

GOVERNMENT ON A FAR PLANET

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Although modern science and technology have a long way to go before it will be possible to establish a self-sustaining colony of men and women on a distant planet, it is not too early to ask "What do we do when we get there?" A partial answer is that the instant the spaceship carrying the colonists is underway, "we" will be irreversibly divided between those who are on that ship and those who remain on or near the earth; it will be those on the ship who will make all decisions and answer all questions even though, for a while, they may accept control or advice from earth, and continue to carry out a plan devised on earth. They will be accountable to no power on earth. Each individual will have his own view of what he wants the colony to do, and in the course of the voyage these views will probably be modified as the individuals grow older and discuss the question among themselves. The process of reaching a joint answer is a governmental or political one and the effectiveness of that

process will determine the measure of success of the colony and (unless it fails for reasons of sheer physical impossibility of success) will determine the colony's very survival.

It now appears that no self-sustaining colony can be established in the solar system, and the nearest stars are several light years away. Not only must the planet have an atmosphere of nitrogen and oxygen with water vapor and an upper layer of ozone, but it must also have a mass and density great enough so that its gravitation will retain such gases at approximately one earthly atmosphere, yet not so great that ordinary human activities would unduly strain the human heart. It must be above the freezing point of water most of the time in many places and close enough to its sun to receive the necessary energy for growing plants of earthly origin, yet there must be substantial regions where the temperature does not exceed 40° Celsius. The planet should rotate about every 24 hours unless earthly plants can be developed which tolerate a different day-and-night cycle. A substantial part of the surface of the planet should be made up of water, not only to provide water vapor to make rain to grow plants on land, but also to maintain a relatively even temperature over the land areas. A look at our own solar system shows that of nine planets, one is too close to the sun and too small, five are too large and too remote from the sun; Venus, the nearest earth's size has a surface temperature about 900° Fahrenheit, an atmosphere of carbon dioxide, 90 times the pressure of earth's, and, possibly, occasional rains of sulfuric acid; Mars, the nearest to being inhabitable, has no free oxygen, all water is frozen;

Mars has about 1/200th of the atmospheric pressure on earth made up mainly of carbon dioxide and argon and a temperature that may encourage the formation of dry ice at the higher latitudes.

Measured on earth, the flight of the spaceship will take longer than the lifetime of all who were born when the ship leaves. However, according to Einstein's special theory of relativity, time measured on the spaceship, if a way can be found to make it travel at a velocity approaching that of light, will be considerably less, taken up mainly in the process of accelerating to and slowing from that speed. Thus, anyone to take the trip at such a speed can expect to reach the destination in his lifetime, but no one he ever knew will be left on earth to receive the message saying that he got there. Note that I said if a way can be found to approach the speed of light; the amount of energy required for a round trip to a nearby star at 99% of the speed of light has been calculated to be so great that if such a spaceship were to be propelled by hydrogen fusion (as in hydrogen bombs) the payload would be only one billionth the weight of the fully fueled rocket at take-off. Until the development of a method of accelerating a spaceship with energy from sources other than on-board fuel, we had better stay on earth or prepare for a journey lasting several thousand years for the people on board. A theme of science fiction deals with a group of people who set out on a journey taking several generations to found a colony on a remote planet, only when their descendants get there they encounter a thriving civilization established by another group who left earth a couple of centuries later after a

method of travelling at almost the speed of light was invented.

You may wonder whether there are any planets that could be inhabited by people, and how they might be found. Finding them cannot be accomplished by present technology applied on earth; the interference of the atmosphere with the light from stars and other bodies makes it impossible to see, with even the finest theoretical telescope, an object as far and as small as any habitable planet would be. However, a satisfactory telescope mounted in space, or possibly on the moon, would not suffer this problem. And the probability that such planets exist in our galaxy seems quite strong.

Fred Hoyle, in his book Astronomy and Cosmology, describes a current theory as to the formation of our solar system to be much as follows: the sun's rotation increased as its volume diminished; this increased rotation caused some material to be ejected by centrifugal force and eventually coalesce into planets, with those having the heaviest elements being smaller and remaining closer to the sun and those of the lighter elements generally being larger and farther away; comets also were composed of lighter elements, including particularly hydrogen and oxygen, and the presence of these and other gases on earth may be accounted for by one or more collisions between earth and a comet. Hoyle estimates that the chances that any other star similar to the sun would have a planet at an equivalent distance with similar rotation speed, tilt of axis of rotation, distribution of water and other atmospheric components to be about one in ten or one in a hundred. With several billion stars in the galaxy, the odds that some of them will have habitable planets are overwhelming.

