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## SPACE COLONIZATION AND THE QUEST FOR COMMUNITY

HISTORIANS AND SOCIOLOGISTS are accustomed to interpreting conflict among terrestrial cultures in one of two ways. One of these may be called The Top-Dog View, the other The No-Hope View. According to the first mode of interpretation—The Top-Dog View—some one terrestrial culture may sooner or later become globally dominant, either through military penetration short of nuclear war or through cultural conquest. The top cultural bidders at the moment appear to be either a *pax Americana*, a *pax Anglo-Saxonica*, or a *pax Sovietica*. (A *pax Sinica* does not appear to be an immediate threat.) Each of the three real possibilities gives concern to certain prominent national groups. The French, of course, fear a *pax Americana*. Knowing the American's fondness for Coca-Cola, they see this beverage as the symbol of all that is coarse, unimaginative, and materialistic in American culture. They are determined to resist the American urge to spread The American Idea, which they refer to as "la coca-colaization du monde." While they are not looking, let us hope however, that they do not succumb to the vodkaization of France.

The Latins, both in Europe and south of the American border, dread a *pax Anglo-Saxonica* more than they dread a *pax Americana* because of a widespread conviction that Anglo-Saxons are bent upon a paranoid mission to remould the world a little closer to their hearts' desires. Many intelligent Latins have taken H. L. Mencken's lampoons of the Anglo-Saxon to heart and have also taken very seriously Anglo-Saxon criticisms of their own national foibles. They do not realize that criticism—particularly intellectual criticism—is endemic to Anglo-Saxon cultures. As a result, Latins are firmly convinced that the Anglo-Saxon, in addition to being politically self-righteous, is also in many ways an incorrigible Puritan. As for themselves, they hold Puritanism to be beneath contempt; they will tolerate a *pax Anglo-Saxonica* only over their own dead bodies.

In the West the most general fear is that of a *pax Sovietica*. The Communist way of life is judged to be completely inimical to our ideals and to our democratic designs for living. We may be willing to consume *shashlik* and *caviar*, but we intend to avoid the adoption of any Marxist ideas and Soviet habits of living until the last breath, if need be, has expired from the body politic. We may not be as enthusiastic as the Russians are over the prospect of class-based societies withering away, but we utter twenty-six *pater-nosters* every night, metaphorically speaking, in public prayer and hope that dialectical materialism, proletarian literature, and party lines in genetics will quickly wither away.

The No-Hope View is shored up by a type of pessimism concerning human nature, which is regarded, by those who share it, as "realistic." This pessimistic realism is, perhaps, best characterized by the outlook of such a thinker as Reinhold Niebuhr—an outlook which, it should be noted, is shared by quite a number of social scientists.

In The No-Hope View—or it may more charitably be called the "Little-Hope" View—evil is real, and the worldly form of Original Sin is the quest for power. Accordingly, any effort to try to find a monolithic explanation of evil and the troubles it generates is doomed to folly. Examples of such unrealistic explanations of evil are: (1) the liberal conviction that evil is the result of ignorance and insufficient education; (2) the Marxist belief that evil is solely the product of a faulty economic structure; (3) the belief held by a good many social scientists that evil is a consequence of our obsolescent social practices or that it is a result of faulty communication; and (4) the faith cherished by a good many idealists currently striving for world peace that it is only lack of vision that produces evil. In The No-Hope View the world is and shall forever remain a Hobbesian world gone mad, in which each man's hand is covertly turned against all his neighbours. The quest for power is, as we have already remarked, the secular form of Original Sin, and the socially approved form of that quest is "institutionalized power politics." Power conflicts are fundamentally concerned with who shall get what, when, and how. They occur at all levels of life, are attended by violence, actual or potential, and eventually lead to group struggles and to war. As a result of all the preceding, it is difficult to achieve a good society because the quest for power is merely a disguised but socially accepted form of self-love.

