

Ekistics and Regional Science

Synopsis: Ekistics and regional science are two disciplines which cover similar subjects, that is, human settlements and regions respectively. They both have to cut through other disciplines, such as geography and economics, in order to provide the necessary synthesis for the problems of space within human settlements. Ekistics and regional science combine technology and art and therefore they are both descriptive and prescriptive sciences. Regional science can be seen as the extension of geography whereas Ekistics as the extension of urban geography. These disciplines should develop a methodology both abstract and empirical, which will be influenced by the scale of phenomena with which they are dealing. Since in the future we are moving towards the creation of a universal city (Ecumenopolis) where a much higher percentage of the surface of the earth will be covered by human settlements, we need systematic methods in order to understand and guide this expansion, that only Regional science and Ekistics can provide.

1. INTRODUCTION

For anyone familiar with the terms "Ekistics" and "Regional Science", it must be quite clear that these two disciplines cover similar subjects: human settlements and regions. Both relate to man's activity in transforming the same terrestrial space, and in this respect their subjects overlap. Both of these disciplines are called, at least by their supporters, sciences.

Geography is also a discipline, covering the same or at least similar subject matter; it too is called a science, if not by all at least by more people than the previous disciplines. As we know much more about geography, and have done so for a much longer time than we have about Ekistics and regional science, I do not believe it is necessary to enter into details about it. I present our subject as that of Ekistics and regional science, although geography underlies many of the notions which are going to be discussed in this presentation and wherever necessary comparisons are carried out.

Since we have two disciplines dealing with similar subjects, and trying to become sciences in their fields, I thought it would be very useful to try a critical comparison of them in a way that may bring out their points of weakness or strength. Such a critical comparison can, if nothing else, provide a mental exercise for all those who are concerned with similar fields, and can provoke discussions leading to greater elaboration and better understanding of the problems and solutions in these

fields.

This presentation will try to proceed in a critical way by defining the subject matter of these disciplines as well as the contents and goals, and in order to complete the comparison it will proceed then to the examination of the methods of approach of each. The picture can then be completed by examination of the achievements of these two disciplines and of their trends in the future. This naturally leads us to examine the tasks ahead and to try to define the practical and immediate tasks for all those who are concerned with these fields.

In writing this paper, I thought that its main purpose should be to lead gradually from a definition of the field of learning to our immediate tasks and duties, rather than to concentrate on definitions, descriptions and methodology, which after all can only be justified if the end result is going to help humanity to meet any of its problems. I should like this paper to be regarded as a contribution to the discussion of that most important problem of all disciplines: their contribution to the advancement of learning a means of the solution of human problems. Thus this paper examines the creation and the nature of the disciplines only as far as such notions can only be of real help to those people who are concerned with learning more about the real problems and contributing more to their solution.

1. CONTENTS AND GOALS

There are many ways in which the contents and goals of a discipline can be examined. In the case of Ekistics and regional science, we could examine the contents of our subject in three ways.

First, we could examine them as a matter of the extent of space; for example we could speak of large or small regions or of human settlements and regions surrounding them. We could speak of special characteristics of space, etc. When we say that regional science is the science of regions, this is a definition in terms of space. When we say that Ekistics is the science of human settlements, this characteristic refers to functions expressed in space by area of certain dimensions.

The second way in which we could define contents and goals is in relation to other disciplines. If we say that Ekistics studies human settlements as a geographic subject, then we specify the discipline of geography as the one concerned with our subject. If we say that regional science examines the economic structure of a region, then we are bringing economics into the foreground. Or, if we speak of both sciences as interdisciplinary, then we refer to a new discipline or to a coordinated group of disciplines.

Thirdly, contents and goals could be described in relation to the intention of the discipline. If we define Ekistics as the field of learning concerned with human settlements; and if we speak of regional science as the science which we will solve a region's practical problems, then we define its prescriptive intention.

In this section, I will try to present the problems in defining Ekistics as well as regional science in a practical way as a foundation of our further explanation. It will be recognized, however, that it is both too early to proceed to exact definitions, (as we have a long way before precisely determining what the proper definition should be) and yet in a different way too late to proceed to such definitions as a means to reach our goals). In any case, we look on the definitions as a means to reach our goals, and not as the goals of our study.

Hence, despite its importance, such a discussion should not divert us from our main obligation: to follow the road, however, faint it may be. The important thing in such an effort is to be on the march. It is the very fact that we are on the march and that we are tending towards a goal that justifies our effort. It is only natural that while on the march we will ameliorate our road, we may even define our goals better if we see more clearly. The one thing that can not be justified is to forget that we are on the march towards a certain goal and to sit in order to discuss the details of how we trace our road.

Geographic Dimensions. Ekistics deals with human settlements and thus it deals with the space in which they are created. Regional science deals with regions or the space in which they exist. Geography deals with space also. Perhaps we should more accurately use the term "terrestrial space" especially now that people are more concerned with space beyond the earth. In this respect we can refer to the three disciplines or sciences as the disciplines or sciences of terrestrial space.

There are many ways in which we can look at our phenomena (be they settlements or regions) in relation to their geographic dimensions. We can study them from the point of view of physical dimensions, from the point of view of time dimensions (phases of evolution), by uses (rural and urban production, living and transportation), by isolated or inter-related features (villages or networks of villages), etc. For the purposes of our study we will concentrate on the examination of our subject by physical dimensions and by the uses of space covered by settlements or divided into regions.

The definition of our subject by physical dimension is the most apparent one. Ekistics, or related disciplines like town-planning and regional planning, very often went wrong by looking on their subject as two-dimensional. In this way, they deprived it of its real dimensions and led to

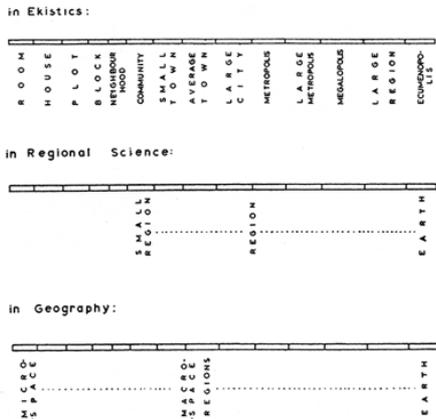


Fig. 1. Logarithmic Scale of Terrestrial Space

an era of weak and unrealistic solutions which on many respects can be seen as the cause of our inability to solve the problems of urban areas.

A region is often described as a "discrete structural unit in an area of two dimensions". With such definitions regional science repeated the same mistakes as Ekistics and has been led along the wrong road. I do not believe that it can be questioned that the subject matter of both Ekistics and regional science, height and depth add the third dimension not as an auxiliary one but as an indispensable component of the subject itself. However, even if we should confine our subject matter in both Ekistics and regional science to three dimensions we would be making a grave mistake, as space is not simply three-dimensional but, for all purposes of the study of Ekistics and regional science, also has the fourth dimension of time. Deprived of this, it is deprived of its dynamic element of evolution, and we are prevented from understanding the real nature of the problems. Neither in Ekistics, which, deprived of therefore dimension, cannot conceive real issues in human settlements, nor in regional science, which, deprived of the fourth dimension, can not look at the subject in a broad perspective of evolution, can we afford to consider space as three-dimensional, much less as two-dimensional.

In order to present the physical dimensions of terrestrial space we have to use a logarithmic scale which starts from the smallest unit of terrestrial space used by man and reaches the largest. The smallest unit can be represented by the normal room, beyond which we go to the dwelling, to the block, to the small neighborhood, the largest neighborhood, the community, the small town, the larger city, the metropolis, the megalopolis and beyond that the largest conceivable space which is the whole earth. In terms of Ekistics this is represented by an ecumenic city which some day is going to cover the whole earth in a continuous network. Such a scale could be called an ekistic scale of space; it could, though, also easily represent the corresponding scale of regions, with one difference: that such regions begin from a certain point up, that is beyond the size of a normal community, and reach up to the whole surface of the earth. The same scale could be used for the purpose of geography, which deals with smaller or larger areas of the earth. See Figure 1. We must further combine the logarithmic scale of measuring space with its four-dimensional conception to obtain the complete picture of the division of terrestrial space by physical, geographic dimensions.

