Articles

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On the Measure of Man: Challenge and Response in the Anthropocosmos

SYNOPSIS: The *anthropocosmos* (nature, man, society, functions and buildings) is currently not shaped to the measure of man. In order to deal with the future population growth and to accommodate our means of transportation, man needs to change the younger elements of the anthropocosmos, that is, the machines, the roads and the cities. The human body provides the model man needs to look at in order to build contained, human cities. The aim is to move toward a new centralization which will preserve older centers within a new higher order.

THE SUBJECT

In a small museum on the rocky, steep slopes of a Greek mountain lies a stone, the navel of the earth. I look at this stone and feel safe and secure. Around it lies Delphi; in a greater circle, Greece, which even the gods inhabit on Olympus; beyond it, the "barbarians"; and then the end of the world. Before the sunset, I leave this center of the earth and walk uphill to the theatre, where I sit and look down at the olive groves, the sea and the mountains beyond. By then the sun has set and I see the running beacons of cars. Now I am back in the machine age, surrounded by the whole cosmos, and I feel lost. Where am I, near the center or the edge, at the beginning or the end?

I try to get hold on the world around me and build another one to replace the one I have lost. There is no longer a navel, but here I am with my family, my city, my country, this earth, the galaxy and the cosmos. I belong to all of them, but I have to limit myself to a unit that can serve my purpose of identification with myself. The crust of the earth does this; it is big enough to contain all humans; it is limited; we can visit and study it. How does my world go? I cannot see the molecules, and I stop at the limit of what I can see, hear, touch, smell and taste without any technical assistance. In the "external silence of these infinite spaces" which frightened Pascal and frightens all of us, halfway between the great cosmos and the microcosmos, is our world, the human crust of the earth, on which man lives, which man is reshaping: the anthropocosmos.

Thinking of the time dimension, I need not go back to the cosmological or biological phase of evolution; I do not need to speak of the four-billion year history of the earth, or the hundreds of thousands of years of man's own evolution.

Concerned with the present-day anthropocosmos, I can identify myself with the historical period, a few thousand years; and a few generations into the future is long enough for us who do not know what is going to happen tomorrow, and who only lately have dared to express ourselves with five-year plans. We have limitations. Some are imposed by my subject, the anthropocosmos, and some are subjective limitations of a mason who deals with brisk and mortar.

Our subject is the anthropocosmos- this very little thin layer on the crust of the earth from which man cannot jump even eight feet and where, after his death, he rests at an even lesser depth; this thin layer, this film which he reshapes without managing to change even one inch through all his constructive activities- building, draining, irrigating. From the beginning of history to the present, the total building activity of man is no more than one fiftieth of an inch, no more than the thickness of a fingernail.

Five basic elements form, and are formed by, the anthropocosmos; nature, man, society, functions and shell, the shelter which he has built; or stated differently, contents - man and society - and container - nature, functions, and shells. We try to understand our subject by the study of its elements, through many disciplines, but we usually fail to connect these five elements properly and to recognize that the element of functions - transportation, telecommunications and the like - is a very distinct one. This last weakness is due to historical reasons; however, it is no longer justified, with present-day technological evolution, because functions are playing an increasingly important role. The study of every one of the five elements often takes different directions, but we must try to study them not only as separate units but in all their interconnections as well as in order to understand the balance within the system they are forming.

This balance in the anthropocosmos does not exist in present. What Claude Bernard realized about the human body over a century ago - the necessity of a "constancy of the interior environment" for the maintenance of life - we are only now beginning to realize for the human crust of the earth. On it "nought is constant nor abide", as Euripides said, but it is only lately that we understand that the anthropocosmos is under a systematic stress, which elicits a syndrome that helps adaptation and which, in the case of humans, causes a severe disease of the system. You know by now that I am transferring Hans Selye's theories on human stress to the anthropocosmos, because it too is suffering from very severe stresses. This is our great problem.

The definition of the problem helps us to clarify our goal: re-establishing a balance on the anthropocosmos. Here the similarity to the human body ends. Whereas for the body

our goal is to have it re-establish its own balance, the earth has to tend toward a new balance, because many of its elements are now changing continuously. Our goal is to work toward a changing, man-made dynamic balance on the anthropocosmos. Where should this balance tend? What should be our purpose? There is no precedent, but "purposes in life are made, not found", as Julian Huxley tells us. To formulate our purposes, we have to turn to Aristotle and make man "happy and secure", and follow Protagoras' wish: "Man is the measure".