The No-Hope View therefore assumes that all contemporary cultures will continue to exhibit a venomous antipathy towards one another rather than move towards a planetary cultural melting pot. Partisans of this position are

quite convinced that international understanding and goodwill can be achieved only by a select and knowledgeable minority. As for the rest of us, advocates of The No-Hope View are convinced that we are doomed to flounder indefinitely in the quicksands of cultural bias. Cultural provincialisms, it is felt, are bound to increase because of the emergence of new nations seeking a place in the sun. The broadening effect of international travel cannot work very effectively against cultural provincialism for two reasons. First, few individuals have sufficient means for foreign travel. Second, those who can travel have a tendency to carry their cultural biases with them and these are reinforced by the culture-shocks which are the inevitable accompaniment of travel abroad.

Cultural conflict, however, may be regarded as being less a product of national pride than it is of present living arrangements in the community structure of advanced, Western societies. This is a consideration which is overlooked by both The Top-Dog View and The No-Hope View. The community structure of advanced Western societies has been the historical accompaniment of mass society. Mass society is, at the present time, inextricably bound up with an excessive degree of centralized and bureaucratic administration, which tends to reduce considerably the area of human freedom and the extent to which the citizen can fruitfully participate in the democratic process, and which makes almost impossible the face-to-face situation which is the ideal of genuine democracy. It is only an historical accident, however, that science and technology since the Industrial Revolution have encouraged pathological urban development and its unfortunate derivatives.

Modern science and technology, on the other hand, and particularly the revolutions in computer technology, data-processing, miniaturization and micro-miniaturization in industry, and the technologies of small-scale production, may produce counter-trends to unrestricted bigness. Decentralized living and small-scale community existence may encourage direct participation in democratic processes by the individual citizen. New types of science and technology—some of them derived from research devoted to the exploration of space—make it feasible to decentralize community living in the future, without sacrificing any of the advantages that have been gained by large-scale industrialization. One such form of social enterprise, the “intentional community”, is aimed at freeing men from the worst evils of overcentralization and the worst injustices of stultifying authoritarian bureaucratic control.

An intentional community is one which is deliberately formed by a relatively small group of individuals who band together to realize a given way of life. Because the members of such a community originally chose a design for

living which could not easily be fostered within the framework of their existing culture, or even one towards which that culture was wholly inimical, they had decided to form a community of their own. Only in this way do they feel that their *intention*—to give concrete expression to what they hold to be the good life—can be realized. Hence the phrase, “intentional community”. Many intentional communities have religious objectives, but usually the intention is to refashion a secular way of life. Almost all such communities wish to overcome the extensive alienation produced by modern urbanized, centralized, and bureaucratic government. Even more importantly, they wish to move towards a more perfect social order in which greater freedom and more social justice will be realized and one which will increase the opportunities for individual self-fulfilment. Often this new way of life has been spelled out in fairly great detail.

One well-known detailed blueprint for an intentional community was furnished by the psychologist Skinner, in his novel *Walden Two*. In his mythical community, understanding and goodwill are achieved by the prevalence of what may be called the “rat’s-eye” point of view. Skinner believes firmly in the possibility of social reconstruction through the application of the psychological laws of operant behavior. This application for community design has been described rather fully in one of Skinner’s better-known professional books.<sup>1</sup> He believes that the laws of operant behaviour will do for man what religion, time, and history have thus far failed to do for him. He may be right, but this is certainly not the place to argue the merits of his position. There are also many actual—in contrast to fictional—“intentional” communities throughout the world today, many of them quite successful and thriving. The point, however, is that any community design for living, which is subscribed to by a small group, and which embodies several new ideas for making it possible for men to live together in greater happiness, more perfect justice, mutual trust, and increased understanding, is what is meant by an intentional community.