Hoyle also concludes that under conditions such as those prevailing on such a planet, life is quite likely to develop. However, the possibility that any such life would have developed creatures which not only have the intelligence of men but also use it in the same way is considerably more remote. During the estimated period of 4.5 billion years since the formation of the earth, life started about 3.4 billion years ago with bacteria and blue-green algae, but plants began to produce oxygen only about 2 billion years ago. Dinosaurs were dominant 100 million years ago, but modern man appeared only about 35,000 years ago, and has been keeping written records only for the last 5,000 years. Thus, "intelligent life" might be said to have existed about a millionth of earth's history, and less than two millionths of the time that some life has been here. How long "intelligent life" is likely to remain on earth is a matter of pure speculation, especially since so much of man's intelligence seems to be used in contriving ways to kill other intelligent men.

However, the subject of this paper is not the scientific or romantic aspect of space travel, no matter how enticing they may be. My purpose in mentioning them is to show that inhabitable planets probably can be found outside our solar system but that a journey extending from about half a generation at the minimum to several generations will be required to get there. A round trip should not be considered likely for many reasons, including the fact that after the passage of several hundred years on earth, our planet would no longer be home if the travellers ever did see it again. "Home" will be a spaceship, a highly artificial

environment, more like an ocean liner than anything else in common human experience, but with no sense of motion and, except briefly, no sun. Gravity will have to be replaced by either constant acceleration followed by constant deceleration or by a spinning motion of the ship itself so that centrifugal force would press those inside the ship against the inner surfaces of the outer walls. The weightlessness of outer space cannot be tolerated because, over a period of years without gravity, people's muscles, particularly their hearts, would atrophy and cause them to die of overexertion upon reaching a destination with normal earthly gravity. Initially there will be some radio contact with earth, but the time between a message and its response will gradually lengthen and the subjects about which the parties wish to converse will diminish until further communication will not be worthwhile except to convey information of utmost importance, such as the arrival of the ship at its destination or the landing on earth of someone from another planet.

For reasons to become apparent later, we must assume that there will be several thousand people on the ship. Despite the artificiality, it will be necessary to have the semblance of non-artificiality (perhaps the greatest artifice of all) so that the skills necessary to live on the destined planet will not be lost. Farmers must farm, weavers must weave, and carpenters must build. Some skills, such as the curing of bacterial diseases, may have no subject matter upon which to be practiced, yet may be needed badly when the colony is established. Hunting will be impossible, yet a hunter's skills must be retained somehow or else re-established.

If the journey is to last for generations rather than half a lifetime, births must be strictly regulated to prevent overcrowding and excessive demands on the food supply. Property on the spaceship will be owned in common, except for personal effects, and the economic system will probably be strictly regulated, with everyone having some assigned task which he will be required to perform. The society will probably have little crime (as there will be nowhere for a thief or murderer to escape to); it will not be necessary to protect people against casual unknown hazards and, most significant, the purpose of the society will be a single known end: to reach and populate the destination.

It is tempting to think of the government of the spaceship and the people on it being like that of a ship at sea, with a single captain having complete authority over both the operation of the ship and the behavior of the passengers and crew. But this would be unacceptable for two reasons: first, on a sea voyage the ship will reach land sometime and the captain can be held accountable for any excesses he may have tolerated or perpetrated--such a restraining influence will not occur on the space ship; second, and more important, people who board a seagoing ship, whether as passengers or crewmen, are asked to surrender only temporarily any right to participate in a government which affects neither their property, their family relationships nor a significantly long portion of their lives. The person with the technical skills to operate the spaceship cannot be expected to have any greater skill than anyone else in the political function of governing people. Thus, I would expect two governments on such



a ship: one in charge of navigating, operating and maintaining it and the other in charge of governing the people on board, at least when they are not performing duties under the first government. The former will originally be selected by the people on earth who set up the flight and will spend full time at their jobs and select and train their successors; the latter government will comprise people regularly employed at some other task, governing on a part-time basis, perhaps with a small permanent staff, and preferably elected by all adults on the ship from time to time. The latter will survive when the ship lands, while the former will cease to function as people leave the ship.

Upon arrival at the destination, the men and women of the spaceship will be faced with the most challenging series of adjustments since birth. I'm told that people who have lived in mountain valleys all their lives suffer an unpleasant feeling of being exposed when they visit the plains. This feeling, magnified many times, will afflict those who have spent all or most of their lives on a spaceship when they first disembark; I suspect that many will be psychologically unable to cope with it and the other adjustments involved in leaving the ship. The move from a totally artificial environment to one untouched by man will require a period of years, if not generations.

