Sustainability and Morphogenesis

The Birth of a Living World

Schumacher Lecture, Bristol, October 30, 2004

Christopher Alexander

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PREAMBLE TO THE LECTURE

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The core issues of sustainable development, as presently understood, are the following. They may loosely be grouped into technical and philosophical issues and I have grouped them in this way:

Technical issues

- Protecting and recycling all natural resources
- Saving soil and water resources from exploitation and erosion
- Taking measures to protect planetary climate stability
- Reduction of wasteful energy consumption
- Using appropriate green building materials
- Developing renewable non-destructive cycles of food production, material production, and land management.
- Development of non-destructive energy sources such as solar energy, tidal energy, and wind energy
- Water and waste management are carried out in a way that recycles water and uses refuse and waste for fertilizing land.
- Recovering and maintaining bioregions.

Social and Philosophical issues

- Birth control to help reduce and stabilize the earth's population
- Protection of vanishing and threatened species
- A good spiritually healthy relation between inhabitants, users, communities, and their environment.
- Physical and social health of the environment.
- Protection of the natural ecology of plant life and animal life in their relation to human life.
- The economics of sustainable thinking are introduced to overcome the negative effects of large scale corporate development.

Let us now turn to the key empirical propositions of my lecture. I claim that when environments are generated by morphogenesis – that is to say, by morphogenetic processes – they will then have the following qualities:

- First, by the very nature of morphogenetic processes the environments generated will, of themselves, support and encourage contemporary technical issues of sustainable development.
- Second, they will also encourage, sustain, and encompass a large number of key social and philosophical attributes which the adherents of sustainable development wish to reach, but which present day technical methods do not achieve.
- Third, our environment-building activity will step back from its present technical orientation and vision of corporate gigantism as a source of solutions to sustainability, and begin again, from a deeper source, with a primary orientation for all society to achieve health of the whole in the largest sense,

and to develop new solutions to individual issues of “sustainability” from a deeper understanding of wholeness.

In short, these are the key empirical propositions of this lecture:

(1) When environments are built by morphogenesis they will of their own accord become sustainable.
(2) Among strategies for dealing with sustainability, morphogenesis alone can deal with ALL the issues of sustainability together.
(3) This effort will reorient all our efforts, and achieve the deeper agenda of the sustainable movement, in a form that is more profoundly satisfying, and more in keeping with our social and cultural aspirations.

THE LECTURE

Bristol, October 30, 2004

Oh what a lovely welcome, thank you. I am very honored to be speaking before you. Thank you so much.

I Preface

I am on a rather delicate ground in what I'm going to say today. I know how much careful thought has gone into the issue of sustainability, and I know that hundreds of advocates and devoted sustainability enthusiasts are sitting in this room. And yet… and yet . . . I have developed a serious concern about sustainability (in its contemporary meaning) which I hope we will share. But it may make you uneasy. During the course of this lecture I am going to try to link sustainability (as it is so often thought of today, from a technical point of view) with another, second meaning of the word, which fewer people think of. This second meaning of the word, which is so far removed it is almost another topic, refers to the wholeness of the land, the extent to which we see our land (rural, urban, or wilderness) as sacred, and the extent to which we treat our interaction with the land as a sacrament. The extent to which we recognize the beauty of what we make in the land is of paramount importance. It is not just an add-on or a luxury. Rather, it goes to the core of what sustainability really is. And I'll try and explain why I think so and what that involves. And, coupled with this, there is the issue of spirit. I was brought up as a Catholic. But what I'm to say about these matters has little to do with what I learnt as a Catholic. It has to do with empirical findings connecting the process of morphogenesis – those processes which bring life to the land – to issues which deeply touch us -- the human soul. If you don't believe in the soul, that's all right; you can call it what you like, or if you wish call it nothing at all. I am fairly sure I will still be able to make sense of it for you in perfectly straightforward fashion that is empirical and grounded in experience.

Now, briefly put, what has been worrying me about our current view of sustainability, is that the enthusiasm for technical gismos and for technical analysis and solutions, whether it be in the realm of transportation, or in the realm of air quality, or many other aspects of sustainability that can be expressed in practical terms. Of course those things are in themselves sound, but they are very, very one-sided. And so a world built according to the present sustainable paradigm, the technical sustainability paradigm, would be quite a horrible place. Perhaps many of you may wonder what on earth I am talking about when I say this. During the lecture I'll show you some pictures to explain what I mean. But even without pictures, we may be able to agree that anything that is too one-sided has great pitfalls. If you look, for example, the built world only in terms of money, you run into terrible problems. We all know how that goes. If you were to look at everything in the environment from the point of view of structural engineering it would be hopelessly one-sided, too, and one couldn't accommodate what happens to cows in a field, or what happens to children with their mothers. So you really cannot deal with things from the point of view of one particular limited perspective and hope to see the whole. Our present technical view of "sustainability" -- the focus on renewable resources -- is such a one-sided perspective. Of course, the issue of making sure that resources are renewable and taking care that we don't run ourselves into a dead wall of energy, food, and water,

and damage the planet as a system, is of colossal importance, very, very serious… I in no way wish to belittle it. But the current technical view of this problem is nevertheless very, very one-sided, and I hope to persuade you to move, with me, in a direction which is less narrow. And less dangerous.

And, please let me give a small warning and an apology. In this lecture you'll please forgive me because I'm drawing things from the four books of *The Nature of Order*, which have just been published, and I can't summarize 2,000 pages in 40 minutes. So if some of it seems unclear, or too fast, please examine a slower and more detailed version in the four books.[1]

II Introduction To Morphogenesis

Things in the biological world, almost by definition, are created continuously by morphogenesis, that is by a process which is all the time growing and adapting, whether it be in a growing embryo or in a forest or a field, and which gives form, progressively, while growth and change and adaptation are happening.