The members of most intentional communities are, relatively speaking, cosmopolitan in social ideals but decentralist in their political outlook. They would automatically reject The Top-Dog View of terrestrial conflict because they would hold that a monolithic culture which dominated the globe would thereby deepen and reinforce the characteristics of mass society. It would thus intensify the evils of centralization and bureaucratization. Furthermore, they would reject The Top-Dog View because they believe in social pluralism. That they reject The No-Hope View is evident from the fact that those who organize an intentional community clearly hold to a dream that the world—

or, at least, their local portion of it—can be remoulded a little nearer to the heart's desire.

Traditionally, intentional communities—particularly those tinged with a religious, Utopian outlook—have sought social, cultural, and political isolation. This may be seen from the brief informative accounts of some of them furnished by Hinds<sup>2</sup> or the penetrating discussion of imaginary societies presented by Negley and Patrick.<sup>3</sup> The hope of such communities is to avoid misunderstanding and keep from being socially molested. Even more, they hope to avoid the complexities of their host milieus—complexities which they often attribute to the growing secularization of life made possible by the increasing growth of science and technology and by the resulting scramble for material benefits. Withdrawing from their host communities for such reasons as these was equivalent, however, to throwing out the baby of scientific and technological advantage and progress with the bathwater of such evils as social conflict, excessive centralization and standardization, demands for unreasonable degrees of social conformity, and ubiquitous and unenlightened administrative bureaucracy. Such withdrawals were mistaken. There is no necessary conflict between social idealism and social altruism, on the one hand, and scientific and technological progress on the other.

Today the opposite conclusion may be justified: developments in modern science and technology make it more feasible to establish decentralized communities. Some of the technologies that have been emerging in recent years are enlarging the opportunities for realizing small-scale community life and the concepts of the good life that are inherently associated with decentralist thinking. A type of community is, in fact, being made possible in which decentralist ideals can achieve their purest expression precisely because of the support that can be given to these ideals by revolutionary developments in science and technology. A community of this type can, with justice, be called a scientific, intentional microcommunity (SIMC). The emergence of such a possibility is an automatic guarantee of social pluralism. An increase of social pluralism in the future is quite likely to usher in that kind of understanding and goodwill which we now seek on an international scale and which is currently conspicuous by its absence. Internationally-minded intentional communities, however, whether scientific in outlook or not, would have a difficult time if they sought to set up housekeeping in large numbers in the middle of the fratricidal atmosphere which now rules the world.

If the atmosphere of protracted conflict, which is now so characteristic of our age, continues well into the twenty-first century—an expectation now held

by many advocates of nuclear deterrence—any visible and extensive effort to set up technologically based intentional communities (SIMC) on terra firma has little chance of success. Curiously enough, however, our coming efforts at space colonization may provide elsewhere the opportunity which may diminish here. Suppose that in the decades which lie ahead it became entirely feasible technically and socially for hardy bands of altruistic and scientifically well-trained persons to establish scientific intentional microcommunities on the moon or elsewhere. This would occur only if the advanced social thinkers of the age were convinced that the fratricidal social and political atmospheres on terra firma did not provide much chance for terrestrial success in such experimentation and that, furthermore, the greater the success achieved by such terrestrial experiments after take-off, the greater the likelihood of social and political interference from their host communities.

Many scientists are looking forward to lunar cities as a feasible future possibility. Should such lunar settlements ever become a joint venture of existing nations, each of which is given the right to furnish a quota of its own scientists in order to help forward the realization of a lunar city, we would have all the conditions necessary for social experimentation except the intentional dream itself. This last, however, has a very good chance of emerging from the hearts and minds of any group of lunar pioneers, once they are freed from home directives and are on their own. Home directives will not in fact be very meaningful on the moon or on a far-away planet where intelligent, kindly, and civilized souls will face the task of constant adaptation to new physical and social circumstances. Under such exigencies, planetary social pioneers are hardly likely to signal terra firma for advice.

