestial history of the lovers is tragic. They no longer had to walk, because there being nothing much to walk on, the celestial mode of locomotion is a delicious glide. consequently they were able occasionally to give their lips a rest, and hand in hand to quietly slip along with the glittering crowd thinking of nothing whatever unless it were of each other. But this happiness at last came to a sad ending. They were sauntering along as thoughtless and careless as children, when suddenly and without the least warning, an

immense aerolite came dashing through the sky and before Lucy even perceived it, it crashed into her face knocking out every one of her pretty eyes, smashing her lips and disfiguring her in the most terrible manner. In the confusion she was separated from her companion, and when she sought him, distracted by pain and blindness she took the wrong track, and from that day to this she skurries across the sky in the most feverish haste, rising in the west sailing overhead and setting in the east from two to three times a day, while all the other stars including the sun, and Jack with the rest, rise in the east and set in the west. As for Jack, when he found how changed and hideous she had become—his love turned to aversion. When she sought him, he avoided her, and passed by far on the other side. And now, although they pass each other every few hours he always looks the other way and she, poor thing, cannot see him. "There used to be a serious dispute among the Martians as to the particular sort of star that threw that rock. One sect of theologians stoutly maintained that it was hurled with malicious intent by a malignant five legged star, and struck the fair mark it was aimed at with terrible precision. Another sect held that it was only an accident; the missile was probably fired by a friendly six pointer, missed its mark and unfortunately struck where it was not intended to. As there was not a particle of proof for either side, affirmations and assertions took the place of argument, and were dogmatically made and maintained with no little acrimony on both sides

But they all agreed in rendering divine honors to Lucy with their sympathies and condolences: Poor Lucy! Perfidious Jack!

When the King learned what the Lunarians wanted him to give them a mortgage on, he laughed heartily and thought it a good joke. He could hardly be made to believe they were in earnest. "As for the poles if there is anything there except snow and rocks," said he, "whoever gets them will earn them, I warrant you.

As for the moons, I shall never undertake to deliver them in case you foreclose on them, and your mortgage must distinctly state that you are to take them running."

The King thought the idea of mortgaging his moons was peculiarly comical; and after the deal was consumated and the papers all signed, he would sometimes stand on the door step and call out to Lucy as she rushed along overhead with the speed of a cannon ball, and ask her how she felt to be mortgaged. In addition to the scheme for the construction of the canals, the Lunarians asked and easily obtained a charter or concession from the king for an easement or right of way twenty miles wide, ten miles on each side of the equator, and reaching entirely around the planet, for the purpose of one or more lines of telegraph and cables for the conveyance of electrical power and for railroads etc. This region was entirely uninhabited, and not suited for the occupation of Martians, but the Lunarians said they would have use for it in the course of time and wished to have

it understood so they could know what to depend on.

All the preliminary negotiations being at last concluded, and the contracts signed, they went to work with a will. The bonus or subsidy of 100 kiks per acre was raised by taxation, those who had no money being compelled to work out their tax on the canal. The route selected for the first line was across a low swampy country. The work was light and much of it in the water where the Martians were at home. The Lunarians had flat boats constructed on which the excavated muck and earth were loaded and floated to the deep places which they partially filled up or deposited on the dry land. The canal was made 200 feet wide at first, one-half of which was kept entirely clear, while the other half was planted to the sea-weed.

It took several years to finish the first line, and as soon as it was done they commenced the work of widening it, adding a strip 200 feet in width, which when completed made the canal 400 feet wide. This process was then repeated and has been going on constantly not only in the first canals but in all subsequent ones of which there is an immense number. As much material was carried to the banks and deposited there in the construction of each strip, a good deal had to be moved more than once. When this accumulation became too great to be profitably moved it was skipped and the next channel constructed parallel with the main canal, but separated from it by the strip of solid land on which this waste earth was piled

from a few rods to a quarter of a mile in width. On these strips are located the villages of the working people that cultivate the sea weed, work on the canal and are engaged in navigation etc.

The total width of some of these canals is now as much as sixty miles, but they generally consist in reality of numerous wide channels separated by narrow strips of land. This plan of canal making has been steadily adhered to for several thousand years. Lines parallel to each other and several hundred miles apart have been constructed, and many others connecting with these and intersecting them at various angles. These canals not only constitute the principal fields for the cultivation of their staple food, but also furnish what was for a long time their best and chief mode of transportation. Their chief commercial and manufacturing cities sprung up at the intersections of the canals.

The building of these canals had a wonderfully stimulating effect on the development of the Martian people. The population promptly increased in proportion to the increase of the means for its support as it always does, on all planets. With the increase of population came diversity of employment, new ideas, tastes, and wants, new inventions more culture and refinement."

"How did the Lunarians come out on their contract?" I asked. "They must have made a lot of money I reckon."

"I was just coming to that," said he. "Yes they made lots of money if they could only have got it, but that was the rub. For a few years

while the amount of the acreage of the canals was small, it was comparatively easy to raise and pay over the five per cent due the Lunarians, but by the time the first great canal was completed through at a width of 200 feet, their interest amounted to 375,000 kiks per annum. By this time the king had discovered a good many new uses for money, and it went very much against the grain to pay over this interest. He began to think the Lunarians were going to be rather too well paid for the services and "investment," they had talked about; and he congratulated himself that they had not availed themselves of his effusive offer ,of ten per cent instead of five. However while he grumbled, he paid; and continued to do so as long as he lived, although towards the last the interest amounted to the very handsome sum of 1,000,000 kiks per annum. But that is all, after the death of that king who is yet affectionately referred to by the Martians as the "father of the canals," the Lunarians for 7,000 years never got a kik. However, what they had already received was enough to make every member of the colony many times a millionaire if they had divided it amongst them. But this they did not do. The Lunarians are socialists and they regarded this money as belonging to the whole Lunarian race, to those at home on the moon as much as to themselves. They invested it to the best advantage in various enterprises, consuming on themselves only what their simple and modest personal wants required. The bonus or subsidy of 100 kiks per acre generally paid the entire cost of construction

and the Lunarians had their interest money. At the death of the king there was one year's interest due amounting to 1,000,000 kiks. The successor to the throne was not satisfied with the contract to pay a dividend on the stock the Lunarians held in the canals, and in fact repudiated it all except the 1,000,000 kiks then due which he said he would pay when he got around to it. But he never did, and the claim continued to draw interest which was computed and audited at the beginning of each subsequent reign, but always put off for some reason or other and not paid."

"Why didn't they foreslose their mortgage?" I asked.

"Well they did not want to do that until they were ready to improve the property so as to make it earn something. They reasoned that the canal claim, as it was called, was making money at a tremendous rate. The interest on it 2,000 years ago or, over 6,000 years after the work on the canals was commenced, amounted to thousands of millions of kiks every minute, and they had not been able to devise any plan by which they could make any satisfactory use of the mortgaged property; and so they let the money remain in the canal fund."