To face our problem we have to consciously shape the anthropocosmos *to the measure of man* - quite a heavy task if we think of its complexity, quite difficult if we consider that the problem only recently took its present form. On this I will have to proceed with the builder's naivete, which says: We have to build anyhow - let us do it better.

THE CHALLENGE

We now turn to the stresses of the anthropocosmos, the lack of balance among its elements and its diseases, in order to study these phenomena carefully and understand the problems and their causes. For the last several thousands of years the evolution of the anthropocosmos was precipitated by the action of man; this caused an imbalance, which in turn brought about the evolution of other elements - the taming of nature, the transformation of society, the creation of functions and shells - thus creating the need to re-establish the balance. This did not take place without great losses of people, societies, civilizations, and natural resources; but the process continued and the speed of changes increased. During the last two centuries, especially in ours, the unprecedented increase of the number of people which modern medicine has caused has created for the first time in our knowledge such a lack of balance between all elements that at present we are entitled to speak of a crisis in the evolution of the anthropocosmos.

Nature is now suffering enormous losses. In spite of the fact that many parts of it are developed for the benefit of culture, natural resources, particularly those of the skin of the earth, are decreasing. While man's constructive activities add a layer of one inch to the anthropocosmos, his destructive action is equal to two inches. Water is gradually being polluted, and the air is becoming more and more dangerous. Because of polluted air due to various causes, including the use of chemicals and insecticides, we are losing buildings, plants and trees, we are losing flowers and birds - half the subject matter of English poetry, said Aldous Huxley when he read Rachel Carson's *Silent Spring*.

Man is not only suffering indirectly. In England and Australia it is accepted that air pollution is one of the

causes of chronic disease and lung cancer. In California, four to seventeen per cent of the people may move because of air pollution, and as many as fifty four per cent complain about the effects on the eyes, nose, or sinuses. It is sometimes argued that it does not matter if the skin of the earth is scarred and water and air are polluted; this is only happening in the small areas inhabited by man, while the vast area of nature remains sound. But this is wrong, for man has to stay in his settlements, breath their air, drink their water, and these settlements cannot be built on mountains and deserts.

Man is our main concern, and he is suffering because settlements impose on him an inhuman life and tend to crush him. Sitting near the source of the Kastalia, in Delphi, I was intrigued by Pindar's desire to hear the dance-step of men. I then remembered a famous Chinese dancer who once visited a temple upon a hill. He climbed the stairs and then ran down them. He climbed up carefully again and then asked why two steps were missing. When the monks told him that no steps were missing, he asked them to dig; and they found two missing steps covered by the soil. There were people moving in dance-steps, and some civilizations built their shells in a way corresponding to these dance-steps. Now we build highways, we allow cars to enter our homes, dining rooms and offices; we have only protected our bedrooms. We have seen the birth of the new centaur, half man and half car; and we are gradually turning into legless species.

We need our legs and our whole body, we need our senses and our nervous system to operate properly, because, for the time being at least, we need man as we know him at his best. But we do not help him when he commutes for hours in ugly, unhealthy surroundings; we only increase his nervous stresses and we finally break him.

Our cities are full of squatters, even if you do not see them in this country; many tens of millions of families are practically homeless. Even in your cities man is a displaced person; haunted by the car, he seeks refuge within buildings. We are all frightened slaves of machines. Have we ever thought how many of our phobias are due to the fact that we start our lives held by the hand in order not to be killed by monsters controlling our surroundings, and that life in the jungle may be less dangerous for an uniformed child than is the life in a big city to which he is not adapted? Have we ever thought of the cost of our so-called adaptation to all sorts of sense and nervous system stresses and the impact of all sorts of magnetic and electrical waves on us?

Such problems extend to society as a whole, from the anthropocosmos to its smallest units. While we have become one world and can understand it, if we think of transportation or the telecommunications or war, we still

behave as if we belonged to several different, isolated worlds. In our own settlements, social contacts do not correspond to our requirements. We cannot visit our friends or go to the theatre or to lectures as often as we want. Although knowledge in many fields is increasing and means of communication are excellent, we may easily today learn less in relation to what man knows than before. In the smallest- in our family- we have reduced our contacts (when does the father see his children?). In our neighborhood we have reduced contacts; there is no longer any feeling of neighborliness between people separated by a horizontal slab in a block of flats. This latter situation would seem to necessitate a head-to-leg connection between men, whereas the only true relationship is head to head.