During this period of transition the dual governments of the ship will continue to operate, with the people-government exercising whatever control is necessary on the planet outside the ship. I expect this period to begin with occasional picnics

and camping trips ashore, but with no land being immediately assigned to individual ownership. Exploratory trips will be made by those having the requisite skills and inclination to inventory the portion of the planet upon which they have landed. It will be necessary immediately to determine whether soil conditions will permit the growth of earthly plants and whether and which local plants are edible by men or livestock, combustible or structurally useful. Bacteria must be identified and, if any seem harmful, ways of preventing or curing the ills they could inflict will have to be invented. Dangerous animals, if any, must be identified and removed or dispatched. Mineral deposits, including metals, clay for pots and silica for glass will have to be located. The first real trial of the government will be to allocate the land, or the use thereof. Decisions will be required as to what use should be made of a given tract, to whom shall it be assigned, and what will be the nature of his rights -- ownership, leasehold, rights for a limited period of time or for limited use, and whether exclusive or part of a community interest. Presumably some lands will be set aside for mineral exploitation and some for farming, on a basis approaching ownership by individuals or families in the case of farms, and by small groups in the case of mineral lands. Grazing rights, but not necessarily ownership, might be appropriate for other lands. No rights at all might be appropriate for hunting and fishing, at least to begin with. Supervening priorities should be established for limited areas, such as places of assembly, facilities having unique requirements, like mills on streams, and places of exceptional beauty to be preserved for

aesthetic purposes.

The government would also have to determine the uses to be made of what I'll call "trousseau" -- equipment brought from earth which cannot be duplicated on the new planet when it breaks or wears out. Equipment like bulldozers must be controlled by the government to make sure that the highest priority needs are satisfied first; thus clearing land for farming might take precedence first, followed by road building and then by mining or quarrying. At the same time will come that which cannot be avoided any more than death -- taxes. Taxes may be in the form of produce or man hours of work rather than money, but they will be there just the same, and anyone who left the earth to avoid taxes will be badly disappointed.

From this time on, the success or failure of the colony will depend primarily on the effectiveness of its government in co-ordinating the actions of the people without being so dictatorial as to make them dissatisfied. All of the needs of the colony will have to be satisfied by its people working together and relying less and less on the capability of the spaceship and the trousseau, yet probably many people, being unable to make the necessary adjustments involved in moving ashore, will continue to live the rest of their lives on the ship.

When the Western Hemisphere of earth was colonized by Europeans, only trade with Europe kept those colonies alive, and any colony denied such trade quickly perished. However, it may take a hundred years for a radio message to transmit an order to earth, and perhaps several centuries, measured on the planet, for the ordered goods to reach the new planet, and the energy requirements for

moving anything such a distance within even that long a time would be excessive. Unless instantaneous means of communication and unforeseeably fast low energy-cost transportation becomes available, there will be no trade, nor any other significant degree of contact between earth and the new planet. The colonists will have to be in great enough numbers, with enough specialized and generalized skills, so that they can manage without externally produced goods, other than the trousseau. Most of the facilities that modern man considers basic will not be available for long simply because they cannot be economically produced for only a few thousand people; electricity, for instance, might be produced for a time with the use of generators on the ship; but eventually those generators will wear out, or run out of fuel; there will not be a steel industry capable of making replacement parts because economically making steel requires more people than the colony could spare for the purpose and a market greater than the colony could provide. Perhaps pumps can be fashioned and piping can be made with local materials so that running water will be available in areas of high population density, and perhaps sewers can take liquid wastes from these areas to a river for disposal, but it is more likely that outhouses and community wells will be the practice. Certainly a society of this size could not support a plastics industry; containers would be made of pottery and plant material and glass, and maybe metal; fabrics would be wool, cotton, silk and linen. I expect the economy and industry to look like those of a small, remote, medieval European principality -- quite a change from the highly technical age the people will have left on earth, and from the thoroughly artificial environment of the

years on the spaceship. Perhaps the best place to look for a list of the occupations to be trained for would be the unclassified telephone directory -- those names that describe occupations, like Potter, Carpenter, Miller, Hooper, Chandler and Fisher, also describe the occupations of a society having the degree of specialization that can be achieved with only thousands rather than millions of members.

The nature of the government to be established would depend, to a large extent, on the traditions of the people involved. If they are Americans (and if our own traditions haven't changed much between now and then) I would expect something like a town meeting form, initially established on the ship and continuing on land, but with responsibility gradually being delegated to a few who would be elected by the others. The delegation of these powers should be by a constitution which establishes the forms of the government and the principles upon which it will operate. Chief among these principles should be a declaration of the rights of individuals since the one feature which cannot be dispensed with is the belief of each that his life is better if he is a member of the society than it would be if he were not.