In real morphogenesis the form of what is coming, or what is about to be, is always drawn from the form of what was in the moment just before. That is, things are always going like that. If a tree is growing for 500 years, it is continuously unfolding from its previous state, and then what we see and recognize is first of all in itself a process. But even if you just look at it in its static state, it is at that moment the end product of transformations that have been going on, and on, and on. And these are the things which give it shape, form, and substance.

Traditional society also managed to do something very much like that – that is to say, morphogenesis -- with buildings, plazas, streets, fences, windows and so forth. And I shall show many examples of this phenomenon. But the point is that up until somewhere around a hundred years ago -- until it started to get off the tracks -- a human-inspired version of this natural morphogenesis, was going on <u>whenever</u> something was built. This was true of fields, forests, churches, houses, streets, even a window or a bench. Whatever it was, it was shaped, modified, shaped again, and adjusted and so on, and so on, and so forth. As a result of the morphogenesis and the complex adaptation that was possible under these conditions, the places people made had life.

The idea that we have inherited from the thinking of the last years is that when you build something you make a plan which is so detailed that it can become a specification for a contractor and protect you in a court of law if something goes wrong with a particular line of bolts. This legal reasoning began to dominate architecture and construction – and as a result of accepting it, we slipped into a fiction which was that it is actually possible to make a blueprint of a piece of the environment or the completed environment, and have it work. Now ***this is a fiction***. It is very clear that if it was applied to a human being or a daffodil it wouldn't work. Well, you can't make a daffodil that way, you can't make a human being that way even if you had all the micro tweezers in the world and a stack of blueprints that thick, and tried to assemble it. It's just a nonsensical idea. Because morphogenesis is of the essence in the way a thing achieves not only its beauty, but its adaptive

resources and its organization, which is beautifully adapted internally. And this morphogenesis happens at a tremendous number of levels. It's not just something large, it is happening at the cellular level, it is happening at the molecular level, it's happening in the limbs, it is happening in the skeleton, and so forth. I mean that hundreds of systems at different levels of scale are all adapting, moving forward, adapting again, and so forth and getting their shape in this way.

Now my hope in giving this lecture is that those of you who share perhaps an uneasiness about the too technical nature of sustainable architecture and sustainable thinking, that somehow by putting a model before you which deals with the very things that you have this uneasy fear about, about where it's all going, could be reassured, re-established in a different way. And that there then is a real chance of making the Earth precious, as it once was, and as it still is in various places. But also we have to face the fact that it has been desecrated in many places. Even for those enthusiasts of sustainability a wind turbine four hundred feet high may sound like a very good idea because of its potential impact on renewable energy. But if it is also a desecration of a quite a large piece of land, it's a bit of a problem.

And so we need to think about these things in a way that puts them in balance.

III Non-Sustainable Techno-Architecture

Now I think I'll show a few pictures.

First of all just to be clear about what I was just saying with regard to "techno-thinking", here are a few of the better-known examples. This is William McDonough's Ford plant in Detroit.

Grass on the rooftop of the Ford plant, William McDonough

It has grass on the roof, and somehow this was viewed as a wonderful step forward in sustainability. Now I don't argue that putting grass on a roof might not be a step

forward. It is a perfectly sound idea, and one that has been used for thousands of years. But is there any sense in this picture that this piece of grassland grew out of the land that was there before? That this was made to respect whatever land there was? This place doesn't have that kind of atmosphere at all. Without meaning to malign Mr. McDonough I think I have to make a guess that this was simply not in his heart when he did this.

Here is another important building from the pantheon of conventional sustainable wisdom.

IBM headquarters, Amsterdam, William McDonough

Interior of the IBM building, Amsterdam

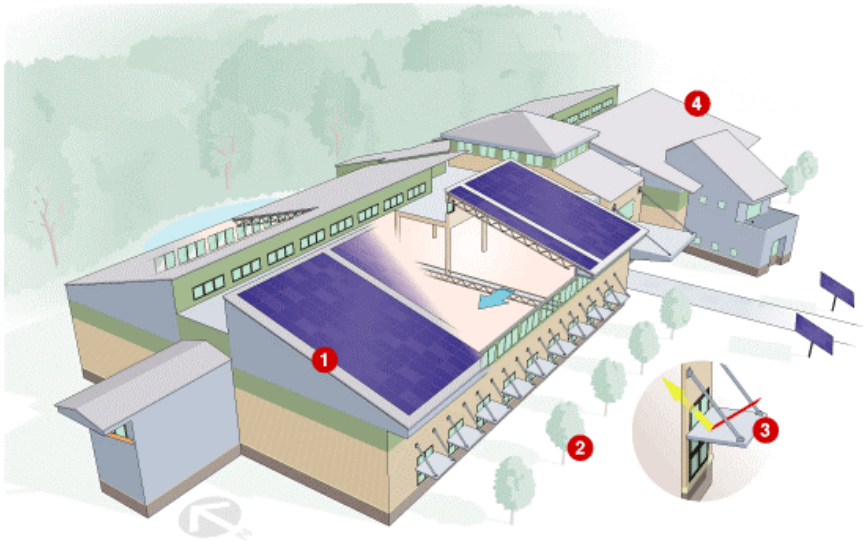
This is in Amsterdam, the IBM headquarters in Amsterdam. Now this building may indeed have good materials or special ways of handling heating systems, perhaps water and so on. But its failure to honor and enlarge the land is really quite bad.

And here is another famous green building at Oberlin College.

David Orr, the Science complex, Oberlin College, Ohio.