There is a great controversy as to whether the modern city is safer than the old one - in health, crime, security, and so on. I do not believe that we know the answer. We can say, however, that whereas we eliminate solutions which have grown in a natural way, we do not consciously build anything; we leave it practically to chance without using the findings of modern science.

Lack of an overall conception of the society we want to form leads to inconsistent and unreasonable use of modern technology. We build highways everywhere we can afford to, mostly in order to relieve the cities of pressure, and then we wonder about their over congestion. This reminds me of the lady who rang the fire chief and asked how she could get rid of a skunk in the basement. "Put some crumbs of bread in a line from the basement to the forest", he answered. The next day she rang again. "Has the skunk gone?" asked the chief. "No", she answered, "now I have two!" We build new systems of transportation, but then we spend even more time commuting. How unreasonable our overall behavior in this field is can be demonstrated by the fact that the higher the speed of mechanical transportation, the more time it takes man to cross the cities that correspond to that phase of development. We now cross London and New York at nine miles an hour, which is the speed of the horse-driven buses at the beginning of the century. And we are now beginning to worry about our leisure, while we forget we are living on a small planet with billions of people who have no free time at all and who are trying hard to earn a living without even managing to produce enough food. In both cases, we overlook our basic goal - man's desire and need to live happy and secure. Our goal cannot be reached by higher car-speeds, or by less work for only some people.

As a result of this confusion, we are today creating cities which are worse than the previous ones. The city turns from a static to a dynamically growing settlement, into a dynapolis; but we are only beginning to understand this. Under the pressures of too many forces, the city is being

choked to death. Life in the center becomes unbearable and we flee from it to the suburbs. We rely more and more on our means of transportation, we spend more time in them, we turn them and not our homes into marks of prestige, and thus we gradually develop a nomadic psychology, proud of our horses and always on the move. But nomads do not create civilizations!

On the other hand, discovering the disadvantages of nomadic life, threatened by smog, noise and ugliness, we close windows, seal homes in order to breathe air-conditioned air, and create a new, illusory environment with electric light, radio and television. We gradually turn into troglodytes. But troglodytes do not create civilizations! It makes no sense to live in the contaminated, nerve-shattering city. Age-old values of architecture and art, age-old love affairs between man and sculpture have now been broken by the intrusion of the third person- the car. "David" in the Piazza de la Signoria in Florence can only be viewed like a traffic policeman - barely visible above the tops of the cars in front of him.

It is interesting now to note that the crisis is graver and more dangerous in the younger elements of the anthropocosmos. Systems of transportation are affected first and foremost; settlements follow; then society and man, who still stands the pressures; and finally nature, which in spite of the crisis can hold its controlling position in the macroscale, even if it is suffering on a microscale.

If we look at the whole, we can see that we produce more and more items, but we fail to connect them into a system, and thus we create conditions which are the result of a somehow coincidental accumulation of produce. Man moves within them like an ant, without thinking of his own happiness or the lost years of his life- he is commuting.

Many people, speaking of the principles of Eros - or Yin in Chinese - crudely translated as Love, and of Logos (Yang), or Reason, think that Americans and Russians are now controlled by Logos (Yang, Reason). I doubt it. I think that our crisis is due to the fact that after dismissing Eros (Yin, Love), we disassociated ourselves from Reason, and are building a habitat which makes less sense than the Tower of Babel; for at least the tower could not lead us anywhere, whereas the present-day habitat is leading to disaster.

Why has this happened? I think that the unsatisfactory response of man is due to two main reasons. First, these stresses are taking place for the first time on such a scale that the anthropocosmos has not developed defense mechanisms. Second, the emergency - the crisis due to increase of population and pressure - is being prolonged and is acquiring extraordinary dimensions.

If man continues responding in the same way, there is no

basis for optimism. His ability to adapt himself to new conditions, which is usually beneficial, may lead this time to disaster, since he easily identifies himself with the spoiled parts of the anthropocosmos. What is wrong with downtown if I close my windows so as not to see the parking lot and breathe its air? And what is wrong with distances if I have my wheels? The stress is so strong that even utopias are now very weak in conception. Characteristically enough, Skinner, in his Walden Two, and Huxley himself, just before the end of his life, in Island, follow an escapist line - that is, the very small ideal community of one or a few thousand people. One day near Athens I tested this desire on the captain of a small boat. I told him to go to the best place in the Aegean Sea, and he took me to a small island with a village of a few hundred people, not to a city or natural landscape. The wine was very good, but we could find the same wine in the large cities of the islands. The captain, like me, wanted to escape the pressure, not by avoiding human settlements but by selecting small ones. Our real challenge lay behind us in the big port and its hinterland.