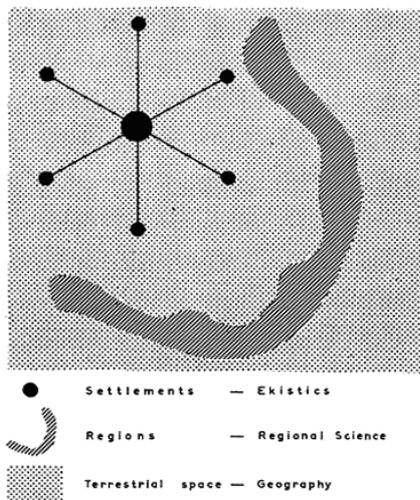


Fig. 2. Terrestrial Space by Disciplines

If we now try to define Ekistics in relation to the physical dimensions of space we will notice that it covers the whole scale of space, from the single room with which it is concerned to the dwelling, the building, the block, the community, the town, up to the ecumenopolis or the universal city. Ekistics covers the whole of terrestrial space, as far as human settlements are concerned

irrespective of scale.

Speaking now of the physical dimensions of the subject of regional science, we have the definition that it begins with the size of a community, although it is not exactly defined how large this can be. It is mentioned that "systems with which regional science might be concerned may be as small as a community or as large as the world". Here we have a definition of space which is vague and its lower limits, as again we do not know exactly what a community is and specific in its upper limits, if by the "world" we mean the earth (although unspecific if we don't mean earth but also the space beyond it) .

Geography is described in many ways but usually as the field of learning in which the characteristics of particular places on the earth's surface are examined. In practice this means from a micro-scale concern of small settlements and small areas to the whole surface of the earth. In this respect the physical dimensions of this field are rather well defined and cover the whole earth at different scales or phenomena related to man. Actually, geography, in a certain interpretation, could be concerned also with single buildings, by describing the nature of the human settlement, but this does not happen as a rule.

If we try now to look at terrestrial space as covered by different disciplines we can see that the settlements, and hence Ekistics, cover certain parts of it with great intensity, that regions cover major parts of it with a lesser intensity of observation that Ekistics, and that the whole of terrestrial space is covered by geography. See Figure 2.

We now turn our attention to the use of terrestrial space and the study of it by the different disciplines.

In Ekistics, we concentrate our attention on the settlements rather than on all parts of terrestrial space. These are really the centers of dense expressions of certain functions. This is the reason why in studying the interrelations of settlements in Ekistics, we study their connection by lines of transportation. The proper study of human settlements requires the analysis of their relationship with the surrounding space: a village, for example, can never be understood if it is not seen as the nodal point of functions happening within the whole community which may cover forests, fields or sea or lakes for fishing. In this respect Ekistics concentrates on the denser physical expression of the use of space. Although it speaks mainly of points and of special meaning, it is concerned with the whole of space as far as man is concerned with it, even if only indirectly. Thus every type of space in which man has some interest, or is making use of, is the concern of Ekistics. In this respect we have to remember that an architect studies the whole space of a dwelling, although when drawing a plan he draws only the walls and leaves the rooms blank and the town planner

studies the whole space of a city, whether it is the roads he designs or the blocks.

Ekistics could be divided, in relation to the use of space, into architecture, or Ekistics of the micro-scale; urbanism, or Ekistics of the middle scale; and planing, or Ekistics on a large scale. Although this division is a division of disciplines within the realm of Ekistics, indirectly it is also a division of the subject matter by physical dimensions. This was true more in the past than at present. At present we may have urban areas which are larger than regions, if these regions are around centers of lesser importance. We may have, for example, certain cities with their region smaller than one large urban area. There is no longer the same direct relationship of the branches of Ekistics with the dimensions of space as in the past.

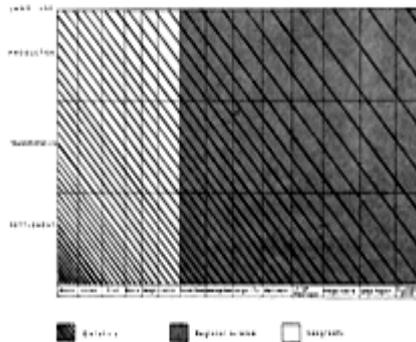


Fig. 3. Terrestrial Space by Physical Dimensions and Use

By narrow definition, Ekistics does not cover the space related to production or transportation and communication. In practice, as we have demonstrated, this division of space by uses cannot be adopted unless we want to look at the subject of human settlements in a way that cannot guarantee the understanding of their real functions. It is not right to view their functions as isolated phenomena.

If we try to divide the space by use we break it up so that it becomes impossible to achieve any synthesis whatsoever. Just as we cannot separate in a dwelling the space meant for living (let us say a bedroom) from the space dedicated to production (a kitchen or a study room), and we cannot separate from each other the functions of transportation within the dwelling (that is, the lobbies, the entrance hall, etc and leave them to some other discipline than architecture), in the same way we cannot divide by uses larger than space by separating the transportation network from the points of production. To mention a specific example: we cannot separate the roads of a farm in order to study them as a phenomenon of transportation while the space between the roads of the farm is seen as a phenomenon of production.

The conclusion is quite simple: that irrespective of how we look at space, if we concentrate our attention on the settlements which are the nodal points for the totality, we deal with one subject and this subject is space, no matter if for reasons of systematic analysis of its elements we call it space dedicated to production, transportation, or other living purposes. In every scale of space, small or big, once it is settled by man, we have the homogeneous part, the lines of communication and the nodal points. This is true of a house or farm, of a factory or of a metropolis, of the whole earth. What makes the space of interest to Ekistics (and not only to natural geography) is the fact that it settles or ecumene.

Regional science is concerned with the same problem. It

studies a region. It does not separate parts of it by uses but only for purposes of a systematic analysis. If it speaks of the transportation network within a region it does not mean as a phenomenon which is not related to production or to living. Geography does not divide space by use but only for purposes of a more systematic study. It is only thus that geography can be divided into urban geography, transportation geography, etc. Geography actually divides space into regions or units of certain sizes. In this respect the terminology of geography coincides with the terminology of the regional science. On the other hand, geography recognizes that within every region there are nodal and homogeneous areas. The nodal areas are the settlements and the homogeneous areas are the ones which provide the space which justifies the existence of any type of nodal point.

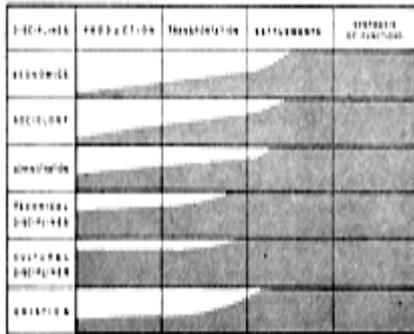


Fig. 4. Space by Functions and Disciplines as Handled by Ekistics

The areas covered by the three disciplines (Ekistics, regional science and geography) can be represented as in Figure 3, which presents the whole of terrestrial space by dimensions and use.

Ekistics covers the whole space, though with greater intensity over the lower left part - that is, in the smaller scales - and the areas more directly related to settlements. Theoretically, if production could take place in an area without any type of human settlement (let us say by sowing a huge area by plane and collecting its product by plane) then Ekistics, by definition, would not be concerned at all with it.

Regional science covers the macro-scale part of the whole space from the community up, and is concentrated more on the upper right corner of our diagram - that is, more with greater intensity and production.

Geography, finally, covers the whole space. If it is the settled part of space, it is covered by human geography as a social science; if it is completely non-settled part, then it is covered by natural geography as a natural science.

We can begin drawing our conclusion about the three disciplines concerned with terrestrial space. Geography covers the subject in the most complete way as far as scale and use are concerned.