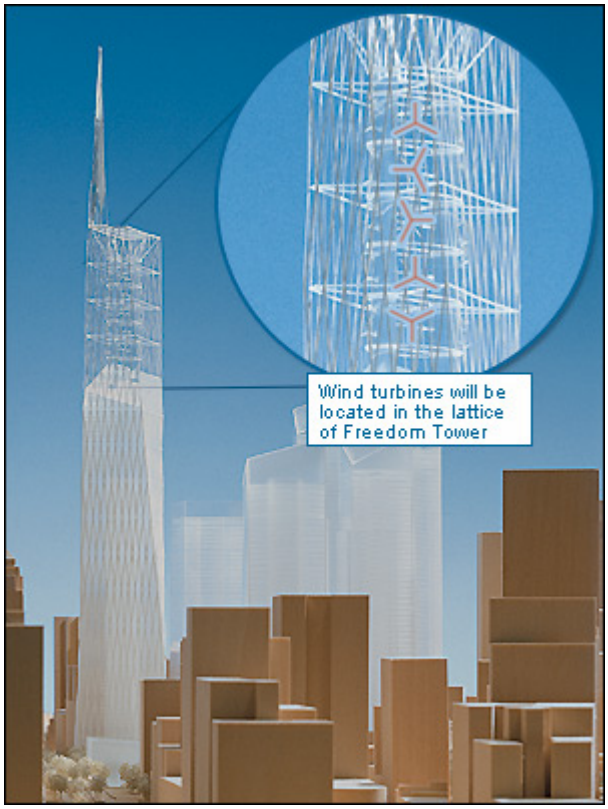
What is positive about it, is that David Orr has very, very carefully chosen the materials. That is an important and good thing. But these sorts of landscapes! Is this what we want of the earth? I wonder how many of you think so? I do know that the situation is urgent. And, I suppose in a slightly simple-minded view one might say it's got a nice little curve on the roof and it is making an effort to be harmonious with the place where it is. But this is still really a very, very shallow nod to that kind of thing.

On the next page, I show further energy saving buildings. The last one is a little bit different. Again carried away by the enthusiasm for producing wind energy, one could say "Gosh, this is a step forward". But again, I don't think so. These projects do not help the land, nor do they support human feeling. Above all, they do not beautify the land in its own terms.



Cambria project

Solar panels



Freedom tower, Gotham

On the next page are two photographs from the recently built BedZed project in Sutton, outside London. This is perhaps the best and most imaginative, and most sophisticated sustainable housing that has been built so far. Yet even so, elegant and inventive as it is, it is still a technical product, which lacks the deeper properties of something truly living, or of something *truly* sustainable.

BEDZED, zero energy development of 100 apartments at Beddington, Sutton, near London architect Bill Dunster

Aerial view of BEDZED

IV Respect For Land And Morphogenesis

In contrast to the previous highly technical pictures, here is a very ordinary bit of a not-very picturesque village in Sussex, about a mile from where I grew up, in Chichester.

Lavant, West Sussex

This is Lavant. I chose Lavant as an example because it is rather ordinary. It's not cute, it hasn't got thatched cottages in it. It's not Shakespearian. It is not antique or precious art-historically, rather it is made by a slow and gradual common sense process of morphogenesis. If you look at it carefully, you see how the this bridge was made, you know how it was started, you can read the order in which things were done, you can see progressive adaptations. The bridge was built narrower. Then the flared parapets walls you can see, were added. This, that parapet that comes off, was done to make the safety of the passage across the bridge easier. Then a side bit of bridge with a row of posts just so pedestrians could walk, when traffic became a little bit more. It's entirely un-pretentious. It has no pretension to be "designed," and it is also in no sense a high-end kind of beauty. It is very ordinary, but it is quite deeply harmonious.

That is a model of sustainable structure. And one has to ask if the Amsterdam IBM building could aspire in any way whatsoever to this sort of harmony in the land.

A street in Jaisalmir

Here is a place in Rajasthan, a small town called Jaisalmir, and shown here a lovely kind of street with houses where these adaptations were going on within a simple and very elegant framework. But you can see simply from the what people are doing and how they look that something has been achieved here which roots people in the land.

V Casy's Soliloquy from *The Grapes of Wrath*

To bring the point home, I want to read you a passage from Steinbeck, a very short passage, quite a beautiful passage. It's from *The Grapes of Wrath*, and it's before they set out from Oklahoma. Casy, the one-time preacher is ruminating, trying to decide whether to go or not, and he doesn't consider himself a preacher anymore. And he just talks about his thoughts.[2]

" I been thinkin" he said. "I been in the hills thinkin almost you might say like Jesus went into the wilderness to think his way out of a mess a troubles. I ain't sayin I'm like Jesus," the preacher went on, "But I got tired like him, and I got mixed up like him. And I went into the wilderness like him, without no campin stuff. Night time I'd lay up and look at the stars. Mornin I'd set and watch the sun come up. Mid day I'd watch the dry country. Evenin I'd follow the sun down. Sometimes I'd pray like I always done. Only I couldn't figure what I was prayin to or for. There was the hills, and there was me. And we wasn't separate no more. We was one thing. And that one thing was holy."

Now if we set our sights to the right place, that is what we need to be shooting for. That's not theology, that is an ordinary man speaking, of course through the mouth of Steinbeck. It's not high falutin'. The feelings are feelings that exist in all of

us, but in our age we have begun to accept a view in which we have basically been taught (and are often obliged, now, it seems) to forget about these feelings.