Even although the first scientific pioneers, astronauts, and devoted, long-term colonizers of the moon would have gone there for strictly scientific motives unadulterated by dreams of a fresh design for living, such a dream is nevertheless likely to emerge. Dream or no dream, however, the early efforts to colonize our satellite are likely to result in the emergence of scientific intentional microcommunities. The development of the social architecture of such a lunar community is bound to become a social necessity. There is something, however, that is even more important than this connection with man's dreams of a more perfect social order. If we make the reasonable assumption that by the time lunar colonization has been somewhat regularized, man will have adopted a world organization—whether or not this be the United Nations—which has been given more power, more money, and more independence for social experimentation than the UN has at present, we shall have an atmos-

phere which is more favourable for social reconstruction and social dreams. It seems more than likely that such a world organization would also be assigned the task of planetary colonization and exploration. In the course of furthering this objective it would undoubtedly have the official power to subsidize settlements in space intended for social experimentation. The two objectives mentioned—space research and social experimentation—would complement each other very well. Because of the enormous financing that would be required, such extra-terrestrial social experimentation would have to be supported by an authoritative international agency.

Let us suppose, however, that as a result of several early and successful efforts to land isolated astronauts on the moon, a group of technically trained, socially idealistic and inspired men and women have got together in an effort to establish a quasi-social Utopia on that satellite. Let us assume that they have been financed by the international organization which we have alluded to above. We shall make the further assumptions that the members of a group of this sort wish to establish a lunar SIMC in the expectation that, if successful, it will be a benchmark for similar social experiments on the earth. Such men and women would clearly hold the hope of moving ever closer to a more just and more perfect social order and would expect to see that vision facilitated by human progress in science and technology. What are the technical possibilities for the success of such a venture?

There are a number of fundamental considerations which must be kept in mind when we consider the bearing of space colonization on the creation of new types of social order. The first of these is that man would be in a position in the not-too-distant future to transport an entire terrestrial ecology to other heavenly bodies. Technologically, a human ecology on the moon becomes possible because we can transport—at enormous expense, to be sure—such items as packed earth, fertilizer, the means for creating a simulated terrestrial atmosphere, and the necessary flora and fauna to maintain an edaphological balance. Yields per acre of a given depth would probably be greater on the moon than on the earth, because of the absence of insect pests and plant blights of every sort. The transportation of such an ecology would have to ensure that the delivered ecology would have been sufficiently isolated from the moon environment, so that contamination of that environment with life forms from earth did not occur. Initially at least this might have to be true. Undoubtedly biological quarantine stations will by then have been established on the moon and efforts to obtain sterile, germ-free environments will probably be accomplished by such means as sterilization with a bactericidal vapour such as ethylene oxide.

dry heat, or ionizing radiation. Only when it was felt that no considerable risks of any kind would be run if terrestrial life forms were planted on the moon, would the processes of sterilization and quarantine be discontinued.

The alternatives to lunar agriculture which simulates terrestrial conditions would either be such technologies as hydroponics and chlorella culture or new technologies developed locally, in a lunar sense, which could render fertile materials already present on the surface of the moon. Man can transport equipment for utilizing subsurface soil on the moon so as to render it productive, perhaps by the addition of chemicals and chemical fertilizers which may be processable from materials to be found upon the moon itself. He now possesses the possibility of seeding the moon or any other habitable planet with plants of terrestrial origin, since he can create or transport terrestrial atmospheres isolated from local atmospheres or from the local absence of any atmospheres at all. The solution of the problem of nutrition, other than by import from earth, can surely be reached eventually, provided only that we are willing to disregard prime costs.

Man will also possess the means for transporting any existing social structure elsewhere or for initiating on another celestial body the social expression of any new ideas concerning the nature of community. If, in the minds of any group of intrepid, socially-minded cosmonauts, the ideals to be given social expression far outweigh the biological and technical difficulties which will be initially encountered, then the sacrifice of terrestrial standards of mass culture and gracious living are not likely to daunt them at all. It will be a relatively simple matter for small groups of men to establish entire facsimiles of existing cultures found here on earth or of parts of such cultures. It will be equally simple to establish a lunar culture which is a composite of parts of existing terrestrial cultures, where these parts will cohere and maintain the same value-system. Best of all, of course, will be the possibility, already mentioned, of establishing new designs for living in intentional communities adapted to the small-scale use of science and technology.