Nature of the Disciplines. If we think of the nature of the disciplines of Ekistics, regional science and geography, we will easily find that they all cover fields containing many other disciplines. For example, Ekistics, when concerned with the economics of urban or rural settlements, is stepping into the field of economics. If it deals with the methods of construction of any settlement, it is stepping into the field of technical sciences or engineering. If it deals with the aesthetic aspects of a settlement, it deals with the cultural problems and art. The same is true for



Fig. 5. Space by Functions and Disciplines as Handled by Regional Science

sociology, and many other fields, just as geography, too, can step into many other disciplines.

It is quite clear that we could present the disciplines of terrestrial space as disciplines working in a direction which is perpendicular to many other disciplines. In this way we can speak of them as inter-disciplinary fields of knowledge, or disciplines, or sciences. They all cover at least five major fields: that is, economics, sociology, political or administrative sciences, technical sciences or engineering, and cultural disciplines or art. As such they are not unique; there are many other disciplines which have to be conceived as perpendicular to others, as for example anthropology. It is quite clear that we can enumerate many other aspects which are part of the previous five major categories; we have only to think that technical sciences or engineering cover an enormous number of fields, and the same is true of cultural sciences, sociology, etc.

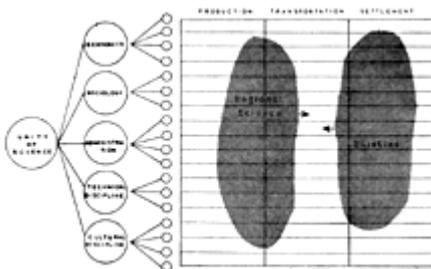


Fig. 6. Space and Disciplines

If we try now to classify these fields of knowledge into the broader categories of natural and social sciences, it is obvious that geography crosses the frontiers of both natural and social sciences. Regional science is always described as a social science, although it is certainly based on natural sciences and in order to lead to proper solutions it has to employ their knowledge and methodology. The same is valid of Ekistics. In broad classification it is a social science with an interdisciplinary approach which is based on foundations related to natural sciences. In order to understand better the relation of the disciplines we are studying to the other disciplines, we can use the whole diagram of space as divided by functions or land uses and different categories or disciplines; see Figure 4.

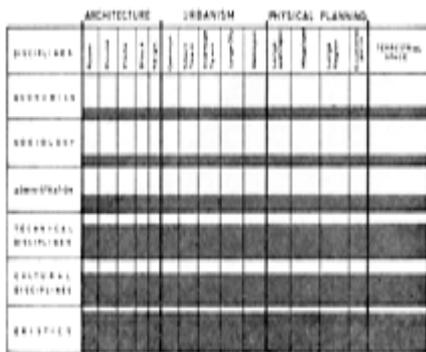


Fig. 7. Space by Dimensions and Disciplines as Handled by Ekistics

Ekistics has to deal with a part of the economics of production, a larger part of the economics of transportation, and an even larger part of the economics of settlement. The total aspect of the economics, in production, transportation and settlement, could well be handled by the discipline of economics.

Ekistics has to look into an important part of the sociology of settlements. As a whole, sociology should cover all these aspects. Similar remarks can be made for administration.

Ekistics, in relation to technical disciplines, has to cover a major part of the technical aspects of production, transportation and practically the whole of the technical disciplines within the settlements. As a whole, though, technical disciplines cover all technical aspects of production, transportation and settlement. Ekistics has to cover again the major part of the cultural disciplines related to production, to transportation and to the whole of the cultural aspects of the human settlement. Cultural disciplines again could cover all these aspects by



Fig. 8.Space by Dimensions and Disciplines as Handled by Regional Science

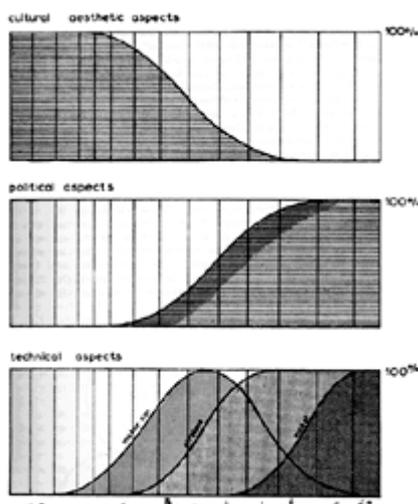


Fig. 9.Space by Dimensions and Scales as Handled by Ekistics in Relation to Specific Disciplines

themselves.

As a conclusion now we see that Ekistics has to cover parts of the problem of production through several disciplines. It has to cover a major part of the problems of transportation, cutting through many other disciplines, and it has to cover the total aspects of human settlements.

The conclusion is quite clear. There are many functional aspects of spaces which can be covered very well by other disciplines. It is the role of Ekistics to cut through them and provide the synthesis which is necessary for the problems of space within human settlements. It is the synthesis which is the main task of Ekistics.

If we study a similar diagram for regional science (Figure 5) we come to the same conclusion. Regional science up to now has been more concerned with the aspects of production and less with aspects of transportation and even less with aspects of human settlements. It is more concerned with economic problems and less with social, administrative, technical, and even less with cultural and aesthetic. As a whole, it is more concerned with production, less with transportation and even less with human settlements.

If we look by disciplines, all economic problems that are related to production, transportation and settlement (even as seen by regional science) should be the concern of economics. All social problems should be the concern of sociology, etc. It is again the synthesis within the region which is the main task of regional science.

In fact, what has happened is that, at the beginning, we had adopted a unity of scientific approach when thinking consciously or unconsciously about a problem. Gradually, we split our scientific approach into many sciences: in our case, economics, sociology, administrative sciences, technical disciplines, and cultural disciplines, which again split into many others. On the other hand, we split our attention by production, transportation and settlement, and this again into other categories. Thus we lost our final goal. It is here that Ekistics steps in, beginning with the human settlement, in an attempt to re-conquer the lost ground and try to make some sense out of its problems. At the same time, regional science, beginning mainly with production, moves in the other direction to achieve the same goal. See Figure 6.

Having examined space in relation to its functions and disciplines, as handled by Ekistics and regional science, we must now look at space not by functions but by dimensions and disciplines. See Figures 7 and 8.

If we study this total space as handled by Ekistics, we will find that in the field of economics, we have a coverage of a certain proportion, as in sociology and administration.

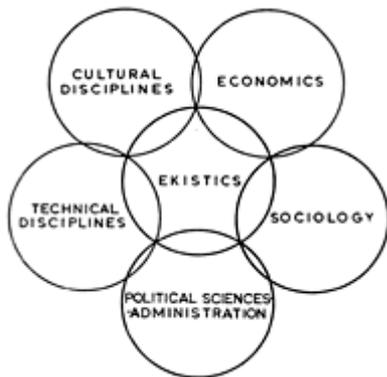


Fig. 10. Ekistics and Other Disciplines

This proportion becomes larger in technical and cultural aspects, which Ekistics covers more completely. As a whole, economics should be able to handle the problems of a space irrespective of its dimensions if they fall within its own discipline. The same is true for sociology, etc.

It is Ekistics though that has to achieve the synthesis of all these disciplines in every size of space whether it is as small as a room, as big as a city or as big as the whole Ecumenopolis.

We can only draw similar conclusions if we look at space by dimensions as handled by the discipline of regional science. It is the synthesis of disciplines in the region which is the concern of regional science, and this is valid for spaces which are larger than communities. The conclusion remains the same, although we are now looking at space by dimensions and disciplines while previously we were looking at it by functions and disciplines: Ekistics and regional science have to cut through other disciplines in order to achieve a synthesis in every dimension of space with which they are concerned.

We can now look at space by dimensions and scale as handled by Ekistics in relation to specific disciplines, as shown in Figure 9.

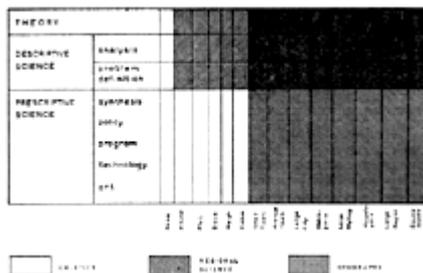


Fig. 11. Space by Dimension and Branches of Disciplines

If we consider the cultural-aesthetic aspects of Ekistics in relation to the scale of space, then we will find that man perceives space around him up to a certain scale. Thus the cultural and aesthetic aspects have very great importance in the small scales, an importance which decreases as the space becomes larger and outgrows the ability of man to perceive it or to sense it.