Faced with the crisis, we do wrong things. In order to relieve our cities from the pressure of their circulatory systems. We proceed with surgery; we cut new arteries through the community and then recognize that Rene Leriche's "maladie postoperatoire" is so serious that we have killed our patient. We do much better when we begin to build the primitive nervous system of the city, the automatic regulation of traffic lights; but such solutions are only now beginning, and they cannot cope with emergencies of lasting and increasing stresses.

So far we have not even the proper measurements of our problem. How can I compare life in the small island community, with its beautiful and peaceful habitat but without a doctor for my children, with the inhuman metropolis, which may be killing all of us slowly but which has plenty of pediatricians? Norbert Wiener in *The Human Use of Human Beings* says that, "There is one quality more important than 'know-how' and we cannot accuse the United States of any undue amount of it. That is 'know-what'…" I think he is right in his statement, although unfair to the Americans, as this is the case with all industrialized societies. We do not know what to do for the anthropocosmos, especially the part developing technologically at a high speed.

If we do not know what to do, let us try to understand what is going to happen. One of the most important factors for the future is the number of people on the earth. There are now more than three billion people and there will be around seven by the end of the century, and perhaps double that a generation later. How long this increase can last we cannot foresee, but it is probable that toward the end of the next century, barring war, our number is not going to be less than twelve billion (even if

birth control is decided upon now) and could even reach a hundred billion. Let us assume an average of thirty-five billion. This means a population more than ten times the present one, but not with ten times more stresses. As we do not expect any increase in rural population, all growth is going to be in the urban areas; this means a thirty-times larger population and a hundredfold increase in incomes and activities, pressures and stresses. By then, because of the limitations of the habitat, the rate of increase will be curbed either as it occurs in other animals - by the operation of biological self-controls - or by conscious decisions on birth control, whose nature may not be genetic but which are social decisions as part of the overall biological process.

Such an evolution means that in the immediate future we have to face three phases: first, an accelerated increase of population with the production of goods still lagging behind; second, a deceleration in population increase, during which the production of goods will tend to catch up with population; and third, a relative stability in the evolution of the population, during which the standards of life can be more easily raised and a relative balance achieved. It is quite clear that the most critical period is the first one, which may last from one to two generations. This is the period during which, under colossal new pressures, many values are going to be changed and many achievements of thousands of years of civilization - from customs and traditions to villages and cities - may be lost forever. Although calculations and experience prove that, in spite of the difficulties, we can in the long run reckon with an increase of the per capita income and look forward to periods of very cheap energy, we will have to face a much greater crisis than at the present.

We will have to face three great problems: people who are deprived of basic goods, even food; inequalities between people, which cause stresses that increase the danger of war; and the physical deterioration of the anthopocosmos. We all concentrate on the first two problems; but when some day (probably by the end of the century) we have faced them satisfactorily, we will find ourselves with human settlements which are choking us to death.

THE RESPONSE

The crisis is great, the response is weak. We now have to ask ourselves three questions: What should we do? How should we do it? Are we going to do it? We start by asking what we should do. The prediction for the anthropocosmos is disaster unless we alter our responses. Man is not the center of the world; we do not even know if he is the "ascending arrow of the great biological synthesis", as Teilhard de Chardin suggests; but for all practical purposes he is the purpose of the anthropocosmos, and for better or worse he makes most of the decisions on it. Once this is so, it is only reasonable for him to act consciously in order

to guide his own evolution and the evolution of his habitat. Biologists like Dobzhansky agree now that "evolution need no longer be a destiny imposed from without", and such an answer was certainly never in doubt by those building on the earth. We have to act toward a goal- to change the anthropocosmos for the benefit of man- but we must define these notions of change and the benefit of man.

What can we change? What can we do? Of all the elements of the anthropocosmos, nature and man are oldest. We can deal with nature in a minor scale in relation to its dimensions. We have to be very careful with man, as he is our goal. Society is younger than man and thus more apt for development. The shells are very young indeed- a few thousand years old; we can change them more easily, and much more so some of the functions which are only decades old. We can come to the conclusion (which is justified by our experience and is by itself logical) that the younger element the less developed it is and thus not only easier to modify but also more justifiably changed. Thus, we have a set of criteria about the degree of interference which we will allow ourselves and the priorities in our action. The key to the solution of our problems cannot be to begin by changing nature or man or even society; They have not changed recently. But the crisis has occurred, and what has changed are the functions; whereas the skin of the earth and the natural and static man-made elements once belonged to man, machines and their containers, such as roads, are now in control. They have to change. We can now answer: We can change the anthropocosmos by starting with the youngest elements in it- the functions- and proceeding toward the oldest.