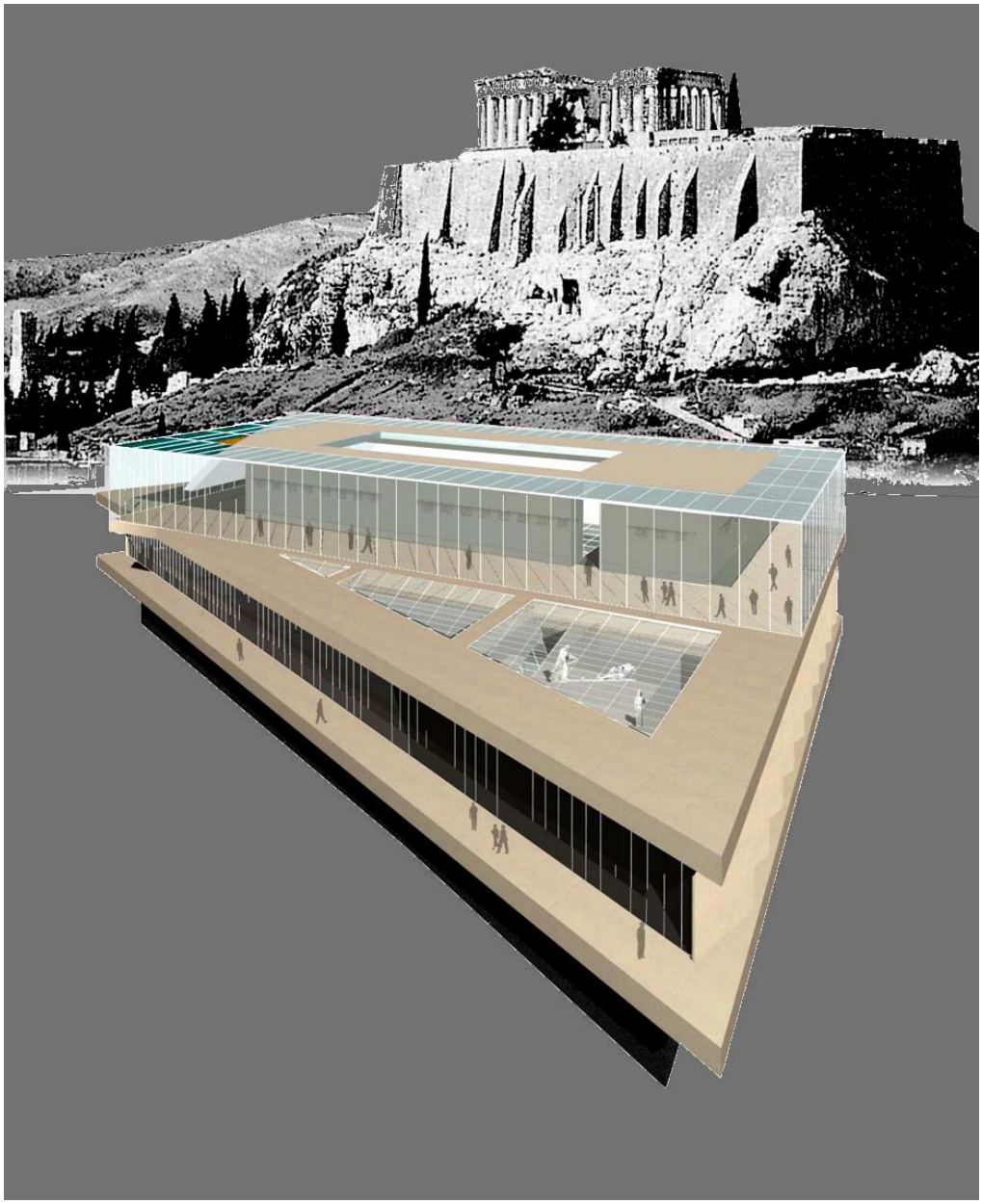
VI Real Adaptation And Fake Traditionalism

Now of course in England, the magazine *Resurgence* has done a wonderful job of directing our attention towards the living Earth, and away from purely technological sustainability. For years, now, *Resurgence* has been trying to move towards this kind of living thought and experience, and away from the purely technocratic. But the difficulty is to have a coherent frame of thought in which that something that is an embodying thing – the thing of Steinbeck's that I just read out -- is actually present when we make streets, traffic lights, buildings, paths, and so forth. Yes indeed, the issue of "green" materials and so forth has its place. But this other matter of being one with the land, being what Steinbeck calls "holy," is a very much different order of business, something deeper, something more all-embracing, something that goes to our essence as human beings. This is a deeper kind of sustainability, and a deeper kind of sustenance.

The Acropolis, 5th century BC.

Let me just go a little further. There on the rock, stands the Parthenon, after centuries of respectful adaptation to the land. And here, below (next page), is a picture of the new Parthenon Museum , in the position it is to occupy, praised by international architects, sponsors, and well-meaning, misguided, too richly-endowed foundations. Without the intention, I am sure, they have raped the land, destroyed the beauty and harmony that was built over centuries, with a shallow, money-guided image, to hold the treasures of the ancient Acropolis. But in so doing, the Acropolis itself is being destroyed.

What is destroyed is a very subtle structure, built gradually, with enormous sensitivity, and then destroyed by people who simply lack the understanding of that structure, and who could not see the lack of connection between the image of the new museum and the place which it is supposed to respect and extend, and deepen.



A profoundly destructive intervention: The new Parthenon Museum

The one thing this horror clearly does not do is to respect the land. Does it enlarge or enhance the structure that was there before? It does not. It is not even conceived within that kind of thinking. And so it destroys the possibility of that holiness that Casy was thinking about in the soliloquy I read.[3]

Development outside Pulborough, West Sussex

More of this kind of horror. Here is a development outside Pulborough, Sussex. Which is intended to be traditional. This has been a catch word for developers in the last decade or two. So it is vaguely aping the appearance of buildings that seem traditional . And in this example, this particular group of developers were trying really hard to persuade us that gosh, gee, golly this is almost like the real thing. **But it really is not**.