"But," said I, "suppose it was earning so many millions of kiks, I don't see what good it did them if they never got it."

"Why you see," he replied, "they got out of it in that shape, all they could have got if the money had been in their hands. And it was safe. It could not be stolen and nobody would be tempt-

ed to assasinate the owners in order to get it. When people have such enormous fortunes they can come into personal contact with only a small portion of them. An individual owning many millions can only use on himself a few hundreds or thousands, and the rest of it buys him nothing but the respect homage, consideration, obsequiousness and sycophancy of the crowd. For all this he does not have to pay a cent, but must own or be supposed to own millions. The funds which our Lunarians owned in canal stock made them the lions of Mars. Their personal abilities, accomplishments and graces would have done that anyway, with a certain class, but the addition of all that wealth gave them an influence and consideration amongst the mass of people who had no great appreciation of any other sort of merit.

All sorts of odd stories concerning the wealthy foreigners found circulation amongst the masses. Once it was reported that if the canal funds were not paid before the next Christmas, the Lunarians intended to fiill up all the canals again. It was well known for ages that there was not enough money on Mars to pay the canal debt, or even its accumulation for one year. Not very long ago it became reported that the Lunarians had sold their claims to capitalists on the earth, and that the latter were going to get out an attachment for Mars, bid it off at sheriff's sale and take it for another moon to the earth. The story even settled the route it was to run on—half way between the earth and the moon."

"That was a likely tale indeed!" said I. "They

didn't know our capitalists very well or they wouldn't have imagined them going into a scheme that did not promise to pay pretty big."

"O, but it was to pay well as they had it planed. First the speculators were to sell short for future delivery all the gas and standard oil stocks in the world: then they were to bargain with the various great cities to furnish additional moonlight at so much for each added moon power, measured by our moon. They calculated that Mars placed 120,000 miles from the earth would reflect upon the earth 16 times as much light as the moon does. This would make the night about as bright as day. This would reduce the value of oil and gas stocks almost to nothing and the speculators would then buy them up for delivery on their sale contracts and make an enormous sum. The most of the Martians were keen for the enterprise to be consumated. They said that they would gain more than the earth by the change, for both the earth and moon would act as moons for Mars, and he would get four times as much light from the earth as he would give it. He would also get far more light and heat from the sun than he did where he was. When it was announced that the story was a hoax many people were actually disappointed. Others said they were glad to have escaped the disgrace of being sold out at a bankrupt sale and degraded from a full fledged planet to a mere satellite to be towed off to play second fiddle to another world."

"But how did they think Mars was to moved over to the earth?"

"O they supposed the Lunarians were going to see to that part of it. They had got the idea the Lunarians could do anything."

"But could they have accomplished such an undertaking as that?"

"That question was never settled; but they would not have done it if they could. The Lunarians always felt very much mortified that the moon is only a satellite and not a full planet. They have got some little satisfaction, however, in the great amount of attention, the moon has always received from the people of the earth. In old times in fact the earthlings used to pay divine honors to our globe, as well they might. But if Mars were to become a satellite of the earth it is easy to see he would monopolize all the attention that has heretofore been lavished on us. We wouldn't like that. No it looks as if you may depend upon it, the Lunarians would never lend themselves to a scheme like that. But a hoax like that has wonderful vitality.

A little over a thousand years ago the Lunarians began to think of foreclosing their mortgage. They had the polar regions of Mars quietly explored, and were agreeably surprised to find large deposits of coal, iron, gold, silver, tin, copper and many other metals and valuable minerals. They were already posted as to the nature of the little moons Jack-Deimos and Lucy-Phobos. It was a difficult and perilous task to effect a landing on them, but after much effort it was accomplished. It was found that Jack Deimos, which by the way is about seven miles in diameter and

twenty-two in circumference—you could ride clear around it on a bicycle in four hours—is about one-half iron, the rest rock containing gold, silver, lead and tin. Deimos always has the same side turned toward Mars, and on the opposite side is a lake about a mile in diameter and frozen solid to the bottom, which melts down a few inches every day and freezes up again at night. There is a little thin air, that does not extend more than one or two hundred yards high. The mass of this little moon is so small that its attraction for anything on it is very slight. An ordinary man weighs less than an ounce. He is considerably lighter on the side toward Mars than he is on the opposite side. One might stand on that side and shoot an arrow toward Mars, and it would not return to him, but continue its flight till it reached the planet.

There is in several places quite a growth of a hardy plant something like an alga, although the temperature on the shady side is 40° below 0. It is hot on the sunny side. The difficulty of getting on this little moon is due to its small attractive power. When we approach a large body, such as the Moon or Mars its attraction draws us after it and gradually brings us to its surface. But Deimos attracts with so little force that we have to get up speed and force from some other body and so run alongside and catch him. He flies around his orbit at the astonishing speed of 3,610½ miles an hour or more than 50 miles a minute. In order to get up such a speed as that our folks had to go off a million miles from Mars in a direction opposite to the sun and then allow themselves to

fall toward Mars until they were near the orbit of Deimos; then they turned on repulsion which sheered them off and caused them to describe an orbit around Mars in the same direction as that of Deimos. Deimos passed them several times before they could get into his attraction close enough to be pulled in by him.

They afterwards boarded Lucy-Phobos in the same way. Her attraction is a little stronger than Jack's as she is over eight miles in diameter. But her speed is still more terrific than his as she goes at the rate of 4,777 miles an hour or more than 79.2 miles a minute. She, too, always presents the same face to Mars.

Having made up their minds how they would improve the property when they got it, they informed the King that they desired to foreclose the mortgage. He made no defense and instructed the authorities to throw no obstacles in the way. The foreclosure was advertised in the usual way and when the day of sale arrived there was the usual crowd of loafers, but no bidders except the Lunarians. They bid three million kiks for the whole outfit—one million each for the two frigid zones and one million for the two satellites, and the property was of course knocked down to them, considering the importance of the sale it was a quiet, tame affair.—The King was not a little displeased when he found they had bid in the property for less than the billion, billion, billionth part of their claim, thus leaving the debt practically unreduced. He supposed they would bid the face of their claim and thus wipe out the debt. Still,

however, he made no attempt at redemption; in fact nobody would have given any more for the property than was bid. The title was confirmed to them by the court and they entered into possession.

CHAPTER XV.

The Great Debt.

The King began to be much concerned in regard to the great debt. He called his bankers together and had them compute it down to date. Then after brooding over the matter for some days he called his council and the Lunarian claimants together and made them a speech. He declared he was sick and tired of "paying interest." True, he had never paid any, but it constantly added to the already most appalling debt to be found in the solar system. "In fact it is so great (said he) that we have no single words to express it. It is written by setting down 20 and then annexing to that a string of 153 ciphers. The original debt left by my illustrious ancestor the father of the canals was 1,000,000 kiks, at least that is all his successor assumed, and it is that insignificant sum that has grown to such overwhelming proportions.