We now have to define the second notion, that of the benefit of man. I have already referred to happiness and safety. However, when reaching the phase of implementation, I have to be much more specific. Human happiness, what is it, I was asking myself while I climbed across the burning Rocks of a small Greek island one day this summer; and how is it translated in practice in the anthropocosmos? By then I had reached the top, and I entered the small church of Saint Elias. I sat down on the cool slabs and let my eyes rest on the whitewashed walls which looked so fresh. My breath took in the incense-perfumed air. I relaxed, and I once felt happy and secure. This place helped to rest my body and satisfy my senses. I felt I was in paradise (or nirvana) in a small church- or was it a temple, a mosque of the Tatta after crossing the desert of Sind? - and was I praying to the pagan God of Senses or to the God of Love? There in that small space I had my answer. This human shell provided an anchor which connected me with the world around me. I do not know a better way to describe our task than that we may rest the body, satisfy the senses, and relax the mind so that it may be released for something better. We can now define the ultimate goal of our action: The achievement of happiness and security by relieving ourselves of all the

external stresses that we can - stresses of body, senses and mind - thus releasing our mind to rise and create.

These changes for the benefit of man should be guided by an overall, realistic conception of where we are going. This does not mean escapist utopias but the universal city of man as a city of life. Unlike the settlements of the past, which were separated and were very often centers of different worlds with their own navels, the ecumenopolis is gong to be a continuous network with no navel but with many hearts. Unlike the primitive animals, which have one central, non-specialized organ, it will have many specialized centers- some for administration, some for culture, religion, and arts, Rochester perhaps for medicine; but these too will be parts of specialized networks. Such a city of man will help for, and will be helped by, the formation of an ecumenical conception of the world. Covering the whole crust of the earth, it cannot have one all-powerful capital; the center of gravity of our sphere is in its burning center. The ecumenopolis is going to exist not only in form but also in content. As recently as a year or two ago the telephone connection between Ghana and Nigeria passed through London, and such was the case between East and West Pakistan. The new space telecommunication satellites now connect all countries directly to each other without allowing for "egocentric" states or empires; they form the ceiling of the ecumenopolis, a ceiling with many stars.

This is the city we must build. Its contents have to be defined to the measure of man, but its dimensions have already been defined for the near future by biological evolution. The number of its people is conditioned by genetic forces over which we do not as yet have any control and by social forces which will enter the game. Its physical dimensions are a result of the forces of population, and its character or ecumenopolis is defined by the spherical shape of the anthropocosmos.

Having set a goal for the whole, we turn to its elements and start with nature. The total surface of land on this planet is close to sixty million square miles, of which only about sixteen contain the main habitable areas. Human settlements cover no more than some hundred and fifty thousand square miles, or no more than one per cent of the land which can be reasonably used for them; thus if we tend toward ecumenopolis at the present rate and use for thirty-five billion people a hundred times larger urban area, or close to eight million square miles, we will need half of the habitable area, and this is more than the total arable and crop land of the present. The answer lies in two direction: we must develop a completely new attitude in dealing with nature; we must respect and protect every single inch of it, its whole fauna and flora.

Turning to man, we can ask ourselves many questions: How about his number and quality? Is he going to remain

as he is at present? I she going to become superhuman? What is going to be our role toward his evolution? On the basis of present-day knowledge, it becomes clear that some experts want to check the increase of population because of limitations of resources. Being convinced that such limitations, for the time being, are not the case, I think that we must be prepared for some tens of billions of people since, with reasonable policies, this looks possible.

No expert expects any genetic change in man for the coming millennia unless man takes evolution into his own hands. Because of different reproduction rates of various national, religious and social groups, natural selection is going to favor some of them, and this may mean a slight change in the average man. There is no agreement among experts as to whether we should interfere with genetic processes and, if we do, how this would be done and where it may lead; thus I think that for all practical purposes we can reckon that within the next few generations (my very short range of vision) we will probably be dealing with the same man genetically, since there will be a need for such an experimental period before society can allow mass intervention in man's genetic forces.