The reason why an international organization may endeavour to create lunar cities is a practical one, but one which underscores at the same time the feasibility of SIMC, using small-scale technology on the moon. The necessities of space exploration and the desire to keep the costs of such exploration to a minimum make the moon ideal as the site of self-sufficient lunar ports. If we assume that the pioneers of a lunar experiment in intentional community would not wish to disengage themselves completely from mother earth and would, in addition and for a variety of reasons, need to revisit the earth from



time to time, such lunar ports would be a necessity. Such ports would in no way interfere with the progress of any experiment in international community.

The advantage of a lunar port for space exploration lies in the fact that, because of lower gravity, less energy is required for launching space ships from the moon than from the earth. If this advantage can be combined with the increasing knowledge of small-scale technology which increases the prospects of economic and technical autarchy, then there may prove to be several ways by which lunar cities may achieve independence as launching sites.

In order, for example, to make moon launchings effective it would be highly desirable to manufacture the propellants needed on the moon itself. A small-scale technology may be most appropriate in this connection, since a space vehicle launched from the moon would have to be only one-tenth the size of its terrestrial counterpart and would therefore require less propellant. But will it actually be possible to manufacture these propellants on the moon? Apparently it will. Howard M. Segal,<sup>4</sup> Project Engineer for the Sperry Utah Company, predicts that 100,000 pounds of liquid hydrogen and liquid oxygen can be produced annually on our satellite from a single installation only seven feet high and fifteen feet long. This plant would operate by scooping up lunar rock, crushing it, and heating the crushed rock to drive off the rock's intrinsic water. It is this water that could then be converted into oxygen and hydrogen propellants, and it should be noted that the oxygen thus obtained could also be used either for direct breathing or for the manufacture of a simulated terrestrial atmosphere.

The notion of a lunar base or a lunar city has been worked out in some detail by several scientists. The ability to establish such a city by the twenty-first century is regarded as a distinct possibility. Donald Michael has commented on the requirements for establishing such a settlement.<sup>5</sup> First in importance would be the development of nuclear power from fusion processes to run a space ship. Second would be the development of a robot technology which can supply robots for exploration and for specialized work functions both before and after men land on the moon. The third most important essential, in Michael's opinion, will be the development of psychological tests that can identify individuals capable of living together, both in the forbidding psychological milieu of the space ship and the even more constricted environment of a lunar colony. These elite souls would be subject to both physical and psychological screening. In addition, there could be the self-screening that resulted from their commitment to some form of intentional ideal. Supposing that at

some not-too-distant date all these requirements will have been met, we may picture a lunar colonial establishment as it has been imaginatively pre-vised by the Russian scientist Nicolas Alexandrovich Varvarov, President of the Astronautical Institute of the U.S.S.R. and consultant to the armed forces of that country.<sup>6</sup>

The lunar topography in general would be both forbidding and inhospitable to what we ordinarily conceive of, physically, as human settlement. Its craters, however, would allow footholds for such settlements. A lunar city might presumably be located in one of these famous craters, such as Eratosthenes. A recently arrived space-traveller would be taken in a specially built car to the lunar city located in this crater. The transporting car is hermetically sealed and air conditioned to prevent its passengers from being roasted by direct solar radiation while they are covered by the metal envelope which constitutes the car's shell. The lunar city itself is housed in glass and plastic domes and possesses an artificial atmosphere, gigantic greenhouses, helioelectric stations and, for that matter, everything else that has been found necessary to accommodate living terrestrial organisms to the basic changes required for adaptation to lunar conditions.