Take 20,000,000 septillions of kiks and multiply by 1,000,000 sexteillions; multiply this product by 1,000,000 of quintillions and this by 1,000,000 quadrillions; this by 1,000,000 millions; and finally mul-

tiply this by 1,000,000. Now from this inconceivably great sum subtract **one kik.** That kik is the principal; all the rest is **interest.** As the whole principal was 1,000,000 kiks, our whole debt is 1,000,000 times the above sum.* I have for several days been endeavoring to master the financial principal applicable to this case. Our Lunarian professors have told us that the normal advance of natural modes of motion is by undulation, or the progressive rising and falling of one wave after another, as in the ocean, the movement of heat and light, the ebbing and flowing of the tides etc. I have observed that the same law holds in the accumulation of wealth. It undulates. It is lively awhile, then dull. Business men accumulate a pile, then lose it. It is the same with money engaged in business, it sometimes gains, sometimes loses. A man may drink twenty hogsheads of wine, but he cannot accumulate that much inside of him at once.

It may be possible for one little kik in the course of 7,000 years to earn on Mars all the wealth both real and personal that there is on all the planets in the solar system and much more besides. At any rate it has done it on paper according to the figures and the claim of our Lunarian friends, but evidently it could only be done by its dropping a lot of it occasionally and earning it over again. So the undulatory movement applies here as a physical necessity. But the pap-

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* I have gone over these figures and I find the King was correct. Author.

ers in this case so far, represent only the swelling of the wave without the complementary sinking that completes an undulation, and makes its continued movement a physical possibility. These papers relate only to the ascending or crescendo half of the wave, but fail to provide for the diminuendo side of it. This wave has been swelling for 7,000 years. It is high time it had reached its culmination or greatest amplitude and I think it has. Seven is a mystic number and in this case evidently marks that epoch. Time alone was competent to enable a little kik to pile up such an accumulation of debt against us, and what time has done, time can undo.

I propose now to issue a diminuendo bond that will in the course of 7,000 years reduce this debt back to the level it started from. Instead of bearing interest, this bond will bear discount. This discount the first year will be precisely what the interest was the last, and each year in the descending future the bond will be reduced to the same amount to which it was increased in the year as far in the past as it is in the future counting from the date of the bond. So that 1,000 years hence the amount of it will be the same that it was 1,000 years ago and so on. Coupons shall be attached, representing the amount of the discount each year which the holders of the bonds shall detach and present to the treasurer to be cancelled. Thus the debt will be reduced every year and it will cost nobody a kik.

At the end of 7,000 years all the accumulation of interest will have been dissipated and only the

principal will be left. This if not paid then will begin to draw interest again, because by the undulatory theory, the wave having reached its lowest ebb must thereafter rise.

This was the substance of the king's speech, and it was highly applauded by the whole assembly, except the Lunarians. They said it looked to them like repudiation, and they told the king they feared it would hurt his credit not only in the Moon, but on the Earth, and Venus. Juno. Pallas, Ceres, Vesta and all the rest. The King replied that he would be sorry to do anything that would impair his credit in the other planets and for that reason would not on any account repudiate. That was why he gave this bond. If he intended to repudiate he would not need to give any bond. By this arrangement they would get their million kiks in the course of time—would no doubt have got them long ago—if that load of interest had not been piled on top of them. The object of this bond was to remove this interest. According to the undulatory theory of finance that he had just announced, the total amount of loss of money employed in business exactly equals the total amount of gain, since money does not change in amount by being used. But in particular cases there may be net gains at the expense of loss somewhere else. And he said that the shrewdness of the Lunarians would have insured to them a measure of net gain; but by no possibility could it have amounted to many times itself even in the course of ages. "It is labor, not money, that creates wealth. If you bury 100 kiks

in the ground and after a year dig them up you will not find that they have increased to 105."

This talk of the king convinced the Lunarians that he did not intend to pay the interest on their claim and as they could not afford to quarrel with him, they proposed a compromise, and it was finally settled that they should receive 1,000,000 kiks in addition to the property they had taken on the foreclosure, and a bond for ten million kiks to be paid at the option of the government without interest or security. They did not regard this bond as very valuable, and as a matter of fact it has not been paid off to this day, but still constitutes a "claim." After all, however, they did well enough notwithstanding their astounding loss.

They were now recognized as men who through no fault of their own had sunk the most stupendous sum of money ever known to exist in one fund, and this circumstance gave them as much notoriety and almost as much influence and importance, as if they still had to their credit the sum of 20,000,000,000,000,000,000,000,000,000,000 000,000,000,000,000,000, 000,000,000,000,000,000,000, 000,000,000,000,000, 000,000, 000.000,000,000,000,000, 000,000,000,000,000,000, 000,000,000,000,000, 000,000, 000 kiks.

Deimos and the Great Cable.

These financial questions being settled the Lunarians went to work to improve their new prop-

erty. They commenced work on the south polar region, opening extensive mines of coal and iron and starting furnaces and rolling mills. It soon became known what they were up to, which proved to be nothing less than the capture of Jack-Deimos and setting him to work. The first thing to do was to construct a cable long enough to reach from the pole of Mars to Deimos. Deimos is 14,547 miles from the center of Mars and a little further from the pole viz 14,690 miles. The cable was made about 25 miles longer than that. It was composed of a vast number of strands of tremendously tough steel wire and put together in the most marvelous way, for they were in small bundles insulated from each other as to the attraction of gravitation and also insulated by sections of their length. By this construction a part of the strands might be made to be subject to the attraction of gravitation, others alongside of them to repulsion, also a strand might be made subject to attraction in one part while in another it could be subject to repulsion, and these conditions could be reversed, or all the parts could be caused to be in the same state. The effect of this was very remarkable. When the cable was completed it was stretched out a section of one to two hundred miles at a time, and tested, an alternating electrical battery being used to alter the gravitational conditions. By proper manipulation, the cable could be made to rise bodily from the ground, or it could be made to rise by sections, one section on the ground and another humped up like the back of an angry cat, or when lying down straight it

could be made to roll over, by causing one side to be attractive and the other repelling.

This cable was eight inches in diameter. The lower end was doubled on itself to form an eye five feet in diameter. The other end for 25 miles was left free, the wires all being separate and loose with balls of iron attached to their ends. When this end of the cable was tested, a considerable section, by being subjected to repulsion, rose from the ground and assumed a perpendicular position, the loose ends of the wire parting and repelling each other like the hairs on the head of an electrified person. This was what was required and the test was pronounced a perfect success.