Modern medicine, especially surgery, promises great contributions in repairing man, but medicine does not foresee an new phase of life without stresses and diseases, nor surgery a new type of man. Irrespective of how spectacular and important the achievements of medicine are for every one of us, they do not tend to change our type but merely eliminate our individual deficiencies and thus relieve us from suffering and help us come closer to the ideal conditions we have set in our minds as possible. I think that we are entitles to proceed on the assumption that we will be dealing with the same type of man that we now know.

This is not so, however, if we think of the socio-cultural phase of the biological evolution of man, because here we must expect the greatest possible changes. Genetically, man is not changing; but the environment is; and as Dr. Medawar says, there is just one organ which can accept instructions from it: the brain. How big these changes can be, can be shown if we consider that only a very small potential of the total brain power of humanity is developed and that even this can be developed further. Although we are only at the beginning of a really universal development, tapping the world's resources for the first time, we are told that the number of reasonably literate people is rising by a factor of a hundred or a thousand over a period of a century as compared with a tenfold increase in the total population. Can we foresee what is going to happen when in every nation two generations from now everyone tries to acquire a university education? How big the changes which we can expect will be emphasized by the fact that, in the field of intellectual

effort, computers are creating a greater revolution than machines in transportation. Machines already calculate one million times faster than man, while with machines we move only five thousand times faster than when walking. Can we now calculate what it will mean to have one thousand times more experts calculating one million times faster? Progress or disaster will be just that close to all of us.

Dealing with man, we notice that natural selection favors those who reproduce themselves at higher rates. This means that eugenic policy must tend to help the reproduction of the best, and this at least can be a first goal of a positive eugenic policy next to the indispensable negative eugenic measures. Thus the ecumenoplis, through proper formation, must help the best rather than the weakest to have more children; and this means, first, shells allowing for larger families and more children and second, a proper mechanism of selection is more desirable for the benefit of the coming generation.

But this is not all. We should not forget that the main problems ahead are the inequalities between classes, as mainly evidenced by poverty, which lead to clashes, and the physical formation of the ecumenopolis. The greatest social task should be to reduce the large gaps which exist between so many groups of people. Failure to recognize and solve this grave problem might make the building of the ecumenopolis impossible because of the stresses which may even lead to wars. There is an imperative need for a plan to equalize pressures all over the anthropocosmos.

Realization of the ecumenopolis means satisfactory solutions of the problems of many functions, especially transportation and communications. Only proper systems can allow the ecumenopolis to function in accordance with its requirements, as can be demonstrated by the following. The real difference between the cities of the present and those of the past lies in the much larger physical dimensions of the former, which cause many other problems. The city of the past was a success for thousands of years; in it man could reach the central functions within ten minutes. To achieve this today means up to two hours' commuting. This leads to many evils. All distances have been increased, all social bounds loosened. Is that reasonable? In order to find the answer we must set up the proper criteria. Man being the measure, we do not start by thinking what speed machines can develop but how much time must spend in transportation; and this leads to the question of how fast the average man should move in his habitat. Trying to find an answer, we turn to nature. The difference between the speed of blood in mammals in the capillaries and that in the aorta is seven hundred to one. This means that, if we want the same thing to happen in the city and compare the speed of man (two and a half miles per hour) with the speed in capillaries, we can think of a maximum speed on the main

highways of a thousand seven hundred and fifty or an average speed of about eight hundred miles an hour leading to a city with a radius of a hundred and thirty miles. If we have such speeds, then the inhabitants can be at the average time-distance of ten minutes from each other; if we do not, we must limit the size of the urban community.

In order to achieve such speeds we must think of a new system of transportation. If this is going to be based on airplanes, life will be unbearable because of noise, movement, and contamination of the air; there will be no peace on the anthropocosmos, and we will all turn into troglodytes. We must get the lines of transportation off the atmosphere and the surface of the earth. We must look for the solution that nature gave us and hide them under the skin; this means in underground tunnels with new types of automatically controlled vehicles which would bring man at the desired spot within broader areas. Assuming the previous speeds, we set the specifications for the circulatory system of the ecumenopolis for areas of about two hundred and sixty miles in diameter. Larger distances will be covered by special planes taking off vertically, and by rockets. Thud we specify that man is going to live in two types of space: the static one on the surface of the earth with men, animals, plants, and buildings, and dynamic space, high up and down below; but in the latter, man will live in a capsule, within which he must again be provided with static space. The same solutions must be conceived for the nervous and peptic systems of the ecumenopolis. They will have to be buried under the skin of the anthropocosmos. Could it be otherwise? Could we stand each other if we could see, much more smell, the circulation of all the fluids in our bodies?