The functions of the multi-layered transparent domes, some made of glass and some of plastic, are clearly protective. The elastic glass roof must permit the same proportion of solar rays to come through as that which reaches Mother Earth. This roof, together with several auxiliary operating devices it would possess, will also have to capture and transform solar radiation into electrical energy. The proportion of the solar radiation which will have to be transformed will be almost the exact equivalent of the proportion of the sun's rays caught by the earth's atmosphere. In addition these glass roofs will be shields against falling meteorites, which do not burn up when they fall on the moon because our satellite lacks an atmosphere. It is thus clear that the domes will have to be made of a special type of glass or plastic, resistant to the momentum of falling meteorites. Some meteorites, however, will still succeed occasionally in penetrating the outer glass or plastic shell. For this reason multiple layers of housing, or other devices, will have to be employed to restrict damage to certain zones.

The fruits and vegetables of a lunar city will seem somewhat strange to the space traveller, because of their enormous size. The absence of lunar gravity, we are told, will permit radishes to grow as tall as date palms and onions to produce stalks thirty feet in length. Inside the city the traveller will find aluminum, glass, plastic materials, water, and soil. They will be both mined

and processed on the moon itself. Aluminum can be mined economically in the long run. Glass and plastics can be made in lunar factories. Water can be extracted, we are told, from the depths of our satellite. This water will serve many purposes: human needs, humidity needed for the cultivation of soil, and hydroponic cultivation. Oxygen and nitrogen are equally obtainable from lunar resources. Thus an atmosphere can be created which simulates the terrestrial one and which is equally healthful. Lighting needed for the long lunar nights will come from battery-fed lamps, which will also supply heat for residential living and power for industrial production. A number of writers have also speculated that in addition to energy captured from the sun, local atomic-power stations will also be able to supply energy.

Lunar cities of the type we are envisaging will be economically self-supporting. They will also be able to manufacture synthetic fuels for voyages in space, in a manner similar to that proposed by Howard M. Segal. If by the twenty-first century rocket-propulsion by nuclear power has already been achieved, such an advance will be no necessary drawback to progress in other types of lunar energy technologies. Raw materials for nuclear power may also eventually be found in lunar deposits and, if not, there is no reason why lunar launchings could not continue to be made by propellants. Many writers also believe that if raw materials for nuclear power should be found on the moon, the equipment for exploiting such materials may eventually be producible by a lunar colony. Wharves for cosmic ships can be attached to lunar cities, and lunar "cosmodromes" may become the starting point of long-distance space journeys.

All the preceding, then, reflects some of the technological possibilities for lunar colonization as foreseen by scientists. Inasmuch as only some of the lunar colonies thus envisaged need be way-stations, the remaining lunar colonies will be able to achieve more independence in social experimentation and will be able to use the lunar way-station chiefly as a crossroads for revisiting terra firma, when necessary. In short, many lunar colonies may eventually be able to become what economists call "closed economies" and what the sociologists call "open societies".

If lunar colonies are established initially by the advanced nations, they will, no doubt, function as lunar extensions, politically speaking, of their native lands. When, however, the task of lunar settlement is taken over by an international agency which has, as its primary function, the establishment of peace on earth and good will towards men, we may expect a change. Under the auspices of such an agency we may expect, I think, more direct encouragement

of social experimentation by way of lunar SIMC. No doubt this can be done at the same time that lunar settlement is being exploited for the purpose of scientific research, space exploration, and the advancement of human knowledge. However, the kind of social experimentation that is likely to be encouraged by such an international organization should result in an increase in social pluralism, cultural fusion, new forms of community living, more social altruism, more intercultural goodwill, and more intra-group and intra-community understanding.