Over the south pole of Mars is a mountain some 8,000 feet above the sea level. They found the exact pole not far from the highest part of this mountain which was a lucky circumstance. Here they planted a great steel shaft deep in the hard rock, its end sticking up so as to receive the eye of the cable. A good deal of grading and leveling off of obstructions that stood up above the proposed sweep of the cable, had to be removed. But the largest part of the work was the construction of the circular railway. This railway was built in a circle around the pole and 285 miles distant from it. The diameter of this circle was 570 and the length of the road was 1,791 miles. There were two purposes to be served by this road. A person standing at the pole of Mars cannot see Deimos on account of the bulge or convex surface of the globe. And it is only when he gets 285 miles from the pole that he can look over the bulge

and see the little moon. So a rope drawn taut from Deimos to the pole of the planet, would drag on the ground for the 285 miles next the pole, but outside of the 285 miles the line would gradually leave the ground. A large heavy car was made to travel on the railroad to hold up the cable as it swept around. Attached to this car there was to be a train holding the dynamos in which the power was to be turned into electricity.

When everything was ready to hook on to the little moon, the cable was caused to erect itself by repulsion. It tended to stand directly out in line with the pole as if it were a continuation of the axis, and care had to be taken to prevent it sliping off its shaft and going off bodily into space. This had been anticipated and provided against however. After standing a few hours under the influence of repulsion it became rigid and perfectly straight. One-half of the strands throughout the whole length of the cable except the last twenty miles were now placed under the influence of attraction and the other half under repulsion. This left it still rigid, but indifferent and movable in any direction by a very small force like a water soaked log in the water. Attraction was now turned on a very small portion of the lower end of the cable and it began slowly to incline toward the ground. When it got down almost to the ground it was found that the ground where the railroad was built was running under the cable from west to east at the rate of 72½ miles an hour. Some very delicate manipulation was required here. The cable by having been erected at the

pole had no rotary motion as the planet had. The planet revolved from west to east at the rate of 521.4 miles an hour at the equator, but, at the circular railroad this was reduced to 72.6 miles. At the pole of course it was nothing. As the railroad track and the car for carrying the cable were whirling along at that rate while the cable itself was stationary, it became necessary to give the cable a rotary sweep corresponding in direction with the diurnal revolution of the planet, and at somewhere near the same speed. This was accomplished by compelling work to be done by the revolution of the planet. Several little circular tracks were laid around the pole and close to it on which were placed cars carrying heavy steel beams that projected on either side and dragged cutting and scraping tools. The cars being attached to the cable, as the planet revolved they were made to pare down the mountain, and as this process continued long after the successful attachment of the cable to Deimos the part of the mountain immediately at the pole became shaped like an immense pin or capstan. The doing of this work by this steady pulling on the cable gradually set the cable to revolving around the shaft at the pole, the speed constantly increasing until at the railway the cable had developed a speed of 60 miles an hour or within 12.6 miles an hour of the rate the surface of the planet at the railway was traveling. A locomotive was now attached to the car or truck that was to carry the cable, and by running it from east to west at the rate of

12.6 miles an hour it could be kept directly under the cable. Before lowering it, however, it was necessary to hump or raise up that part of it extending from the pole to the railway, to keep it from dragging on the ground which if straight it would do on account of the rounding of the globe of Mars. That was done by turning on repulsion over that part of it, and simultaneously putting on attraction in the region of the railway. This tended to cant the loose end of the cable toward the plane of the planet's equator and brought it very near to the orbit of Deimos. The cable was settled upon its truck without trouble. This truck with the cable now had an apparent motion from east to west of 12.6 miles an hour its real motion being from west to east 60 miles an hour and that of the railway track also from west to east 72.6 miles an hour. The loose end of the cable swept around with a speed proportional with its distance from the pole of Mars. This speed was 3,062½ miles per hour which is 46 miles faster than that of Deimos which is 3,016½ as I mentioned before. Of course it was now only necessary to tip the cable over a little more so as to get it into the equatorial plane of Mars in order to bring it into contact with Deimos. This was done by applying attraction to a short section of the cable just outside of the railway track. The cable slowly moved at the switch end and came into line with Deimos about 43 days after having passed him. So as it gained on him only 46 miles an hour, it took about 40 days after this to catch up. This gave ample time to get the cable into exact position so there would be

no danger of missing him. This most exciting race was now closely watched by every body on Mars that could get near a telescope—and our folks had introduced some very excellent ones. The cable gradually crept up on Jack—so the spectators said—like an old woman with a broom. As the final moment approached the excitment became intense. The cable like a vast arm terminated by an immense hand with extended fingers came up threateningly behind and at the fated instant gave Jack a spank on the rear with a shock of 46 miles an hour which sent all the fingers flying around him and clasping him with a tremendous grasp.

At that moment full attraction was turned on to these clasping strands of wire and their hug was made permanent by the attraction with which Deimos held them down to his surface. This was considered by the Lunarians the greatest feat in engineering that had ever been accomplished up to that time."

"Or since that time either I should imagine," said I, "it was wonderful! What else has ever been achieved to compare with it?"

"Well, the catching of Lucy-Phobos"—

'O, I forgot about Lucy-Phobos. What did they do with her or him?—Did they hitch Phobos to the other pole of Mars?"

"No, I'll tell you; but let me finish with Deimos first. When the cable struck Deimos of course its speed was at once checked. The shock caused quite a wave to pass down the whole length of the cable, but no damage was done, and when things

got steadied down again it was found the truck that carried the cable was making a speed of 13½ miles an hour from east to west instead of 12.6 which it was doing before the cable struck Deimos. The reason of this was that Deimos was slower than the cable and Mars dragged the track out from under the car 13½ miles faster than Deimos dragged it forward. It was no trouble after this to go up to Deimos by way of the cable. A car was built around the cable consisting of four stories, one above another. Friction rollers pressed the cable on all sides to steady the car and there were brakes to hold it when necessary. Its chambers were air tight and it carried compressed air for the use of its passengers together with all the modern conveniences. Of course it ascended by repulsion and came back by attraction. It entirely obviated the trouble they first experienced in making a landing on the little moon, since the cable traveled as fast as it did. Frequent trips were made to Deimos and it was always quite the trip for the strong nerved traveler to take. But the main advantage of this work of course came from the enormous power that it afforded for industrial purposes. A long train of trucks were attached to the one carrying the cable. and these contained dynamos driven by gearing connections with their axles. The electricity generated in this way was carried to wires running parallel with the circular railroad, and from these, radiating wires running north, convey the power to all parts of the south temperate zone."