The functions of the government will, at least initially, include those functions which must be performed for the benefit of all, but cannot be performed at a profit under a tolerable system of government by any individual. These include fire and police protection, common defense, public health, roads, and maybe canals and sewers. They also include the establishment of money and systems of measurement, particularly units of time, weight, velocity, and possibly distance, volume and temperature. Note

that if the gravity of the new planet is different from that of earth, a cubic centimeter of water will not weigh one gram - it will weigh more or less than that. Unless the planet's rotation is almost exactly 24 hours and unless it revolves about its sun at every 365 days, give or take a little, earthly measurements of time will be meaningless and confusing. I suspect that the colonists will have enough changes to face up to without changing their numbering system, and they will continue to have ten fingers, but it would be a significant opportunity to establish a duodecimal system for ease in expressing fractions, a numbering system based on twelve is far simpler than one based on ten, and since the things to be counted will be new, the system of counting them might be improved with less disruption than at any other time.

The government might furnish education or it might not; however, it should insist that the children be educated to the extent necessary to survive and contribute to the community.

Government's initial role, of regulating and keeping the peace, might have certain unique characteristics. Since the community will probably need the services of many people, each of whom performs a function that no one else knows how to, imprisonment for crime might be a hardship on the community. Perhaps fines, forced labor and shunning would be used to keep life sufficiently unpleasant for the criminal who gets caught. I hope older punishments, such as flogging, branding and cutting an offender's hand off will not be used, though I suspect that the death penalty will be available for the most serious crimes because of the fact that imprisonment, which is the most generally accepted alternative, is

too expensive for a small society. In addition to using a well-built building, a prison requires guards who cannot produce much while guarding a prisoner. Banishment might well amount to condemning an offender to starvation or being eaten if the planet contains large predators.

One function that governments on earth do not necessarily perform but which should be carried on by the government of the new planet is the preservation of knowledge that is not currently useful. As I have said, the colony will resemble a medieval European principality more than a modern city, and many items of knowledge and intellectual activities we take for granted will not be useful, and may be burdensome. Communication will be largely by word of mouth and radio and television will be impossible in the absence of electricity. Newspapers will be hard to produce since paper is least expensively made in quantities and printing is suited to larger circulation than the initial colony will afford. Thus, there is a real danger that people will find it no longer useful to read. Most of those who lived on the ship will, of course, continue to read and believe in the value of reading; but their children and grandchildren may question that value. The available books will be largely about matters of earth, a place they will only have heard of, not seen. The knowledge of how to do whatever has to be done will be learned by trial and error and passed on by word of mouth and example; instructions written on earth will be obsolete for the day-to-day life of the people. Thus, it is possible that in a few generations the colony will bear another resemblance to the middle ages -- only a few will know how to read. In this milieu it may be difficult to preserve the books that will again

be needed dozens of generations later, if the colony prospers. Tables describing the structural strength of steel of various alloys and in various shapes, or formulae for the computation of the capacity of electrical condensers may seem of value only for the paper in them to a society that has neither steel nor electricity. I suspect, however, that the knowledge of how to make whiskey can be preserved even in the absence of writing altogether, and the steel and electrical handbooks can be calculated anew when the time comes. However, the thought that there should be a formulation of the strength of steel or the capacity of condensers may perish with the books, and that thought may take much longer to be reborn. At first the books to be destroyed would probably be such handbooks and other technical information useful only to a society that is inconceivable to the third or fourth generation to be born on the planet. However, the practice of destroying or neglecting books of one variety may grow to include textbooks and treatises on matters not pertinent to the current society, and from there to all books not protected by physical or psychological means. The burning of marble statues of Rome to make cement after the fall of Rome will serve as an illustration of the capacity of people to destroy for little cause that which had been highly prized and which would again be of great value in subsequent centuries.

Thus, I believe that one of the functions of government should be to protect and nurture the knowledge and wisdom that will lie in the books brought to the new planet; special attention should be given to impressing on all the importance of preserving such treasures for future generations. Locked repositories for



books would be only a partial answer, like the precautions taken to keep grave robbers from the tombs of the pharaohs; when society was willing to accept grave robbing, the graves were robbed. Perhaps, like the medieval monasteries, only cloistered living institutions, devoted to wisdom or faith will preserve the books until the community grows old enough and large enough so that the people as a whole will again recognize their worth.