But since several such lunar, intentional, scientific microcommunities can communicate and work together on the principle of voluntary association, this bids fair to give us non-coercive planetary (or satellite) federations that will be free from the highly centralized, coercive, bureaucratic features of mass society. These are precisely the features of mass society which today produce so much alienation and give rise to the anguish and criticism of our more sensitive intellectuals and social critics. In the West we have come to associate the bureaucratic way of life with technology, that is, with the large-scale technology which is so characteristic of our lives. We have become habituated to the idea that technology and bureaucracy are indissolubly associated. From the viewpoint, however, of the historian of the future, the over-centralized mass society of the present may yet prove to be an historical accident. As a result of planetary and satellite colonization, executed on the basis of well-designed social philosophies concerning the nature of the good life, men may yet be able to fulfill some of those visions of a more perfect social order which have moved our more sensitive Utopian thinkers in the past.

If much of this should come to pass, the brotherhood of man might become a reality on our satellite sooner than on earth. The success of SIMC on the moon and later, perhaps, elsewhere in the solar system, could lead to social relationships quite different from those envisaged in the cheaper grades of science fiction. The picture of *homo futurus* furnished by popular science-fiction writers reminds one of a cunning but aggressive adolescent on the rampage, sowing destruction right and left with space guns, nuclear disintegrators, interplanetary gigaton missiles, and other assorted hardware. In this Hobbesian universe gone mad every space adolescent seems bent on cornering some galaxy or other and sewing up some celestial empire just for the heck of it. To the space adolescents of our lowbrow science fiction, these planned rampages may be viewed as new maps of heaven. They are, in reality, what Kingsley Davis calls new maps of hell, and the gory space operas they deal with are psychopathic nightmares. There is something unutterably ridiculous about

the straitjacketing of human imagination by the *idées fixes* of low-grade science fiction, in which an infinite lust for murder is assumed to exist side by side with the most advanced level of technical intelligence and administrative capacity for complex organization. The juxtaposition of a zenith of intelligence with a nadir of morality is too incongruous for words. Let us hope that man in the future, presented with the current picture of what science-fiction writers so pessimistically expect of him, will be able to say "This is a universe I never made."

Of such stuff then are our dreams of space and society. We can only hope that the discoveries of space technology and the results of space exploration may be translated into social forms which at present are completely undreamed of. The activities of space research and exploration may, indeed, produce a great deal of desirable and needed social change, provided only that we show a little patience.

We have now reached the point at which it may be appropriate to sound a few sour notes. Not all natural and social scientists who have had something to say about the relationship of the space sciences to the future of man have been heartened by the prospects. Thus Kingsley Davis,<sup>7</sup> a specialist on population problems, has had occasion to comment on the costs of interplanetary travel, while discussing the delusion held in certain quarters that space colonization might be a solution to our terrestrial population problems. In the course of his discussion he has assumed that the cost at the present time of sending one person into space is in the neighbourhood of about one million dollars, and that conceivably this figure could be halved in 40 years. Thus, if Davis's cost assumptions are anywhere near correct, one can readily see that a space colony of 1,000 persons, or two space colonies of 500 each, would entail an expenditure of one billion dollars. Clearly this is a prime cost which is likely to be borne only by well-financed, well-organized nations or by internationally supported political institutions. If our colonizers intend to commit themselves as permanent pioneers on the moon or elsewhere, if we assume that half of these will be women and if we further assume that the initial hardships of building planetary settlements will be the responsibility chiefly of the males, then the cost of launching a productive space colony for the initial phases of planetary settlement will probably be closer to a figure of two million dollars per productive person. This figure will, of course, be quite different when costs are amortized over the whole period of lunar city building. After the initial hard-

ship period is over and the ladies have stopped mooning over the drama of settlement and initial discovery, and have begun to acquit themselves as well as the men—an eventuality which may safely be expected—the cost per productive lunar settler will, of course, come closer to Kingsley Davis' original assumption of one million dollars.