They made considerable and remarkable chang-

es in Deimos itself. One thing they did was to import a large stock of air. As I mentioned before the air was very light and thin, and visitors at first had to depend on their flasks of compressed air to a great extent. But after they got to making such frequent trips, it became a rule to always take up large flasks of compresed oxygen which was prepared and kept on hand to be carried up whenever a trip should be made. This was set free on the little moon. In that way in the course of time the air has been made quite passable. In order that visitors might not consume it and replace it with carbonic acid gas, they built several lines of tiny railroads reaching around Deimos on which they built movable gardens. These moved around the whole circuit of the little globe every 30 hours and 18 minutes, that being its period of revolution around Mars. These little gardens thus kept themselves directly under the sun all the time, and were thus always in a tropical climate. Their growth consumed the carbonic gas that accumulated there, and so kept the air pure. The power that moved the gardens was electricity generated by sun light. A large number of machines were placed at intervals all around the little moon so that the sun should always be shining on several of them.

CHAPTER XVI.

Phobos.

Deimos is exceedingly valuable also as a sort of stepping stone from which to get onto Phobos. Once on Deimos and it is as easy getting onto Phobos as to step from one car to another in a running train. Phobos is 5,807 miles from the center of Mars. When the three are in line it is 8,740 miles from Deimos. Deimos travels 3,016½ miles an hour, Phobos 4,777. A body thrown off from Deimos towards Mars will retain the velocity of Deimos and will acquire in falling that 8,740 miles an additional velocity enough to bring its speed up to that of Phobos. So our Lunarians by close calculation and timely departure from Deimos have had little or no trouble in lighting on Phobos without a perceptible jar and have conveyed by that route all the machinery and apparatus they needed in making their improvements there."

"Was Phobos worth improving then?"

"No, its motive power was simply harnessed so as to be utilized on Mars. They did it in this way.

A large number of powerful steel magnets were prepared on Mars together with the materials for a large basket or crate stout enough to hold them,

also four cables made of wire, each two inches in diameter. These materials done up in proper shape were taken up the cable by repulsion to Deimos then again by repulsion cast off with a company of Lunarians in one of their cars to sail down to Phobos."

"I should think that being encumbered with such a lot of stuff would have added greatly to the risk of the trip," said I.

"Not at all, the more metal the better, since it can be made light or heavy at will and so kept under control while other materials could not be made light. It is always desirable to have more than half the weight of our outfit in iron or steel on that account. Well, they landed this material on Phobos and there put it together. The different parts were insulated from each other to provide for the use of repulsion or gravitation as the case might require.

They staked off an exact square five and a half miles on each side, which was about as large a one as they could get on Phobos and at each corner they firmly anchored one end of one of the cables. At the center of the square Mars appeared directly overhead. At this point the crate was put together upside down and its load of magnets arranged inside of it also upside down. The cables 3,760 miles long were coiled in a pile each to itself and the end fastened to the corners of the crate. On Mars this outfit weighed many tons, but on Phobos it was so light that one man could lift it. Wires connected with a battery passed through the cables to regulate the weight of the

concern. A small amount of repulsion raised it and carried it to the limit of the attraction of Phobos. The momentum taking it a little further, and within the dominance of that of Mars when light attraction was turned on and the crate rose or rather fell slowly toward Mars. When the cables were stretched out and the crate hung by them, it was within a few feet of the ground in some places, at others as much as one or two hundred. Its motion was from west to east at the incredible speed of 1,160 miles an hour. Its actual rate of travel is 1,681 miles per hour, but the revolution of Mars on its axis is at the rate 521 miles in the same direction, so the difference constitutes the apparent motion of the crate of Magnets. In order to get electric power from these it was only necessary to set up insulated slabs of soft iron along the route of the magnets in such position that they would pass close to them as they swept by. This was done at different places along the route, and covered altogether, distances aggregating more than three thousand miles. Of the remaining distance around the planet a part was over the sea and some over low land, where the scaffolding would be too high to pay. The electricity generated in these stationary armatures was run off to storage batteries wherever required in the equatorial regions of the planet. So, with the cable to Deimos and the big dynamo of Phobos. Mars is supplied with unlimited power at nominal cost."

"But doesn't the plant require renewal? I should think it would rust out after awhile."

"Yes the cable has been renewed twice. The

last one put up is 12 inches in diameter. It is easy now to put one up, with the one already up to steady and steer it. It only has to fall up as you might say, under the influence of repulsion. The occasion of putting up the last cable, however, was not rust, but a singular accident. During the winter there are generally only two or three men left at the pole to keep the shaft oiled and see that everything is all right. One winter the men left in charge undertook to move some heavy timbers and steel heams that had been left on the top of the mountain, and managed to get them into such a position that they were caught by the cable which slowly carried them around until they partly fell into a crevice and became immovable. The cable bent itself around the obstruction, and in doing so was thrown so far down over the edge of the mountain which as I told you had been turned off to resemble a capstan, that it began to be wound around it as if it were a great spool. The men telegraphed to the general manager who came up with a crowd of engineers and workmen, but they could not do a thing except to keep the cable raised by repulsion as much as possible to keep it from catching some obstruction on the ground. The cable made the complete circuit of the railway track in a trifle over 5½ days. The mountain stem had been whittled down to about a mile in diameter so that each revolution wound up a little over three miles of cable, which was at the rate of a little over half a mile a day.

The cable was so injured where it had been

wound up that they were afraid it would break if they loosened it, and so they concluded to make a new one. There did not seem to be any great hurry about it, and so it dragged along for four years without much being done. By that time almost 700 miles of cable had been wound up and Deimos had been drawn up that much nearer to Mars. Some thought this a good thing and proposed to let him wind himself down within a hundred miles or so of Mars, so that he would be of some account as a moon, for he gave very little light where he was. Others wanted him pulled down to the ground so they could cut him up and get the gold, silver, iron and other valuables he might contain; enough they said to make all the Martians rich. But the more prudent pointed out that if he was pulled down too far he would interfere with Lucy Phobos and spoil her work. It had been observed that the cable had been getting slower and slower and was now moving only a little more than half as fast as it did at first, and the industries depending on it were getting short of power. The mathematicians figured that Deimos would never wind himself up any closer than 12,700 miles or 1,847 miles from where he was in the first place, for the reason that drawing him in towards Mars increased his speed so that when he was wound up to 12,700 miles he would revolve around the planet in 24 hours and 40 minutes, the same time it takes Mars to roll over. Consequently Deimos would appear to stand over the same spot all the time, the cable would cease to move and the winding up process would

stop, and of course all the machinery connected with it would stop too. After a full discussion of the matter, it was concluded to let Deimos get back to his original orbit, so that the manufacturing that had been started and was operated by the power furnished by the cable might not suffer any further loss.

The New Cable.