If we look at the political aspect we will see that it is equal to zero in the small space of a room or of a single dwelling, it increases with the enlargement of the community until it becomes a very important factor in the large scale of space. If we look at technical aspects we will notice that the motor car has an influence on very small spaces, has an increasing influence over middle dimensions and a decreasing one towards ecumenopolis, which, because of its low speed and limitations, it cannot influence. On the other hand the airplane begins to exercise an influence over larger space and continues its influence up to ecumenopolis. In the same way we can see that the rocket is beginning to influence even larger spaces, indeed even beyond the dimensions and the limits of the earth.

On the basis of this previous analysis we can now proceed to a critical examination of the terminology used in Ekistics.

Ekistics covers the subject matter of human settlements completely. This, though, leaves undefined the relationship

of settlements with the surrounding space. To clarify the notion of "settlement", let me explain that it covers not only the built-up part but also that part which, although not built-up, is directly related with the very existence of any physically apparent part of the settlement. If the term is to be useful, it has to be made clear what the real substance of the human settlement is.

Regional science on the other hand is based on the notion of region. This concept of region according to Isard is elusive. Garnsey, on the other hand, defines that "regional science is a social science which deals with the analysis of areal groupings, of physical, biological and societal phenomena". Here we must remark that this description of regional science has a meaning of it is related to the action of man; i.e. to the human settlement. Otherwise, it will remain a purely intellectual concept. Actually, this term "region" is the weakest part in the terminology of regional science. From the point of view of proper conceptions it seems to me that "region" is not a term with very specific meaning. In this respect I agree with Isard that it is elusive. A region is a unit of space. If so it cannot be used in order to determine a discipline. Let us say that the unit of the naval forces is the fleet; we cannot speak of the science of fleet or the discipline of fleet, but only of naval discipline. This we can describe as a subject by its content and not by its unit.

And now we can reach a conclusion about the nature of these disciplines. Irrespective of the weaknesses of their terminology they are very specific disciplines dealing with the questions of terrestrial space. In this respect, they deal with problems of similar nature to those of geography.

At the same time they cut across the fields of many other disciplines and sciences. Their uniqueness is their attempt to approach the problems of terrestrial space in an interdisciplinary way. They will be justified if they achieve an interdisciplinary synthesis of several types of approaches to the same subject of terrestrial space, a synthesis which is not yet achieved and towards which no attempt has even been made by other disciplines and sciences.

In closing this section, I would like to refer to the central position of Ekistics in relation to the other disciplines and sciences. In the same way regional science can be presented in a central position in relation to the related fields of knowledge. See Figure 10.

Intent of the Disciplines. By defining the nature of Ekistics and regional science we have not covered the whole subject. As we said at the beginning, we must look for a discipline, into its dimensions, and into its nature. But we must also know its intention, in order to define exactly what it is.

There is no question that both Ekistics and regional science cover specific sectors of knowledge or specific fields of learning; as such they are distinct disciplines. But this alone does not entitle them to the use of the term science which both are using. Many are therefore questioning their right to use the term "science". (The doubts many express regarding the scientific legitimacy of Ekistics and regional science is one more feature they share.) But many people also question whether geography, anthropology, etc are sciences. There are some who say we cannot have so many sciences, others who say it is too early to make regional science a science and that these disciplines must first prove what they are, what they can do. But we should really ask ourselves if it matters so much to define the time when the title of science is officially acquired, and the graduation ceremony takes place. Is medicine a science? Some say yes, some say no. Even if the answer is yes, when did medicine become a science? Right from Hippocrates, or before him, or after, or perhaps during the 17th, or the 19th century? And how are we certain that even if we call medicine a science today (when still greater revolutions are just around the corner) that people in future centuries will recognize that medicine was a science in the 20th century? Perhaps they will say it will become a science only in the 21st century, when all mental diseases could be related to certain chemical elements. I don't believe that we should be so concerned about this term "science". It is a relative term which may be accepted by a certain group of people and denied by others, accepted by a certain era and denied by another. What matters is to define our goal and to do our best to move towards it. It is the dynamic action in this field that should interest us, and not the static definition.

We need to know though, for practical purposes, if within the realm of present scientific knowledge we can classify both Ekistics and regional disciplines as sciences. This does not depend so much on their contents, which are specific, as on the effort they are going to make in order to reach their goals. Science has been defined as the search for laws of wide applicability. In such a case we can say that as long as Ekistics and regional science look for laws of wide applicability, they can be described as sciences. If they lose this quality or fail in this attempt, they are not entitled to the name of sciences.

By now this definition of science which reflects the positivistic spirit of the 19th century has been superseded by the following definition:

science is a discipline which has

- a. a theoretical aim
- b. well elaborated methods

c. a verification procedure

d. the possibility of public recognition of its findings
Even in the light of this definition both Ekistics and regional science can be or become sciences.

We should not be limited though to such general discussion about the term science; we should attempt to define more closely what specifically we mean by science, and where we draw the line between science, technology, and art. At this point, I think we should proceed first to make the basic distinction between distinctive and prescriptive sciences. Cosmology, for example, is a descriptive science, trying to discover the laws which govern the cosmos, and it does not have any hope, at least for the foreseeable future, to change anything in the realm of cosmos. On the contrary, Ekistics and regional science search for the laws which govern the investment of the surface of the earth but they can also prescribe courses of action by which one may reasonably hope to change the nature and the forms of this investment. As such they become prescriptive sciences as well as descriptive.

Here we can see a first distinction between geography on the one hand and Ekistics and regional science on the other. Geography is purely a descriptive science. Ekistics and regional science are both descriptive and prescriptive. In this respect it can be said that regional science is the extension of geography into the realm of prescriptive science, or that geography is the descriptive part of regional science. In the same context, we can say that Ekistics is the extension of urban geography or geography of human settlements into a prescriptive science, or that urban geography is the descriptive part of the new discipline of Ekistics.

If we now want to be more specific, we have to accept one of the possible classifications of the branches of sciences by intention. We here divide sciences into descriptive and prescriptive, and this again in minor parts. On the basis of such a division, we find that the whole space classified by dimensions and branches of disciplines is covered partially by geography, which is limited to the descriptive and the theoretical part, partially by regional science which covers both the prescriptive and descriptive sciences but is limited by the size of the community, and Ekistics, which tends to cover the whole space (in spite of its concentration on the notion of human settlements which we have already analyzed). This is graphically depicted by Figure 11.

We can now proceed to state that the further we move from the theory and descriptive science into the field of prescriptive science the farther we move from the field of science into the field of technology and the field of art. In this respect it is not quite clear where the line between

science and technology and art can be drawn. What is of importance to us is to know that in order to achieve our goals we need the whole range, from theory to descriptive sciences to prescriptive sciences, to technology and art. After all, in our field, pure science and technology are very closely interrelated. As Sir Robert Watson Watt has written, "modern science is essentially concerned to do only in order to know" and "technology is essentially concerned to know only in order to do".

As a conclusion, we can now define both Ekistics and regional science as a prescriptive, because the intention of both is to shape terrestrial space, and this was never attempted or achieved by geography. They are also both descriptive, as is geography, and in certain respects, because of their concentration on certain methods - regional science on mathematical analysis and Ekistics on empirical study of human settlements - they may even have achieved more in the realm of pure description than has geography itself in some of the whole large field covered by geography. By the new methodology that both develop, they offer an opportunity of control and verification and thus they can be classified as descriptive sciences.

Setting of Goals. Once we grant Ekistics and regional science the right to move into the field of prescriptive sciences, into technology and art, once we have recognized their right to develop policies and programs, we have created the frame for them to set certain goals.

In practice, Ekistics has set the goal of human happiness. It is an age-old goal set by Aristotle, who held that the task of the city is to make its citizens secure and happy. Regional science, although not so clearly defined, sets a goal once it speaks, as it often does, of the proper solutions in the formation of regions. Even though regional science does not want to refer to proper solutions, the very reference to a solution sets the new dimensions of a very specific goal for this science.