Kingsley Davis may, of course, be highly conservative about costs. Arthur C. Clarke,<sup>8</sup> now a fellow of the Royal Astronomical Society in Great Britain and former Chairman of the British Interplanetary Society, has estimated that with present techniques the combined military budgets of all nations might just suffice to land ten men on the moon every day. This would mean 3,650 persons per year. The annual international expenditure at present devoted to war has been estimated to be about one hundred billion dollars, or approximately 27 million dollars per colonist if all such monies could be deflected away from preparation for war and devoted to research in space science and social experimentation. At this price lunar colonization and the formation of lunar intentional communities are likely to come only when social idealism has become the international fashion, and this is likely to occur only when, as Mr. Khrushchev would have it, shrimps are likely to whistle. To make matters worse, Mr. Clarke assumes that the earliest lunar landings will not occur before 1970 and that the earliest planetary landings will not occur before 1980. At the present rate of annual inflation of the dollar, even this figure of 27 million dollars per person will look modest in the space consumer's paradise of the near future.

But the saddest eventuality for both space research and social experimentation will occur if the hopes of both space scientists and social dreamers should be dashed to the ground by some harsh realities still to come. Dennis Gabor,<sup>9</sup> who is probably one of the most brilliant of interdisciplinary thinkers, both in breadth and depth, has helped to deflate the more extravagant dreams of the moonstruck. Gabor, a Fellow of the Royal Society who is now Professor of Applied Electron Physics at the Imperial College of Science and Technology in the University of London, and who has done major research as a physicist, engineer, and inventor, has called a spade a spade. He has pointed out the disillusionment which he feels is almost certain to come, so long as space exploration cannot go beyond our planetary system. This disillusionment, he feels, will be reinforced by the fact that, for a long time to come, astronauts will bring us back an overwhelming impression of the vastness, emptiness, and barrenness of our own planetary system. He anticipates that the existential nausea created by such disappointment will make astronauts long for the good, sweet

Earth where man is the measure of all things. This longing, Gabor feels, will raise a feeling of *insular solidarity* in men's hearts. From this increased sense of insular solidarity he anticipates that there will arise a sense of human cohesion and goodwill that may well usher into being an effort to produce a social paradise here on earth and to achieve the religious ideal of the Judeo-Christian tradition, namely, peace on earth, goodwill towards men. Thus Gabor envisages that a highly beneficial side-effect of the disappointments that we can anticipate will result from the shattered dreams of space scientists, space technologists, and social philosophers who had hoped to give substance to their vision of more perfect communities existing at other cosmic locations.

We cannot foresee whether Gabor's pessimism will prove to be a reality or only a failure of nerve. This, however, is of no consequence at the moment. What we do have to realize at the present time is that the relation of space science and space exploration to human society augurs certain changes so drastic that the type of social and economic relations that we take for granted today will seem almost infantile to the men of tomorrow and will, no doubt, raise a smile on the lips of future historians. This is all to the good. Our fondest hope should be that, whatever may be the directions of social change that will be imposed by the space sciences, they will carry the promise of human relations more consistent with eternal peace and the brotherhood of man.

#### NOTES

1. Burrhus F. Skinner, *Science And Human Behaviour* (New York: The Macmillan Company, 1953). See particularly Chapter XXVII, "Culture And Control", Chapter XXVIII, "Designing A Culture", and Chapter XXIX, "The Problem of Control".
2. William Alfred Hinds, *American Communities* (New York: Corinth Books, 1961).
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## THE SKYLARK

*Stanley Mason*

From foreign fields a sudden skylark soars.  
Disconsolate wanderer, I halt incredulous  
Under the tumbling cataract of its joy:  
A paean, if ever there was one,  
A paean packed in  
A ridiculous handful of feathers, and now  
Streaming out on the void.

The skylark circles,  
Climbing into the lavender morning  
Up the spiral stairway of its own song.

I stand amazed and am  
For a while the phenomenon of the skylark,  
My skylark, whom I would not wish to share  
With Shelley's violet-eyed hysteria,  
The slipshod hyperbole that so badly misses  
The serene wonder of this morning climber.

And the skylark rises and rises,  
Breaking all the laws of gravity and grief  
Into the precipitous sky  
Until I am only  
A stone in a field  
Beneath the towering pattern of its celebration.