The new cable was run up alongside of the old and the upper end fastened to Deimos while the eye in the lower end was placed over the shaft. The cable was then deprived of weight and the 700 miles of slack floated about in space like a big cobweb. It was now supposed that if the old cable was cut Deimos would rapidly move out to his old position. But he did nothing of the kind. He seemed to be satisfied with his new route, and for several months he persistently kept on without getting any further away, his slack cable sagging out behind. They now undertook to compel him, and they succeeded in this way. They gave the cable full weight repulsion. This caused it to straighten out upward, and the slack went on up 350 miles above Deimos curving back to him. The whole thing looked like a fish pole and line with Deimos dangling at the end of it. It had the desired effect, however, for its strain upward exerted considerable power on Deimos disturbing the equilibrium that had been established between the centripetal and centrifugal forces that controlled his motion. It took about two years, however, to get him back to his old route. He was

tipped over twice in the process, on account of the cable having been fastened on the underside; first while the loop of the cable was above it, and second when it got out to the end of the cable it was canted back again."

"It was a funny experience, the little moon had," I observed. "I suppose it got down to its former gait so as to allow of the old retrograde speed of cable at the Mars end?"

"Yes of course, the speed of Deimos decreased with its distance from Mars. It has occurred to them since, that they ought to have had a still longer cable, so as to have got him still further off with a still slower movement. They would have got more power by it.

The last time I was on Mars a remarkable circumstance took place that I shall never forget. I was one of a party that accompanied the King on a visit to the pole to inspect the plant and view the landscape. From this lofty elevation the view is charming, and there is also a strange fascination in watching the solemn revolution of the great cable moving with the deliberation and precise regularity of the hour hand of some enormous time piece. There is a little cabin built over the shaft at the pole which revolves with the cable. The man whose business it is to oil the shaft constantly stays in that cabin, and even sleeps there. While we were admiring the view we suddenly heard a scream from the man in the cabin. The eye of the cable is oval and is not filled by the shaft at its inside end. Upon rushing into the cabin we found the unfortunate man had been asleep and

allowed one of his feet to drop into this space and it had been slowly drawn in between the cable and the shaft until it was so fastened that he could not pull it out with the most frantic exertions, and every minute took it further crushing as it went. At last the man called for an ax, and it was handed to him, when without a moment's hesitation, with two or three strokes he severed his leg just above the knee. I was terribly shocked, but the poor man made light of it, and declared he would have another leg in its place as good as that one in five months. Less than two weeks afterwards I saw him and his leg had already started to grow out and in five months he was walking on it the same as the others."

"That was remarkable," said I, "but it is said the star fishes on earth—what! are you going?"

The professor during his talk had been arranging his car, a process I had been endeavoring to keep the run of without losing his conversation. He had erected a cab or house over the lower part or body of it, had fastened it down with a sort of clamps, that appeared to make the joints air tight, leaving open a small door on one side. The material of this cab was a thick leathery substance, evidently very tough and stiff and very transparent. He had also an instrument that I directly perceived was an air pump, for he used it in pumping air into a number of flasks—those that he had emptied, I suppose, on his trip down from the moon. As he filled them he placed them inside of the cab and having walked around and carefully

inspected everything to his satisfaction, he paused and turned his great benignant eyes upon me in a hesitating manner that seemed to say that he had something more to tell me which nevertheless he hesitated to communicate. After a few moments he overcame his scruples if he had any, and reaching into one of his middle pockets he brought forth a thin piece of stuff resembling parchment covered on both sides by an adhesive substance like that used on postage stamps. In shape it was like the moon at its first quarter. He pressed this piece against his forehead and left it sticking there for only a moment then handed it to me with a gesture that appeared to indicate that I should press it against mine. I did this, but it did not stick and there came into my head a very strange and muddled sensation not unlike a headache. I pulled it off. The Professor was looking at me and evidently perceived my trouble, for he directed me by a gesture to turn it over. The effect of this was as wonderful as it was agreeable. The Professor seemed to me to be talking through a telephone and while I could not say that I understood him any better than by his usual method, it was, to me, a new method, and disclosed new faculties and possibilities showing in a new light the genius and versatility of this wonderful race.

The information that he chose this novel way of communicating to me, related to the rumor in circulation in Mars as stated sometime back, that a company of speculators made up of Lunarians and extensive promotors living on the Earth were actually planning to impose a new orbit on Mars and

had so far progressed with the scheme, that the stock was all subscribed. It was understood the Lunarians were to do the actual work; in fact it was conceded that they were the only people in the solar system that possessed a plant at all commensurate with the magnitude of the undertaking or were sufficiently skilled or experienced to handle it. The Lunarians were too shrewd or wary to undertake such a contract without assuring themselves of their ability to perform it. It was to inform themselves on this point, that the Professor had agreed to make the long trip to Mars directly after his return to the Moon. This was a larger undertaking than they had yet attempted. They understood perfectly the mathematical principles, involved, but the very immensity of the apparatus required to be used and handled made an appalling task, and yet they declared if they could do it at all, they could do it easily. They relied of course on their great secret—the repulsion of gravitation.

The great scheme was therefore not the hoax they were willing to have the general public believe it to be, but a well considered project, by some of the most astute financiers and physicists in the solar system. The following are some of the principal names and firms enlisted in the enterprise. U. L. & V; J. Y. & Co., K. G. Q.; A. W. Z. & Sons; H. O. & Co.; R. H. R. Sons and Co.; M. D. C. C. C.; J. X. & J.; I. & P.; D. J. & N.; L. H. I. & F.; N. B.; S. I. & Co.; C. M. & Co.; R. T. & X.; C. E. The timidity of capital is notorious; likewise its gullibility and therefore its instinct

for secrecy and slyness. But the above array of names is an ample guaranty against trifling.

There had occurred to me from the first, the interesting question, what the business could be that would impose such a long and fatiguing journey on the Professor as a visit to Mars. I remembered the evasive reply he gave me when asked in regard to the great scheme for the abduction of that planet. I presume it was the tension on my mind, relating to this subject, that gave him an inkling telepathically of my wish to learn more of this great scheme and led him to pause and comply as related above. As to their ability to work out so vast an enterprise; it may be doubted. When Mars is in a direct line between Jupiter and the Sun, if they could give it a vigorous repulsory push from Jupitor while the sun's attraction remains in activity, both his orbit and time would approximate those of the Earth. It might take several such repulsory pushes to secure the degree of conformity required for the adjustment of the three orbits—Moon, Mars and Earth. There is no denying the imminent risk to be incurred even by such experts as our Lunarians, in handling three bulky globes in such close proximity, for it is not Mars alone that will be involved in any change that may be brought about; but all three. It will prove a much greater contract than handling Deimos and Phobos.

These thoughts passed rapidly through my brain, while the Professor after another hasty inspection of his car, suddenly stepped inside and closed the door, fastening it with clamps like the

rest. While he was doing this I eagerly inquired if he would not meet me again sometime and resume the story of my race in the far future beyond the one hundreth millenium.