And here, another example of the same thing, also in Pulborough.

Another example of fake traditional: only a simulacrum

A simulacrum of the real thing. It is almost worthless, because it is not the product of real adaptation. It's just something which is pretending to be. The buildings do not have these shapes because of subtle adaptations – only to try and sell them by persuading people (falsely) that it IS the real thing.

Let me show you, by comparison, what the real thing looks like.

The real thing

As you can see, this is a really different order of business. You know that it shows something very modest indeed. Not a whole bunch of money behind it necessarily. But it is, it has, that same rough, gradually formed quality which makes it possible to be a truly comfortable person there. A full discussion of this difference is given in Book 2 of *The Nature of Order: The Process of Creating Life*.

And on the next page we see another example of the real thing: a physical plan of a large part of Rome, as it was in about 1750. Here ,too, we see an almost endless tapestry of shapes, size and angle, not willful, or made in a design to be creative, but something that arises from the process of paying attention, with great care, to the situations which exist and develop, and what it takes to solve them and make them comfortable.

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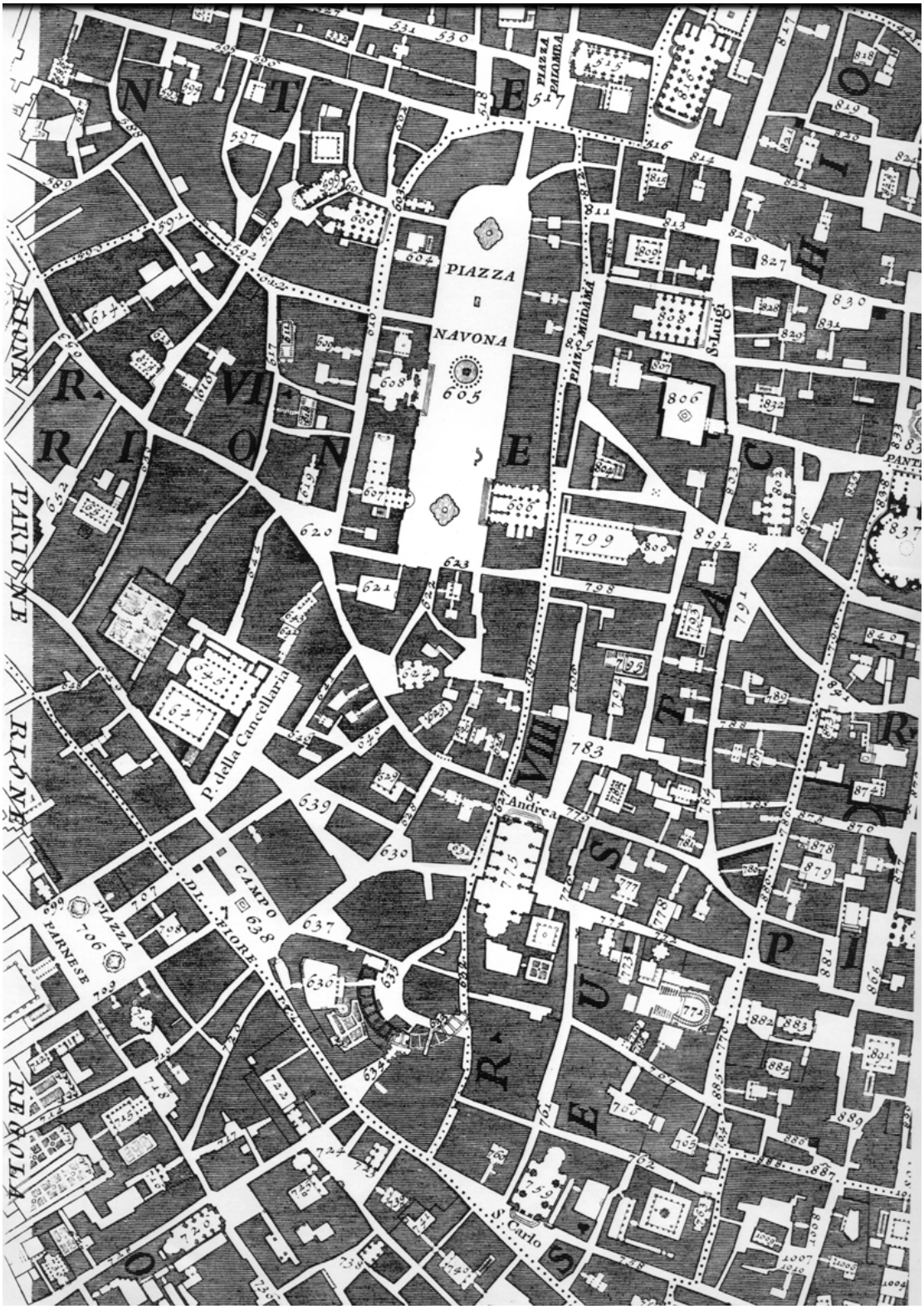


The Nolli plan of Rome, c. 1750

Here is a plan of Rome, as it was about 1750, drawn by Nolli. If you look at it carefully, you find hundreds of bits of evidence of the subtle adaptation that had taken place over centuries. If you look at the shapes of streets, the little jigs and jogs and places, then a very formal church. This widens here, and then this particular bit of street is narrower here and is wider here, and so forth. All for reasons having to do