We are gradually being led to the design of the ecumenopolis. With all functions buried under the skin of the anthropocosmos, we can graft new skin where it was scarred and burned, and mend it. We can return the surface of the anthropocosmos to man. He can walk again: his children can play in freedom; flowers and plants can grow; and art and architecture can flourish. The air and water can be clean. Nature should not give way to technology but be protected by it. We cannot bury the city as H.G. Wells predicted; we must bury our functions and the machines, for these were last to come and were created as slaves and must remain so. In such a city we can organize our families and social lives, not according to the impositions of the machine but on the basic requirements of man and his nature. The circulatory system is not going to condition life; it will have to be conditioned by it and serve it. It is not a goal but a means.

We can now shape the ecumenopolis by its proper human units. Man comes first, and he should be given all chances for solitude (from his garden to his laboratory) or social life. The family is the next unit, and then comes the whole

hierarchy of communities up to the universal one. Of them, the one which is practically completely overlooked today is the one which was the most common in the past- the community built on a human scale, the one which allowed humanity to survive and create civilization, the community in which the reasonable time-distance of ten minutes was covered by foot and the population was a few thousand people. We must define it and build it again, giving to man the utopia he longs for, not as a vague ideal lost in nature but as a specific unit where he can again identify himself with a small community whose dimensions he can absorb, a part of the universe fitted in nature but in the larger urban areas also. We have already started experimenting with it in the first evolutionary stages of what has to come- the human community as the basic cell of the universal city where man and child can find in its microcosms a connection with the whole anthropocosmos.

We can now describe the anthropocosmos as follows: its backbone is going to be the ecumenopolis, covering the main settled zones where everything will be fully controlled, formed by a fabric of cells, each one being a human community; then the open countryside with some cities and villages of the past; and beyond this the natural areas, some of them developed, some not, but all protected in order to preserve their characteristics. In order to achieve this overall structure we must proceed, not toward decentralization as it is usually viewed but toward a new centralization which will allow old centers to survive by the creation of new ones of a higher order. We should not accumulate fat and pressure on suffering hearts.

Solving these basic structural problems of the ecumenopolis does not mean a solution to all our problems. Many more will have to be very seriously faced; for example, whether we should build air-conditioned neighborhoods and communities and gradually disassociate ourselves to a certain degree from nature as our forefathers did when they used the first garment (the smallest artificial shell) or the first rooms and houses. Our solution does not answer everything, but it allows man to make his decisions on the anthropocosmos as a free agent thinking only of his welfare and not of his protection against the machine, and in a creative and not in a defensive way.

We speak of creative thinking for the anthropocosmos. It must lead to a dynamic balance of all its elements for the benefit of man. How can this be calculated? I think that it should not only be measured in terms of material goods produced but also as a way of living. This can be expressed in the amount of time man spends for everything he does and the importance of what he does for himself. In simpler words, measuring human welfare and satisfaction by the ownership of a car has no meaning if the owner must spend four hours in it each day for

commuting. Would not a mush cheaper car in which man would commute for only twenty minutes a day, in a better surrounding, be much more to his benefit?

This last question raises another problem. We speak always of man, but which man do we mean? Is the ecumenopolis going to serve a standardized type of universal man? I could see the danger of this from those trying to lead toward such a man, such as the Hindu poet Rabindranath Tagore who wrote Towards a Universal Man. I could see this danger of uniformity and got confused when the poet visited the Acropolis of Athens and a few minutes later came down declaring that he wept at the sight of those barbarian monuments. My confusion lasted until I visited Bengal, a landscape that dances between soil and water, where no architecture can survive and the only forms of art are music, poetry and dancing. Then I understood that for a Bengali like him stone architecture was heavy and barbaric. I could see the role of the ecumenopolis in serving a universal man; with its submerged structure of circulatory system, it must serve man with his material needs, which are basically the same (traffic of goods, messages, and people); however, with its superstructure, it should serve the local man with all his special characteristics- man, who wants to be served like the others and express himself as himself; man, the master of the earth. Thus I reached a definition of the ecumenopolis: universal in structure but local in expression.