He nodded his head affirmatively with a most benignant smile of his great kindly eyes, and said something I could only partially understand—"I will meet you here August — 9 — — —," something preceded and something followed the nine, but I cannot tell what. The nine probably refers to the year—but nine occurs in every remaining year of this century, and in every one of the next. He waved his hand to me, then reached forward from his seat in the back of the car touched a button—or something—and began at once to rise, rather rapidly from the first, and increasing in speed so fast that the car as I gazed after it, dwindled with wonderful rapidity and soon went out. Before he shut himself in his car I had instinctively taken off my hat, and I stood there holding it in my hand, but without sufficient presence of mind to frame an appropriate farewell. The fact is, his personality was overpowering and in his presence—I speak only for myself—one felt small and insignificant.

"Well! can you make it out?" The words startled me and looking up I saw Allan Ocheltree standing before me with a bucket of water in his hand. I could not realize for a few moments where I was. Looking down I saw in my hands the stake with the red blotches on that I had tried to read before I met the Professor. But that was long ago. I had but little idea how long, but it must

have been tedious for Allan during the long period I was interviewing the Professor. I wondered how he had occupied himself, and why he had not disturbed the interview—though I was exceedingly grateful that he had not. Perhaps he had seen the Professor himself. I asked him.

"What are you giving me?" said he, "I have seen no professor."

"But he has only this moment left me, perhaps he is still in sight," said I, "and I at once turned an eager gaze toward the sky overhead and directly descried a small black speck. "There! what's that—I believe that's the Professor."

"That," said Allan cooly, "is a crane, you can see it moving toward the east. It is going home to Crane Island. What's the matter, are you dreaming?"

I briefly explained.

"Well," said Allan, "you must have fallen into a doze and got to dreaming. Don't give yourself any worry about the way I have put in the time, I have been very agreeably occupied getting this bucket of water."

"Do you mean to say," said I, "that all this interview has taken only"—

"I mean to say that you have been sitting down there on that bank holding that piece of stick with the blurred keel marks on it, just long enough for me to walk to that rock yonder dip up a bucket of water and walk back. Here, time me with your watch and I will show you how long it took."

Whereupon he threw away the water in his bucket, walked to the rock, refilled it and walked

back—in one minute and forty seconds! Thus may one get an idea of the quickness of thought. I had heard of it before, but never realized it so completely.

As we went on with our preparations for our dinner I gave Allan some further accout of what I seemed to have heard and seen, and he became quite interested in it.

"I think," said he, "you ought to write it down, and do it at once before you forget it. You had better go right back to your cottage at the other end of the lake. I'll go with you, perhaps I can help you. I can write while you dictate."

I thought myself, I ought to write it down, and was pleased that he made the suggestion. It was soon arranged. After dinner we piled our things in the Sally Ann and were soon under way. Instead of rowing back to the outlet of Halstead's Bay, we steered for a narrow depression in the long point of land that separates the Bay from the upper lake. At this place which is only a few yards wide, we made a portage by dragging the boat over by main strength, and in a minute were in the lake, and just in time to hail a little steamer on its way down. They threw us a line which we made fast to the Sally Ann, and were thus towed back to Excelsior. Here Allan left me to go and settle his board bill and get his things, with the understanding that he would come over to my cottage next morning, while the steamer pursued her way toward the St. Louis hotel. Opposite Cottagewood I threw off the line and in a few

minutes was back in my cottage. This terminated the cruise of the Sally Ann.

That night I dreamed over the entire interview with the Professor, I believe verbatim.

Next morning a messenger came with a note from Allan saying that he had found awaiting him a telegram from a favorite niece demanding his presence at her wedding due to come off at St. Louis at a time that required his immediate departure. This he considered imperative and he had accordingly started the night before. He would try and come back after the wedding was over, he said.

I began to write up the "interview" that day, and that night I dreamed it all over again. It seemed to be now well fixed in my mind and I wrote rapidly. A week later I got another note from Allan. Business had claimed him again and he regretted that he would have to forego any further outing till next season. I have never heard from him since.

I wrote vigorously on the interview, and finished it in two weeks. I was very tired and glad to get back to the city and to work so as to rest up from the fatigues of my outing.

APPENDIX.

See page 17, Mitchel Discovery.

The Reader will remember that the Professor stated that the alternating gravity currents—the secret of which the Lunarians so tightly gripped—could be applied only to metals and has no effect on organic substances. In order to get the use of these currents for moving or controlling such bodies, it must be acquired through the manipulation of the metals. Thus if a piece of metal be attached to a block of wood, according to the Professor, the greater quantity of the metal will control the movement. If a box be constructed of metal so as to hold non reversible materials of course they will share the movement of the metal.

The following account of the discovery by Professor Mitchell, taken from a paper of the period, is suggestive of a connection between that and the discovery by the Lunarians.

Sometime in the sixth decade of this century (19th) a very remarkable discovery was said to have been made by the celebrated astronomer, Prof. O. M. Mitchel, then of Cincinnati, and director of Dudley and Cincinnati Observatories. He discovered either a new metal or an amalgam, alloy or compound, which when formed into plates possessed the property of preventing the passage through it of the influence of gravitation. In short it

effectually stopped the passage of the lines of force that constitute gravitation, so that if a cage or box were made of such material any solid body placed inside of it would lose its weight and not tend to fall. If a man were to get inside of such a box, he would find himself destitute of weight toward the ground. But if he should open the top of the box he would admit the influence of gravity from that direction, coming from the moon, planets or stars that might happen to be in that direction at the moment and it would at once commence to rise. Acting upon the obvious suggestions enforced by such experiments the Professor caused a cage to be built large enough to contain 4 or 5 persons, and in order to secure secrecy had it conveyed in pieces, together with all needed apparatus and stores, to a solitary and obscure circular hollow or depression in the valley of the Mississippi not far from Natchez, and called the Devil's Punch-bowl. Here the cage was put together and the numerous openings in the plates on all sides covered by movable sliIding lids of the same material, were carefully closed and secured, all the scientific apparatus, the provisions' flasks of compressed air etc., were conveyed within, and lastly the voyagers themselves. By opening the ports in the direction of the moon they soon began to fall toward her. As they approached her, by a judicious manipulation of the sliding doors they were enabled to make a complete revolution around her. They did not land, reserving that adventure for another trip. On their return to earth they steadied themselves in a position some miles

up, and allowed the earth to revolve under them until the Devils punch-bowl came directly beneath them, when they dropped into it. They dismantled and secreted their machine intending to return. Shortly after this the Civil war came on, during which Prof. Mitchel became a general in the service and died at Beaufort, South Carolina, October 30, 1862, and the secret of his discovery as I suppose died with him.

P. S.:—Notice! If any of the companions of Professor Mitchell on the above trip to the moon are still living they would greatly oblige the author by sending him their address.