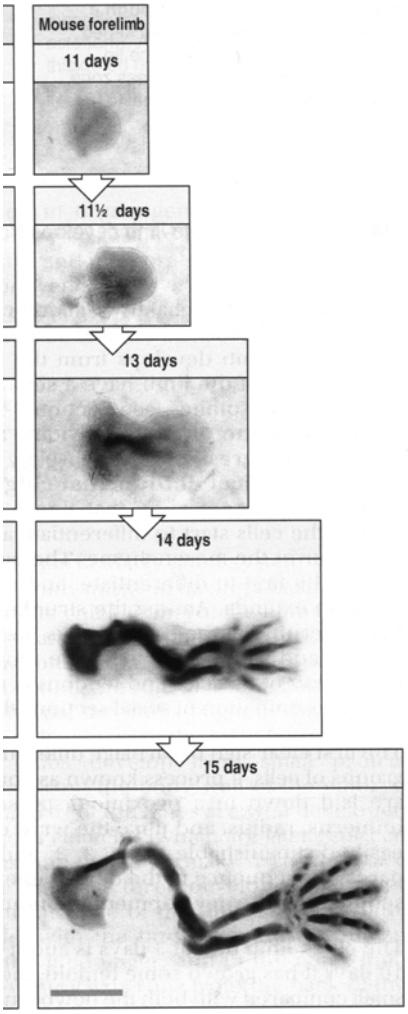
with adaptation. All having to do with that subtle creation of harmony, practical and geometric harmony, being made step-by-step, day-by-day.

If I were to take this plan to The Royal Institute of British Architects in their contemporary mode, as a model of what kind of thing one ought to do, I suppose they would (in their current mentality) say, "Well, this is very nice, you know, but we are now in the 21st century and the Nolli plan was drawn almost 300 years ago: it's a kind of plan which perhaps just happens to be something old that you like. But, of course, it has no relevance to our present-day era. This is not how we design buildings, or streets, or public buildings, or roads, or parking structures. But the idea that this kind of morphology is irrelevant to our era is highly debatable. It all depends what you see in the drawing! If you see only a bit of history, then one might justifiably say that it is irrelevant. But if we see a particular, and interesting deep structure, then, speaking as a scientist, it's not just an old thing. Its age is not what makes it interesting. What makes it interesting is that it is a completely different kind of structure, an important **type** of structure, generated differently, produced differently. The comfort that it creates is not because it has been built a few centuries ago, but because it's simply better. It is a living structure, because it is better adapted. Unfortunately the heritage of 20th century thinking has made us so careless that we don't recognize this structure as more profound, and also do not know how (technically) to create this better adapted kind of structure in the context of today's society and banking institutions – what we now think of as "development" processes.

The beauty and adaptation of the Rome plan is not there merely because the growth and construction of that time were gradual. What was in place, at that time, was a morphogenetic process, which not only allowed things to go gradually so that adaptation could occur, but also guaranteed that coherent wholes would form even while this gradual, piecemeal process was going forward and allowing each place to be different and unique according to its circumstances. That is the essence of morphogenesis, and it is for this reason, that I refer, repeatedly, to morphogenesis as the core of the problem we face, in generating a living world.

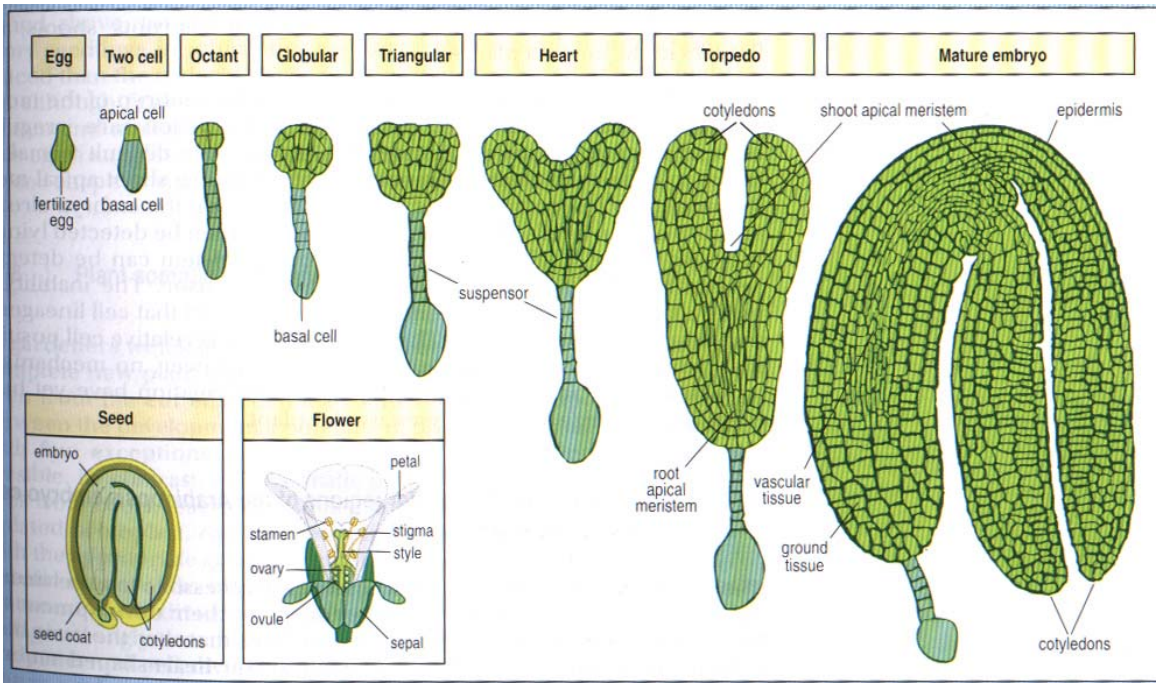
VII Examples Of Morphogenesis As it Occurs In Nature

Now, let me show a few examples of morphogenesis in nature. Here are shots of the foot of a mouse, developing in a mouse embryo. The evolution of the stages shown on the next page only takes three and a half days.