I earlier mentioned the need to establish new measures, including a new measure of time. Part of the urgency of new time measurements lies in the fact that if earthly hours remain the measure, and have little relation to the length of the day, then forces which tempt people not to keep track of time precisely will become even more effective than they would otherwise be. In the simple, largely agrarian civilization which will be rising, the closest things to accurate hourly time measurements may be the casual observance of the passage of the sun and the increase of appetite at mealtime. Failure to keep accurate track of time might be as debilitating to the community as loss of the capacity to read, not only because of the amount of time that would be lost for lack of utilizing time methodically; people would forget the finite duration of time and would no longer measure accomplishments against it. Lewis Mumford, in Technics and Civilization, says "The clock, not the steam-engine, is the key-machine of the modern industrial age. For every phase of its development the clock is both the outstanding fact and the typical symbol of the machine: even today no other machine is so ubiquitous.... The clock, moreover, is a piece of power machinery whose 'product' is seconds and minutes: by its essential nature it dissociated

time from human events and helped create the belief in an independent world of mathematically measurable sequences: the special world of science." The maintenance of a clock would keep people aware of time accurately measured and would serve as a model for those who would make other machines requiring accuracy. The realization that time can and should be measured accurately and in small amounts is one which will disappear in the absence of the machine that does it, and such a realization might not appear again for centuries. Without it, progress would be slow indeed. The maintenance and production of clocks should be a major responsibility of the government, both to hold the model of a machine as such and to maintain in the people a sense of the value of small periods of time.

You may have thought that because of my reference to time-keeping and machinery, and because of the value I place on keeping the books brought from earth, I consider that the people on the new planet should multiply and emulate their earthbound brethren, striving to achieve a civilization just like ours. Perish the thought! First, I expect that a major motivation for many of the new colonists will be to escape that very civilization, and they will not choose to re-establish it on the new planet. Second, the path followed by Western Europe and the United States during and after the industrial revolution was not a pretty one and should be avoided in many respects. The forces that started the industrial revolution will, if the colony survives and prospers, present themselves on the new planet when the time is ripe and will certainly be abetted by the book and the clock. However, if

there are still books intact which describe the human cost of such a revolution, and its results, the government may, by appropriate laws, evaluate the human as well as the economic condition of the colony and stop the worst of the potential sweat-shop and other dehumanizing practices.

Most important of all the functions of the government on that new planet will be its own perpetuation in a form and with a substance that will encourage the satisfactory development of the colony. As the original colony grows, people will move to the other parts of the planet and start local governments where they go. For a while, at least, the original colony will continue to contain the central government. In time it will be natural for remote settlements to wish for a degree of independence. To determine whether, or rather to what extent, such wishes should be granted, and to correct determinations made erroneously, will require considerable statesmanship and wisdom.

Although an elective government is what the people (if they come from North America or Western Europe) will probably be accustomed to, and will most likely pick as their initial form, the precise form will be of less consequence than the traditions and practices within that form. A tradition of systematic, orderly and equitable application of the rules which express the values of the society through a body of law which is both predictable and dependable will be essential. And such a tradition cannot be maintained by any body of written material, however well drafted. It can be maintained only so long as it continues to be treasured in the hearts and minds of the people. The fostering of this

tradition, both by example on the part of those who govern and by demand of the governed will be essential. The empire of Attila crumbled when the genius of the individual who founded it was gone. Yet the tradition of law attributed to Rome survived the fall of the Roman Empire and many other empires and kingdoms; and this tradition, in the characters of the governing and the governed, has enabled nations, some of them now populated by hundreds of millions, to achieve the peaceful co-ordination of the efforts of people of great diversity in language, history, faith and race, toward the improvement of the lot of all. The alternative to such a tradition embodied in practice is probably a clan or tribal society, debilitated by internecine war, with some groups occasionally achieving greatness in things that can be done by small groups or individuals, but mostly achieving a grubby, marginal and impoverished survival at best. Despite the current dire predictions of the evils of over-population, those societies which have achieved the best quality of life on earth have been those in which the activities of millions are co-ordinated under a single government that allows the trade and consequent specialization of individual effort to proceed under the administration of acceptable rules in a manner acceptable to nearly all.

You may wonder whether enough people to form even a small colony can be found with the motivation to spend their lives travelling through space to reach a land whose promise has not been proven. I can think of one group who had sufficient motivation to spend forty years wandering through a desert on a similar quest. The group survived and prospered largely because their leader obtained, and the people followed, sound legal advice in

the form of certain commandments governing their relationships to one another.

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