As a conclusion, we can state that both Ekistics and regional science have been forced to set goals as they have moved from the realm of descriptive sciences, to the realm of prescriptive sciences. These goals are broader in Ekistics. Because of its goals, Ekistics turns into a human science, and, more specifically, one related to the economic goals of regional science.

2. METHODOLOGY

Of equal importance with the search for the contents and goals of Ekistics and regional science is the method or the approach by which they both try to fulfill their tasks. Here we are really trying to give a reply to the question of how they approach their subjects, by what methods they try to

face them.

Abstract and Empirical. There are two basically different methods of study of the phenomena of terrestrial space. One is the abstract method which is based on the construction of mathematical models, and the other is the empirical, which is based on an inquiry test and suggests relevant hypotheses. Geography starts with direct observation of existing phenomena, then tries to classify them. It is basically empirical and only lately, as far as I know, has it tried to use some abstract methods. Regional science starts with an analysis of phenomena which may have never occurred. It leads gradually to more practical considerations. Ekistics starts in both ways: by gaining experience from study of existing phenomena, and by trying to create models of new solutions. Geography has the largest experience with the empirical method. Regional sciences gaining the greatest experience in the abstract method of mathematical model construction. Ekistics is weaker in both. Its strength lies in its desire to use (and experience in use of) both methods in order to reach the one end.

In practice, both regional science and Ekistics will have to become equally strong in both methods. Our phenomena are getting more and more complicated and only by experience in both fields will we be able to face them. I will mention one example. If we look at one of our actual situations, we shall see that the problems are due to the conflict of existing patterns of settlements with newly developed forces rather than to the solutions that these forces require, if seen alone. For example, if we have to connect two nodal points A and B, the problem in practice is more and more not so much how we might best connect them in a theoretical way as how we are going to connect them in view of the fact that in between them we have already a settled area which presents certain forces of resistance to the best possible connection of A and B.

In this respect, an empirical but immediate solution may be of greater use than a theoretical solution of the best connection between A and B. Such a viewpoint does not only present a problem of urgency and priority of research but also a matter of the proper direction of research in both regional science and Ekistics.

Influence of Creation on Methodology. If we compare the origins of Ekistics with those of regional science, we will note that the conditions of their creation had an impact on the methodology which these two sciences follow.

Ekistics was born out of the attempts for a synthesis within human settlements. These settlements first grew without any plan; because of their small dimensions, though, and because of the forces around them, they had a cohesive texture. They then grew on the basis of a certain pattern of a certain plan. Finally, in their third

phase, they have outgrown the plans, humanity has not been able to cope with the expanding settlements, and they have grown without following any overall pattern.

Because of these conditions of its creation, Ekistics up to our generation has been used to achieve a synthesis on a minor scale. Because of its inability to cope with the problem of expanding settlements, with an expansion due to a real explosion of population and other forces, it has not found out how to achieve synthesis over broader spaces.

Ekistics has now to develop a technique of expanding its experience of synthesis on a small scale, into a synthesis on a large scale. This is not an easy task as the problems change with the change of scale.

Regional science, on the other hand, started mainly in the field of economics, and was born out of economic science and of geography. Neither of them had any experience of broader synthesis in space. Geography was limited to analysis and economics had not very much to do with the conception of space. Regional science is therefore facing a difficult task: how to develop a methodology of synthesis, as synthesis is its main task.

Both Ekistics and regional science have to develop a methodology by which they can achieve their main task, i.e. a better synthesis in terrestrial space. It is for this main task that they have the least experience, although Ekistics does have some in spaces of minor order.

Influences of Scale on Methodology. It is not only the conditions of the origins of the sciences of Ekistics and regional science which had an influence on methodology. The scale of the different phenomena they deal with has also had a great influence on methodology.

The human scale, which is of importance in spaces of lower order such as room, dwelling, and building, imposes a pattern of right-angle axes. In distinction to it, the large scale requires the hexagonal pattern and the geographical patterns imposed by the formation of the surface of the earth. These two patterns combined lead towards a natural network of communications and nodal points.

It is the task of Ekistics to see that the human patterns of this small scale and the natural patterns of large scale can be merged into a total rational pattern. This appears to be possible if the patterns imposed by the room and building are the controlling factors in the micro-scale and if physical formation becomes the controlling factor in macro-scale. Where the one scale ends and the other begins depends on the value and size of the settlements and the formation of the landscape. The fact is that two scales impose two types of physical patterns, two methods of approach to our problems. In the same way, we can

discover a variety of differences which are the results of the scale of the terrestrial space we are dealing with. This relationship between scale and methodology changes with the change of the dimension of time. For example, the motor car is now enlarging the scale of the space which can be formed by two right-angle axes. Pedestrian and animal transportation in the past could put up with the same rectangular pattern of axes only on a very small scale. For greater distances, it was necessary to cut through the city with diagonal lines. Now there is no longer a necessity to cut as the car can drive along longer routes without any harm. Such a solution is beneficial from several points of view.

On the other hand, airplane connections are not directly related with the physical formation of the surface of the earth. The fact that we are more and more relying on air transportation will lead towards hexagonal patterns, but this is only valid over greater distances.

We can draw a conclusion. Both Ekistics and regional science have to develop a methodology of synthesis which will no longer solely be influenced by the conditions under which these two fields came into being, but also by the scale of phenomena with which they are dealing, and gradually by several other factors.

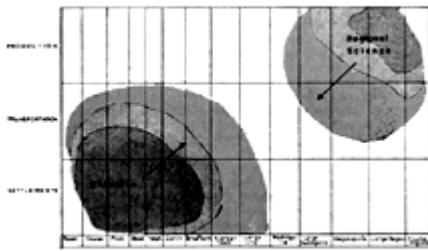


Fig. 12. Achievements of Ekistics and Regional Science in Relation to the Terrestrial Space

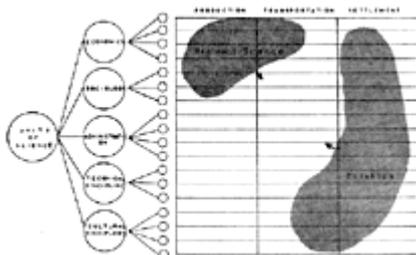


Fig. 13. Achievements of Ekistics and Regional Science in Relation to Other Disciplines

3. ACHIEVEMENTS

Once the contents and goals as well as the methodology of Ekistics and regional science have been outlined, it is worth looking into the achievements of both these disciplines.

In a general way, we could say that out of the whole terrestrial space which they are supposed to cover, their achievement has been larger in some areas than in others. Ekistics, because of the conditions bearing on its origins, has achieved more in the field of spaces of lower order, especially those holding compact settlements. Regional science on the other hand, because of its birth from economics, has been more creative in the realm of larger spaces: those related to production. They have both entered into the field of transportation, but only indirectly. This is indicated on Figure 12.

The achievements of both these sciences in terms of the field covered by other sciences can be described as follows: Ekistics has managed to bring together several sciences but only with regard to the human settlements and the narrow space around them, while regional science has mainly concentrated on the economic aspects of the formation of space. See Figure 13.

Methodology of Analysis. Ekistics has tried to cover wider subjects by methods of empirical analysis. Only lately has it begun to move ahead with mathematical models related to the death of cities, to the dynamic growth of cities, and other contemporary problems. Through empirical analysis it has managed to learn more about the inter-relationship of functions within settlements and the contribution which can be expected from other fields of knowledge and disciplines.

Regional science on the other hand, has done much more through abstract, mathematical model construction. It is characteristic in this respect to study the proceedings of the Regional Science Association, which has systematically presented the work carried out within the Association.

In the first five volumes, it is interesting to note that out of a total of 105 papers, 66 (or 62.9%) are papers in economics, mainly regional economic analysis. Six papers (or 5.7%) are on geography, and 16 (or 15.2%) on regional science in general. Physical planning is represented by 6.7% political aspects by 3.8%, sociology by 3.8% and transportation by 1.9%. It is quite clear where the center of gravity lies.