Morphological development of a mouse forelimb

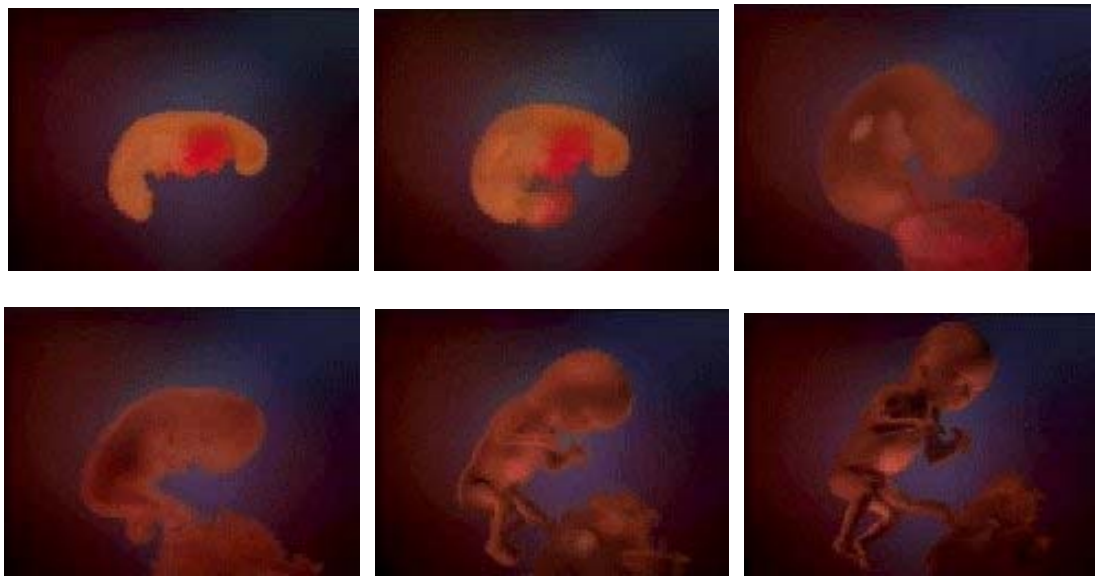
Now in each stage, so you have what's hardly more than a darkened blur which is a different material from that in the gray area around it. Gradually it starts to settle out and form configuration which is not yet bone, but which is cloudy material that will become bone. But it is already taking it's shape. In the third picture (14th day) you see how the two prongs are already there, of these two bones to be. This two-pronged whole is moving out, so that the whole is enhanced and made more complete and so forth. Now these transformations are something I have been studying a great deal, and they can be described by the occurrence of centers in the structure and then certain configurational properties which bind the centers to one another. There are 15 of these transformations, I describe them in detail in Books 1 and 2 of *The Nature of Order*. In biology this is an understandable process, but at the moment it has not been well understood *from the point of view of its configurations*. There's been a lot of work done, successful work, on how chemical fields steer, switch on genes, switch off genes, and so forth. And therefore the differentiation of cells and the way that works has been understood pretty well. But the overall configuration and it's ability to adapt while it's growing has hardly been studied.



Morphological development of an angiosperm

Here you have a similar sequence, in this case a plant, an angiosperm. This time it is a leaf structure. But what I want to draw attention to is the enormous configurational variation among the cells that are shown here. In the drawing you see the variety of cell shapes and sizes. This kind of configurational variation only comes about in morphogenesis. It cannot be generated by a blueprint-driven process; it can only come about from the unfolding of the whole as it arises from the state of the previous whole, and by the iterated repetition of this process.

Here we see further examples. Look, here, at a human embryo growing.



The reason I want to show the human embryo growing, and make you sit through it for about a minute is because again, the <u>structure</u> of that human being is

being created moment by moment, through morphogenesis. This is simply a different way to think about how the world is formed. In fact it hasn't really been thought about yet. I've spent pretty much all my life trying to find a path to do these things. In the last stages of this lecture, I will show you projects where you can see morphogenesis happening on a fairly large scale in towns and buildings. Before I do that, I am going to show you one more picture of this type in biological systems. Here we see a film of blossoms (six stills taken from the film, are shown below).

But again I want you to think, not that this is just a bunch of blossoms that are opening their buds. Instead, please try to imagine a physical world of our making in which the transformations that are occurring here, in our world, our created world, our habitable world of every day, is also growing, changing, moving towards an unfolded whole, in which each state arises from the state before, not by tearing and destroying, but by smoothly growing from what was there before. And then, in the latter stages, the world, the neighborhood, the street, has the same harmony and wholeness and well-being, as the blossoms in this sequence of the buds opening.

The structure here is moving, not only growing. It is moving around, at the same time that what is created is constantly varying from place to place. These variations here are not caused by the DNA. They're caused by the impact of the different buds and organelles, and the dynamics of the system in which they are acting on each other to adapt cooperatively as this system goes forward in time.

VIII An Entirely Different Model Of What It Means To Have A Sustainable World

Now you may begin to see what an intensely different model this is, for our conception of a sustainable world. At present, I do not think there are any satisfying, or exact definitions of what "sustainable" means. There is, of course, the very narrow definition of making sure that resources are not treated in a bad way, or in an impossible way. But I don't think anyone who has thought deeply about the issues, can be satisfied with this kind of answer – not least, because it leads inevitably to a limited and ugly technocratic way of understanding the world.

I am fairly certain that those of you who believe in ecological thinking and sustainable thinking and so on, have something in mind which is this much deeper thing. And I am fairly certain that your reason for being interested in sustainability is because you see a vision of a world which is beautiful. That is where you are trying to get to. And what I'm saying to you here is if you don't follow the advice of these blossoms, you won't be able to do that. This gives us a path towards the beauty of the world. It takes that meaning of sustainability – that which unfolds, and makes itself beautiful, step by step, continually, and for always. This is a completely different way of thinking about building, and planning, and architecture, and ecology.