THE REALIZATION

We can turn to our second question: How are we going to build the ecumenopolis? This also implies the question: can we build it? I think that we can, and this is why and how. We must start by setting our goals in detail and defining our strategy and tactics. We must define the specifications of all the elements of the anthropocosmos with which we will deal, the more so if they are man-made. We cannot let cars define our future: we will have to define their role as a part of our way of living. We cannot let the blood cells define the body; the whole must define the specifications of the parts. And then we must define the conditions for the development of the anthropocosmos. Do we need peace in order to build the ecumenopolis? If so, how can we preserve it?- by armaments only in order to preserve the status quo and serve those who are rich, or by armaments until the tensions due to great differences are eased because of action we intend to undertake?

To achieve our goals we must develop a proper discipline, use a scientific approach- observation, theory, experiment, feedback, theory, experiment, and so on. We must be able to measure all phenomena of the anthropocosmos, compare them and evaluate them. It is high time that we measured the temperature not only of the atmosphere and

the soil but also of the anthropocosmos in order to detect cases of people suffering form their relation with the land or with each other. Why should we know only when one person is threatened by high temperature and not when many are threatened by starvation due to unsatisfactory natural or social conditions? This cannot be done unless we mobilize all categories of experts who can help, put in charge those who can synthesize, and ask the statesman to guide the cacophonic orchestra of the present and, while playing, turn it into a symphonic one. In the meantime we must pray that doctors will help man stand all stresses caused by a suffering anthropocosmos until we achieve some order.

We must develop proper policies and, exactly as in medicine, learn that preventive action is of a greater, far-reaching importance, even if curative action is indispensable. Many of us who all too easily open new highways will have to learn that surgery is a necessity, not a pleasure, and that unless it is very wisely decided upon and executed it may lead to disaster. The anthropocosmos must be shaped with the same care as that which the Chinese gardener shapes his trees - early, before sunrise, with love and patience, massaging every single branch. New developments such as insecticides or machines must be fitted into the system of nature or buildings, not imposed.

We must prepare programs, for the next generations will face the real crisis, the generations which to the best of our knowledge will increase more than at any time in the past. Tentative calculations show that on the basis of available and expected resources the anthropocosmos can be under complete control by the year 2000 and completely ameliorated before 2100. This is a realistic hope, as is proved by the fact that between now and the year 2000 man will build more than he built during the six thousand years of his civilization. This date is not far off. By the year 200 the generations graduated from universities this year will still be active for may more years.

We must build in order to serve two purposes: to cover immediate needs and, by experiment, to provide the knowledge for the much greater efforts to come. We must try in nature, society and man event those disputed methods, like interference with genetic processes, which some day may be indispensable for survival.

First we need an emergency program up to the year 2000 to provide for action on all emergencies in order to avoid the great dangers of famine and poverty, tensions and wars, and disaster to our habitat by the malformation of urban areas. Since we do not always know how to behave, we should be conservative in dealing with existing old natural and man-made resources, local culture, and ancient cities and villages, but be courageous in dealing

with new situations as well as with new functions, such as transportation. At the same time, we must experiment in all fields and acquire knowledge. If successful, in the next phase - that is, in the first half of the next century - we will know much more, the pressures will probably be less, and action will be easier. By then, an even greater effort will be required, but we will also certainly know more about how to interfere with man himself. In the third phase, a century from now, human action in this whole field will be much wiser and easier. By then man can hope to establish a new balance among the five elements all over the anthropocosmos.

I come to the last question: Are we going to proceed a planned anthropocosmos and build the ecumenopolis? I do not know; I can only react as a thinking, feeling, and willing animal. Thinking about it, I reason that what we can try to do is to impose law and order on the anthropocosmos; and in the past man been so successful in minor units of it; now he is developing in other sectors the ability to deal with greater numbers. We do not expect him to deal with the cosmos or interfere with the microcosmos but, instead, to deal with the elements he has always dealt with. Man definitely can succeed. In my feelings about it I have the right to go beyond logic. I look at the Acropolis, I visit Apollo, a small pagan God dedicated to Law, Order, and Harmony. Quiet, serene and beautiful, He looks with a smile beyond the temporary crisis into the future, toward Harmony. Man will succeed. Such an aesthetic answer however, is not convincing enough or completely satisfactory. I am now left with my willing self only. Here again the answer is personal and difficult. I think of three prayers of the Greek author Kazantzakis:

> I am but a bow in your hands, Lord,
> Stretch me because otherwise I will rot.
>
> Don't stretch me beyond my strength, Oh Lord,
> For I will break.
>
> Stretch me beyond endurance, Lord,
> And let me break.