Methodology of Synthesis. Because of the minor dimensions of the space with which it has mainly dealt, Ekistics has been able to develop an empirical methodology in synthesis. If we want to look back into the initial form of this synthesis, we will find that it lies in the

formation of space in a single dwelling. There, humanity has been accustomed for some thousands of years, to bring together spaces of different dimensions and different natures, into a rational whole. This technique has gradually expanded to deal with minor communities and minor cities. Beyond it, humanity has lost the ability of synthesis.

Now, with the recent developments in Ekistics, we are beginning to find ways of empirical synthesis, in bringing together the different disciplines directly concerned with problems of formation of space.

As an illustration of some practical conclusions which we can begin to draw in Ekistics, I would like to mention in greater detail an example to which I have referred earlier, the example: "patterns of physical synthesis on the surface of the earth".

On a small scale, these patterns are based on the system of two perpendicular axes. This is borne out of the necessity to have rooms connected to each other into organic buildings, and the buildings into organic blocks, and these again into organic communities. Thus, we are led to the conclusion that if we begin from the small scale towards the large one, we move with a certain pattern of synthesis.

If on the other hand, we start at the other end of the scale, from the whole of terrestrial space, then the pattern is one based on purely geographic and economic consideration, which lead to direct connections of nodal points of major importance, which lie where the main lines of transportation meet. Between these two systems of physical synthesis, rectangular (human, micro-scale) and hexagonal (natural, macro-scale), we have to find a balance which will depend on the scale of the space and its special conditions. See Figure 14.

Regional science starts with a great disadvantage in this respect: it deals only with spaces of a larger order and thus gain no experience of the transfer from a small scale into the large scale. Ekistics was more fortunate. It started with minor space. Spaces have gradually grown, due to the growth of the city population and the increase in the speed of means of transportation. Thus, man was gradually transferred from the scale of the one building to the scale of the block, of the community, of the small city. And now, in spite of his present failure to adjust to the scale of the large city and the area round it, it can be hoped that with this background experience, man will move easily, through Ekistics, be able also to develop a methodology for this synthesis.

Prescriptive Action. Because of the pressures and the needs for specific action, Ekistics (although it is very young as a discipline) has tried to proceed with

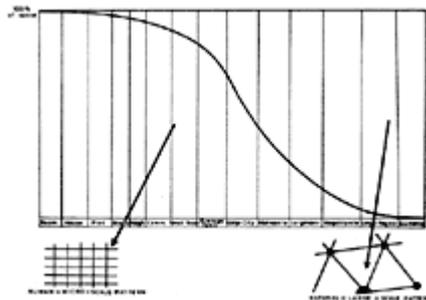


Fig. 14. Synthesis of Physical Patterns

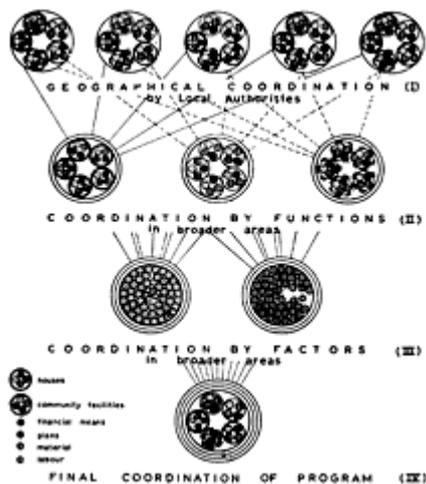


Fig. 15. Types of Coordination of Ekistic Programs

prescriptive action as much as possible. In order to achieve this, it has had to base this action on empirical experience gained at the minor scale of space (small communities, small cities) and on the attempts to learn as much as possible from recent findings of other disciplines like economics (with new techniques of economic planning), sociology, mathematics, etc. On the basis of such experience, and in spite of the dangers involved, Ekistics is proceeding by defining prescriptive action in several ways. I will mention two ways in which it is so strong.

First, Ekistics is trying to interrelate as many elements of the future synthesis as possible. As an example, I mention the pyramid of coordinated action, where we try to achieve coordination by geographic areas, by functions, and by factors of the settlements in order to be led to regional or a national coordination. Such coordination is graphically represented by Figure 15.

Under the light of such conceptions, the physical plans change completely in content and structure, and from static plans they become now three-dimensional projections of four-dimensional development programs.

The other example I would like to mention is that of the principles which Ekistics is setting for the formation of human settlements. These principles are: 1) unity of purpose, 2) hierarchy of functions, 3) four-dimensional synthesis and 4) many masters creating many scales.

In order to succeed in Ekistics, which should understand the importance which the unity of purpose has for all projects, programs and policies. We cannot be successful unless we understand that all efforts should be equally satisfied from the economic, the social, the political, the administrative, the technical and the cultural-aesthetic points of view.

It is an imperative necessity that the hierarchy of functions must be understood. All functions should belong to a pyramid set in a hierarchical way. Only when we understand that every function needs a different solution depending upon its hierarchical level can we lead towards a successful result.

Many people think that problems and solutions are two-dimensional, some more knowledgeable think of three dimensions. But the fact is that we have to understand that all projects, with the exception perhaps of some monuments, are four-dimensional, as it is indispensable that we must think of their evolution in time.

In the past there was only one scale in human settlements: the scale of man. Later the scale of the motor-car was added, then the scale of the airplane and now, the scale of rockets; we may even have others. We

have to think of the fact that every new element of life and transportation on this earth needs a new master, who needs a correspondingly new scale.

Ekistics has tried to set certain general goals. It has to define them in more detail, it has to develop techniques in order to reach them. These goals are of humanistic content, but they are by necessity of a general nature. Regional science has not yet set such goals. As a conclusion, we could say that Ekistics is tending more and more to embrace the whole field which has to be covered, and has better success on the micro-scale of human settlements. Regional science is more timid in its efforts and has gone into greater depth in fields related to economic formation of the terrestrial space.

Both sciences have a long way to go in order to satisfy the needs which they are supposed to fulfil in accordance with their own description of obligations, or in order to meet the needs which humanity is beginning to feel in relation to the formation of terrestrial space. I will try a very general characterization of the efforts of the two groups of people concerned with Ekistics and regional science. I would like to remind you of an old story. Three stone cutters were cutting stone in the central square of a small city. They were all asked what they were doing. The first said: I am earning my living. The second said: I am the best stone-cutter in this area and I cut the best stone, and so he did. And the third said: I am building a cathedral.

I think that the action of regional scientists reminds me of the second stone-cutter, an attempt to cut the best stone, while the action of Ekisticians reminds me of the third one who dreams of the construction of a cathedral, and when he cuts stone, he is thinking of how to set it in order to become a part of a whole although his stone-cutting may not be as perfect as the stone-cutting of the second one.

4. THE FUTURE

New Perspectives. We have seen how Ekistics and regional science have developed to the present, their contents, their methodologies and their achievements. It is not up to us to judge them. So far as I am concerned, I cannot judge Ekistics, as I may not be objective enough. I am too close to Ekistics, in terms of time and space, and distance is indispensable for objective evaluation. Apart from that, the organized efforts towards Ekistics are so short that it is not easy for us to evaluate the potential that it may have.

There is one thing, though, that we can do, and this is to identify the problems of the future. In defining them, we can evaluate the gap which exists between problems which require solutions and the potential of Ekistics and regional science in supplying the solutions. In this way, we will better understand the real dimensions of the practical problems we must face.



Fig. 16. Village; Pre-Urban Era - Unsafe

Conditions



Fig. 17. City; Beginning of the Urban Era Related to a City State



Fig. 18. Early Dynapolis; Related to the Existence of Larger Political Units

Looking into the future we must state, first, that we are living in a changing world, with rates of change that are continuously altering (and in most phenomena accelerating). Thus, it is not enough to state that we have to face difficult problems; it is much more realistic to say that the rate of increase of the problems; it is much more realistic to say that the rate of increase of the problems we are facing is accelerating. It is only thus that we can gain the real perspectives of the problems ahead of us and the difficulties we shall encounter.