Over Population.

See page 155.

Taking our stand in the future alongside of the men and women that will then be pressing their brains against the apparently insoluble problem of over-population, we will share their amazement at the insane panic that penetrated the American people of the 19th century to give away and on any terms to get rid of their magnificent domain and have it pass into the control and ownership of any undesirable bipeds that would take it as a gift. They acted as if they thought land was an encumbrance and something that was impoverishing and ruining the nation. If they had held out an exclusive welcome to the hardy and liberty loving people of the north of Europe, the stock that fought for liberty and independence in the first place, it would have been at least more rational. But under any conditions, why such a panic to fill up the country with people? Carlyle

speaking of the prosperity of America 50 or 60 years ago said: "You may boast of your free institutions and your dimmocracy and all that, but America is prosperous, because you have a great deal of land for a very few people,"

He was right.

As long as land was abundant or rather as long as people were scarce, there was enough of the necessaries of life to give a competence and comfort to all. When the country is filled up there is no longer the profusion that nature set out for us at first. The land that we ought to have reserved for our children, educated in our ways and inheriting our ideas is given to foreigners, and our own are disinherited. The miraculous insanity of this, is that we view this prospect with more than complacency and are anxious to help it along. We not only crowd the country with immigrants, many of whom we are obliged to class as objectionable, but we encourage a double rate of increase by the Apotheosis of the parents of large families, as if fecundity were a merit or there were any danger of "race suicide". The danger is greater that nature out of patience with our colossal stupidity will visit homicide on the whole race, just as she has so often done on parts of it.

The danger the Professor sees ahead is no dream. Neither is the final remedy he so confidently proposes. Even now, are some of these vital questions being solved, and along the Professor's lines. We shall learn to begin our study of sociology with the Bees and the Ants; older races than we are, and in practical hard sense far ahead.

Many people do not know that we have gone to sleep directly over a weak spot in the Earth's crust, that although it gives many warnings by growlings and grumblings, it fails to wake us up. We turn over and half awake, we mutter—it isn't going to be much of a quake I guess. If some crank does not succeed in sounding the alarm loud enough and none but a crank will be likely to sound it at all, the citizen peers out—"'tis nothing but that crank," he says, and he rolls over as if he thought it better to be overwhelmed by a quake than saved by a crank. So much the worse if even the crank cannot save us.

The questions that we seem desirous to push aside are the most persistent in pressing for solution. What is the aim of the aimless multitudes that swarm to our shores? What do any of us live for? To live? Is living worth it, if it cannot be done in comfort? The old theological query shows up—"What is the chief end of man"? As they answered; it was nothing at all to man and of paltry insignificance to anybody else.

Worker Sex.

See page 182.

I inferred from a remark the Professor dropped that he regarded the present human race as gradually developing a third or worker sex from those present, especially the female; and this without any artificial effort. It is evident to the most superficial observation that the women are pushing ahead into occupations that a few years ago were monopolized by the men. The men, are

being dispossessed of their employments, and the women usurp their places. Women thus employed and self supporting, cannot reasonably be expected to see anything very alluring in a marriage that presents a prospect to the woman of being obliged to support a husband and children as well as herself. This condition of things will certainly cause a decline in matrimony, has already done it in fact; amongst the women of the greatest enterprise.

See page 199, Abolition of the Stomach.

The Professor's plan of the abortion or extinction of the digestive apparatus is in direct continuance of evolution. There are many cases in nature in which a process or system is abandoned or superseded by a different one, and new organs and new functions may totally displace others. For example the Amphibians are supplied with gills, and are able to live continuously under water, but they begin to live part of the time in the air, and lungs are developed which at first begin to do part of the office of aerating the blood of the animal, and gradually assume the whole of the function, the gills becoming atrophied and abolished.

The prognostication of the Professor in regard to the metamorphosis of the digestive apparatus is neither wild nor extravagant. The unborn infant lives on food digested by its mother and introduced into its system. After its birth the food is digested and supplied by its own internal laboratory, instead of that of the mother. It might just as well be supplied by a chemical laboratory.

The only essential condition is that the food be perfectly assimilable by the tissues and without any surplus of substances not required. The transfer of the food supply from the circulation of the mother to its production by the chemist is reached by several stages or changes. First it is from the mothers circulation supported by exterior supplies of food. Next it is furnished by the circulation of the infant supported by exterior supplies; commonly beginning with the natural lacteal secretion, then after a time the demand changes from this to stronger food; also to acquired habits in taste the use of stimulants, narcotics etc. Thus nature changes the organism in the most radical way to keep it in conformity with conditions that are necessary for its support, and likewise changes its environment to furnish the conditions with which conformity is essential. If we consider how great the changes are, in the structure and functions of one body during the living of one life; we cannot feel surprised at the changes in human anatomy that we know to have occurred in the long ages up which we have so laboriously toiled, nor at the further changes which the foresight of the Professor points out to us, and for which he helps himself to such a prodigal allowance of time. The changes we have met and passed are far greater than those assumed for the future. As to our evolution we are certainly not yet half through.

See page 225, Notes on Mars.

The following notes of the conditions of Mars and its tiny satellites are furnished by our mun-

dane astronomers, and will give an idea of the problems that demanded solution by the Lunarians in their famous contract. Gravity on Mars is four-tenths as much as on the Earth. The atmospheric pressure is two and a quarter pounds per square inch against 15 pounds on the Earth. The climate of the poles is much milder than the same regions of Earth, although there are heavy falls of snow. In June and July 1892, 1,600,000 square miles of snow melted off in the southern zone of Mars. April 9, 1890, 3,000,000 square miles of snow fell. Ice is not formed anywhere except close to the poles in winter time. The channels are connected from sea to sea. They are 60 miles wide and from 3,000 to 4,000 miles long in a straight line. There are many of the channels that are duplicates, the duplicate being parallel with and 200 to 400 miles from the main channel. There are from 7 to 20 of these duplicate channels. Most of the surface of Mars is boggy syrtis, neither sea nor good dry land. Clouds float 20 miles high—4 times as high as on Earth.

The year of Mars is equal to 687 of our days. His day is 24 hours and 37 minutes. His diameter is about 4,500 miles; his distance from the sun 145,000,000 of miles; his nearest position to the Earth 35,000,000 miles.

The moon Phobos is 8 to 9 miles in diameter. It is 3,760 miles from the surface of Mars, and revolves around him in 7 hours and 39 minutes, at a rate of 79.6 per minute. It rises in the west and sets in the east. Its orbit is 36,486 miles. Dei-

mos rises in the east and sets in the west, so to Mars, does the Earth, Sun and Moon. The diameter of Deimos 6 to 7 miles, distance from the surface of Mars 12,500 miles and his revolution is performed in 30 hours and 18 minutes, rate 50 miles a minute.