It is interesting to look for a moment at the wealth which has been created on the surface of the earth from the beginning of civilization up to 1960. This is estimated to be on the order of \$13,000,000 million. This investment will be doubled in the next forty years. It is going to be more than doubled again by the year 2030, and it will be almost ten times higher by the year 2060.

These changes mean that in the next forty years, humanity will invest as much in settlements as it has invested since the beginning of civilization up to 1960. This gives humanity the opportunity to create wealth which surpasses materially the total wealth created since the beginning of civilization. It is only if we use such figures that we can see the great problems which lie ahead of us.

Towards Ecumenopolis. Such an investment in human settlements opens completely new perspectives for human settlements. It is not only the investment that is increasing at an unprecedented rate. The total surface required on a per capita basis for settlements is increasing year after year. This means that a much higher percentage of the surface of the earth is going to be covered by human settlements. In this way, we are heading towards a form of human settlements which differs completely from the forms of the past.

Where in the past the human settlements were at first isolated within an open countryside, where the relationship was the relationship of certain nodal points lying in a homogenous and relatively passive surrounding, in the future we will be led towards a universal city, or "Ecumenopolis".

From the village we move to the city, to the metropolis, to the megalopolis and gradually we are witnessing the formation of several types of megalopoli in many parts of the world. A century of two from now all these are going to be interconnected in a continuous network. In the meantime, this already is happening in several parts of the world. The network of Ecumenopolis is very different from the networks of the human settlements of the past. It does not consist any more of small isolated settlements within the vast countryside. On the contrary, it is creating continuous networks of major nodal points and many

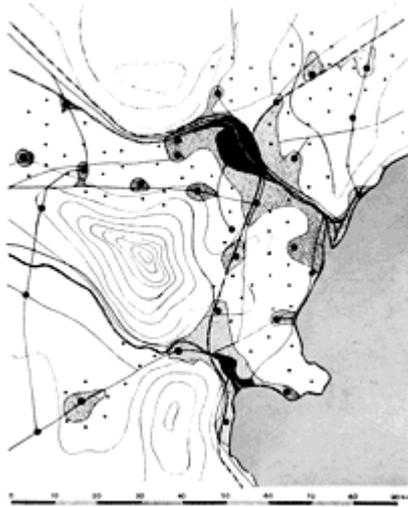


Fig. 19. Dynapolis; Industrial and Railroad Era



Fig. 20. Metropolis; Industrial and Motorcar Era

radial branches. These cover the whole earth like a great octopus, and gradually, because of the interconnection of the branches, they are surrounding the countryside within the elongated parts of Ecumenopolis.

Humanity is completely unprepared for such an evolution. It has overlooked the fact that some time about the beginning of the 19th Century, the city or "polis" was transformed into a new type of settlement, the dynamic city or "dynapolis". This is a settlement which has since a been gradually covering larger areas of the countryside. This process is still continuing. It has led several settlements to the form of "megalopolis" while others are still in the form of growing dynapolis. In both cases, the growth continues and we are about to witness the creation of the first parts of Ecumenopolis. This sequence is schematically depicted in Figures 16-22.

It is quite probable that in a century's time - in some parts of the world even earlier - this growth will slow down until we will again face static settlements in the same balance with the countryside as was noted during feudal times or in the era of the city states. Meanwhile, we should be prepared for changes in every part of the world. It is characteristic to think that the same phenomena are apparent in countries of all political, social and economic systems.

In the light of these changes, it is quite clear that people a century from now will regard Ekistics history to the present day only as a short preface to the formation of the permanent Ekistics network of Ecumenopolis. Surviving cities and villages will look like the romantic leftovers of humanity's period of growth.

It is quite clear that we are gradually moving to the point where we shall have one basic network of human settlements covering the whole earth, a network which will incorporate within it small and large parts of the countryside. This shall be the network to serve us in peace, the condition which, is increasingly appears, is indispensable for Ecumenopolis (but also in war, if humanity will have the misfortune to witness a war of ecumenical dimensions).

Why this is happening, and why it shall continue to happen, is quite clear. We need only mention that so long as economic development continues, there will be higher productivity in the countryside and a higher concentration of people in the urban areas. It is expected that a century from now more than 95% of the world's population (and perhaps 97.5%) will live in urban areas. If we also think of such phenomena as the increasing importance of consumer-oriented industries, we can easily see why all other previous forms of settlements will gradually be superseded and why our main work will be with Ecumenopolis. This will be the only settlement of the



Fig. 21. Megalopolis; Related to the Creation of a Very Large Political Unit

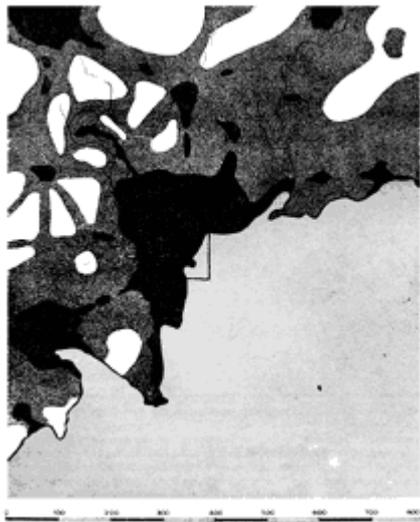


Fig. 22. Ecumenopolis; The Settlement of the Future



future to attract attention: because of its dimensions; because it will house the majority of the population; and because it will incorporate practically all industries, the whole system of transportation and eventually the greatest part of agricultural production.

Ekistics and Regional Science. It is quite clear now that Ekistics will embrace the whole space of the earth and incorporate large areas of open countryside devoted to agricultural production or to leisure and conservation of natural resources. If Ekistics or those disciplines which preceded it (town planning, e.g.) have been able to overlook the real substance of their task - that is, the necessity to look at settlements only as the nodal points of all functions within the broader areas or regions (and this very failure to do so has led to the decline of the disciplines related to human settlements and their inability to solve their problems, especially in the last century) - this will no longer be possible, as the human settlements are conquering the earth and merging themselves with the other areas on a much greater and much more apparent scale than formerly.

On the other hand, regional science (which has up to now overlooked the problems of human settlements in order mainly to analyze the economics of production and, sometimes, of transportation) will become more aware of the great changes occurring and will turn more and more to problems presented by human settlements in reality and not in the abstract. In this way, regional science shall move towards study of the complete field of terrestrial space.

From their own strongholds, Ekistics and regional science are by necessity going to enter openly the same field which, conceptually, already belongs to them: the field of all terrestrial space. As such, they will face problems of new dimensions. Ekistics will move towards conceptions of broader space as the physical dimensions of its problems change. Regional science will have to move towards problems of a wide variety as the types of functions, now more easily isolated, are going to be mixed much more inextricably.

Real and Immediate Problems. It should not be thought that because Ecumenopolis is only beginning to take shape and will achieve a more final form perhaps a century from now, we have plenty of time to face the problems created by Ecumenopolis. We have entered into a phase of crisis for human settlements, and we are already witnessing the death of our cities because of pressures exercised on them. Surgery imposed by urban renewal is only a small sign of the gravity of the situation.

Let us for a moment look at a real example which I think characterizes the very grave situation. This is the problem of continuous accumulation of new wealth around the

Fig. 23. Ecumenopolis as a Dying City



Fig. 24. Ecumenopolis as the City of Life

centers of old settlements. Because of present inaction, because of inability to understand the real issue, we are accumulating new wealth around the existing centers of cities and thus are leading them to their death. If this continues, Ecumenopolis will be a dead city; its old centers, unable to function, will die and spread death instead of life. This is how we interpret one of our greatest contemporary spatial problems. How this could be solved (contrast Figures 23 and 24) can be seen by the proposal to create a new network of lines of transportation and communication which do not lead towards the centers of existing cities but rather towards completely new nodal points.

Such a network with new nodal points will be adjusted to the needs of a growing Ecumenopolis, and will relieve the centers of existing cities from pressures for which they were never meant and which they cannot stand. If we overlook this truth, then we are condemning our settlements to move in a vicious circle of congestion at the center, pressures at the center, renewal at high cost, temporary relief followed immediately by a more acute outbreak of the same symptoms in another ring around the center of the city. It will only be a matter of time until the pressures will once again break the very central core of the city, in spite of the great effort put into its renewal. Once population, wealth and pressures continue to accumulate around the centers of the existing cities we are doomed to move in such vicious circles and finally to see the death of our cities and our civilization. There should be no question in our minds that we are losing the battle in the field of formation of a proper habitat.

Let us recapitulate. The greatest danger and the greatest problems in spatial development in the immediate future are not due to the wrong selection of new locations with which so much regional science is concerned. They are not due to the form and remodeling of existing settlement with which so much physical planning is concerned. They are due to the cumulative effects of development on existing nodal points which cannot stand the new pressures. Not only are we not facing these problems; they are so big that we have lost the ability to understand and analyze them. Physical planners can no more grasp their dimensions. Economists and regional scientists are unable to comprehend their content and importance.

6. THE TASKS AHEAD

The Challenge. In our era, we are conquering the space beyond the earth but losing our battle over questions of terrestrial space. We do manage to produce more and more; we may solve the problem of food in a generation or two and we are making attempts to secure peace. But even when we will have succeeded in these big efforts, even after every one will have been fed and supplied properly in a world of peace, we shall discover one day

that we have created around us a habitat which has created worse living conditions; we could even say inhuman living conditions.

Our great task is to develop the ability to understand and to guide the formation of terrestrial space, which is changing shape under the influence of the new development forces directed by man. The investment and the efforts which are taking place on this earth, however, are not leading to the formation of any better living conditions. Our great challenge is to develop the ability to direct human activity in terrestrial space in order to create a better habitat.

In order to respond to this challenge, we need a better understanding of our problems; we also need better solutions. In order to proceed in this direction, we need better tools, better methods for their use, and better people to use them.

Better tools means better sciences to deal with such difficult problems. Both Ekistics and regional science are the first attempts to proceed in a systematic way toward the understanding and the solution of such problems. But we need better tools, we need better techniques, we need better methodology for the implementation of the ideas of our sciences of terrestrial space. We should proceed both in an abstract mathematical as well as in an empirical way in order to manage to unite the conclusions of both into a whole system which will help us to picture the situations as well as we can, and to meet the challenges in the best possible way.

We need also better people. If we compare the IQ of the young people who are drawn to natural sciences and compare it with the IQ of those drawn to social sciences, I am rather confident that the comparison will not be in favor of those attracted to the social sciences. If we do that specifically for the people drawn to the sciences of terrestrial space we may be even more disappointed. With very few exceptions we have not managed to mobilize any forces which are important in size or quality.

We want, however, to deal with this very important human problem which, together with the problems of food production and peace, may be one of the three most pressing problems facing mankind; we must find ways to mobilize greater and better human resources in this field. The sciences of terrestrial space can and will have to offer young men perspectives which are comparable in excitement with the great perspectives offered by the space beyond this earth.

Yes, we need better sciences, better methodology and better people. We have to turn our attention in this direction; but until we achieve it we may lose the main battle which is fought over the deterioration of the human

habitat, and which is taking place all over the world at this very moment.

In the light of these conditions, our challenge has two aspects: First, it is a challenge to face our immediate problems, which are related to the living conditions in the human habitat. Second, it is to develop, as soon as possible, sciences, technologies, and arts to cope with this major human problem in the best possible way. Unless we recognize that the challenge is a double one, we will lose our battle.

The Response. The time has come to ask ourselves if we can respond fittingly to the great challenge presented to us by problems in the formation of terrestrial space. Are we able to cope with such great forces, and with the daily accumulation on the earth's surface of people, investment, and new capital?

First we have to reply in the name of humanity. Yes, the investment in the next 40 years is going to be equal to the investment of the last six thousand years. At the same time, however, we should not forget that of all the scientists that have ever been born on this earth, 90% are alive today. This means that, expressed in terms of scientist per unit of investment, we have nine times more force than mankind has had throughout its whole history. This does not mean, though, that we have nine times greater ability to cope with the problems. The reason is that, while in the past the problems created by new investment have materialized over a period of six thousand years and humanity has been able to absorb the problems day by day and to face them properly, in our era similar problems are going to be created within only 40 years, and this does not give us the time to cope with the difficulties created by them. The special aspect of the problem is the speed with which we will have to face the new types of investment which will change the conditions of terrestrial space.

In addition to this problem, we have to recognize that, although living scientists may be 90% of all those who have ever lived since civilization began, this can not be true in the realm of the sciences of terrestrial space. We have not nine times more geographers, nine times more planners and master builders than in the past six thousand years. At least not people of equal abilities.

Thus, the problem is a problem of immediate needs. Our ability to respond in the long run should not be questioned because of the great potential in intellectual talents and sciences which can be developed. But we also have to face something that is of great importance in the present until we can divert enough talent and develop enough knowledge in the field of the formation of terrestrial space.

To the great question whether humanity can cope with the

new problems, the answer should be "yes." To the question if it can cope immediately, the answer is "no, it is not prepared." And thus we are led to the definition of our first principle of policy and plan of action: we have to develop as soon as possible policies, programs and plans to cope with the problems created in the realm of the formation of terrestrial space.

This leads to the conclusion that we have to follow a policy of immediate action by coordinating the knowledge that we have in order to divert enough forces for the solution of the immediate problems of the expanding human settlements. Ecumenopolis is the great problem of the immediate future and we have to deal with it as soon as possible by mobilizing all our intellectual resources and coordinating our action in this field.

At the same time, however, we have to understand that, in spite of the successful mobilization, we do not have enough knowledge, neither do we have enough resources to be very successful in our immediate action. We will do our best, we have to do our best in order to guide the formation of terrestrial space. But at the same time, inasmuch as all our immediate effort are not going to solve the problems satisfactorily, we have to do our best to carry out more research, more education, to mobilize greater numbers of young people in order to increase the total intellectual potential which will be available in the future for the sciences of terrestrial space.

Such an analysis leads to some simple conclusions. Although it is important to decide what exactly Ekistics and regional science are, how they will proceed and whether they have the best approach, we do not have the time to carry out such discussions, we cannot afford to lose any intellectual resources in such efforts although certainly they might be very useful for progress in the field of our sciences.

We have to face our task as the task of the science of terrestrial space. Although some of us may be considered fanatics and may not be easily followed by others, we have to recognize that fanatics contribute more to the pursuit of science than do those who are using the forces which are available in our era without proper scientific knowledge. Let us not forget that the greatest dangers arise because of the existence of people who have at their command new natural forces like nuclear power or huge political forces like dictatorships, or huge military forces, or forces of biological importance.

I recognize that some people may follow their ideas with fanaticism, but we need everyone if we want progress in the realm of the science of terrestrial space. However fanatical some people are, they can not be at all dangerous if they speak of sciences related to terrestrial space and if they are guided by the desire to discover the

truth. The real dangers are derived from the desire of some other people to guide the formation of terrestrial space on the basis of their own inspiration or to let the formation of space remain without guidance in the name of liberalism, or to rely on those who try to justify their action in the name of art.

We can reach a last conclusion. The challenge is great, the response is weak, but humanity can stand up to the challenge and develop the proper response. Those who are dealing with the sciences of terrestrial space, be it Ekistics or regional science, are very few and not properly prepared. They have a long road to go but those are the groups which are on the right track. If they understand their historic role properly, if they understand that they are only beginning to open a path and that it will take generations to develop it into the proper road, if they understand that in order to measure up to their historic challenge they have to do their best to serve a great cause without trying to stick to theories which are still in their infancy or to terminology which may be forgotten very soon, but rather to the real substance of the problems which we have to face, the laws which can explain them and the policies and programs which can be developed in order to face them, then their action and their existence will be justified, even if in certain ways they may fail-as all pioneers may fail in certain parts of their efforts. In their main task of opening up a road, they will succeed.

References

1. Actually we have to be positive on the point that Ekistics, regional science and geography are all concerned only with terrestrial space (or parts of it) because space or settlement, communications, etc. beyond the earth are governed by different laws.