The sustaining which has to be done, is that every action sustains what was there before. If what was there before was good, it continues its goodness, extends it, and enhances it. If what was there before was not so good, the work to be done, and the process of sustaining, heals it, repairs its flaws, begins to find that something in it, which is alive, and whole.

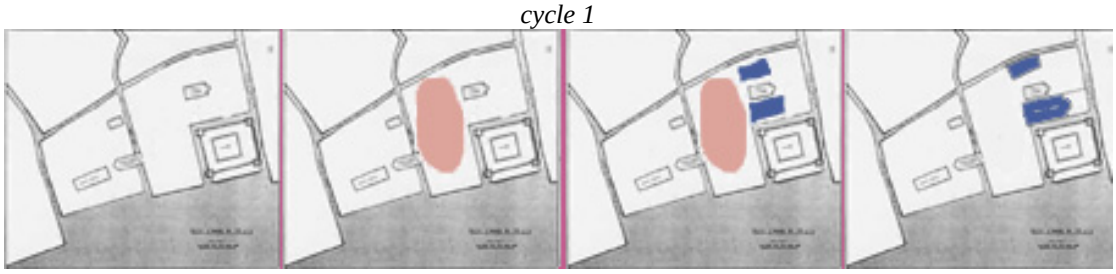
This conception is larger than the present narrow view of resource counting. The cycle of reuse can indeed be part of a sustainable world; the cycle of attention to land, in such a way that it bears fruit, replenishes itself, can be a part of sustainable thinking. But the world must also sustain us, in our existence, sustain animals, sustain plants, sustain water, sustain wind. The morphogenesis itself reflects, and IS, the source of the sustenance.

IX The Morphogenetic Unfolding of St Mark's Square

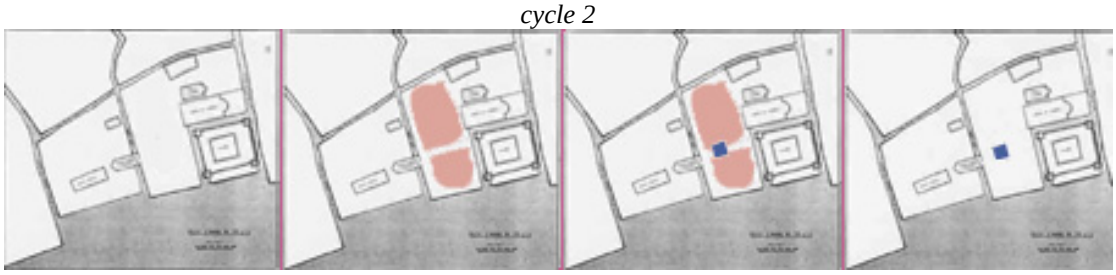
Now I want to show you an example of morphogenesis as it occurred in history, over a long time span. This is St. Mark's Square in Venice. I am going to show you a very short little movie, which is the plan of St. Mark's, roughly as it evolved about 560 AD, up till sometime in the early 17th century.[4] And it runs a bit fast so I just want to prepare you for what you're going to see. You'll see a plan of its state at some era, then you'll see a light gray cloud which is a latent figure in the configuration. And, you can feel it there. If you look at the gray cloud, you'll see that it's a product of the actual configuration of buildings and walls and so forth. Then the step after the gray cloud is a dark gray addition which is usually a building or buildings or some kind of configuration like that which came next. So first there's

a perception of a latent centers, which are not realized, and then there's a point taken to make those latent centers exist. And then, we move and cycle round again.

cycle 1



cycle 2



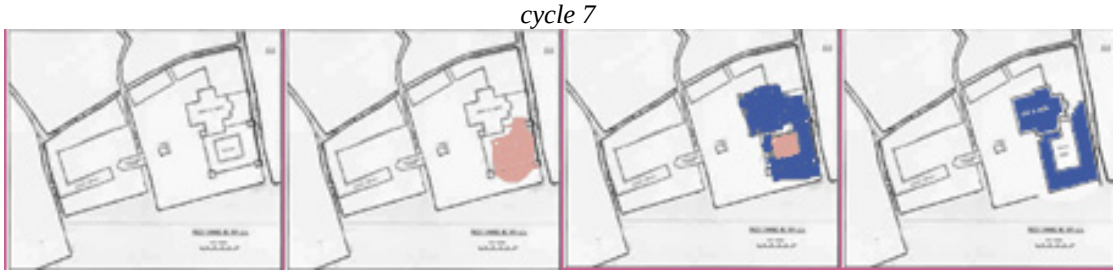
cycle 3

cycle 4

cycle 5

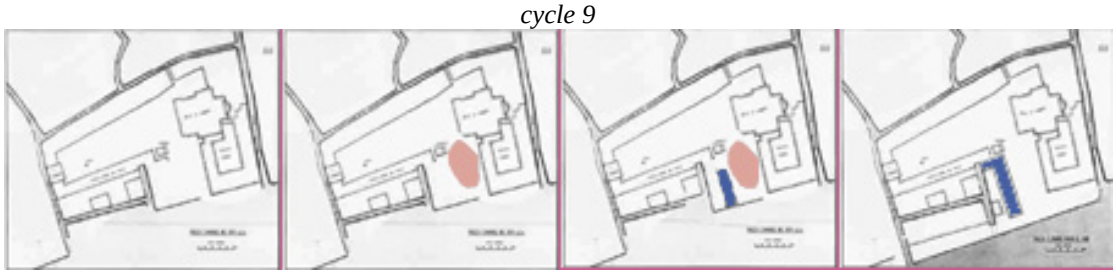
cycle 6

cycle 7



cycle 8

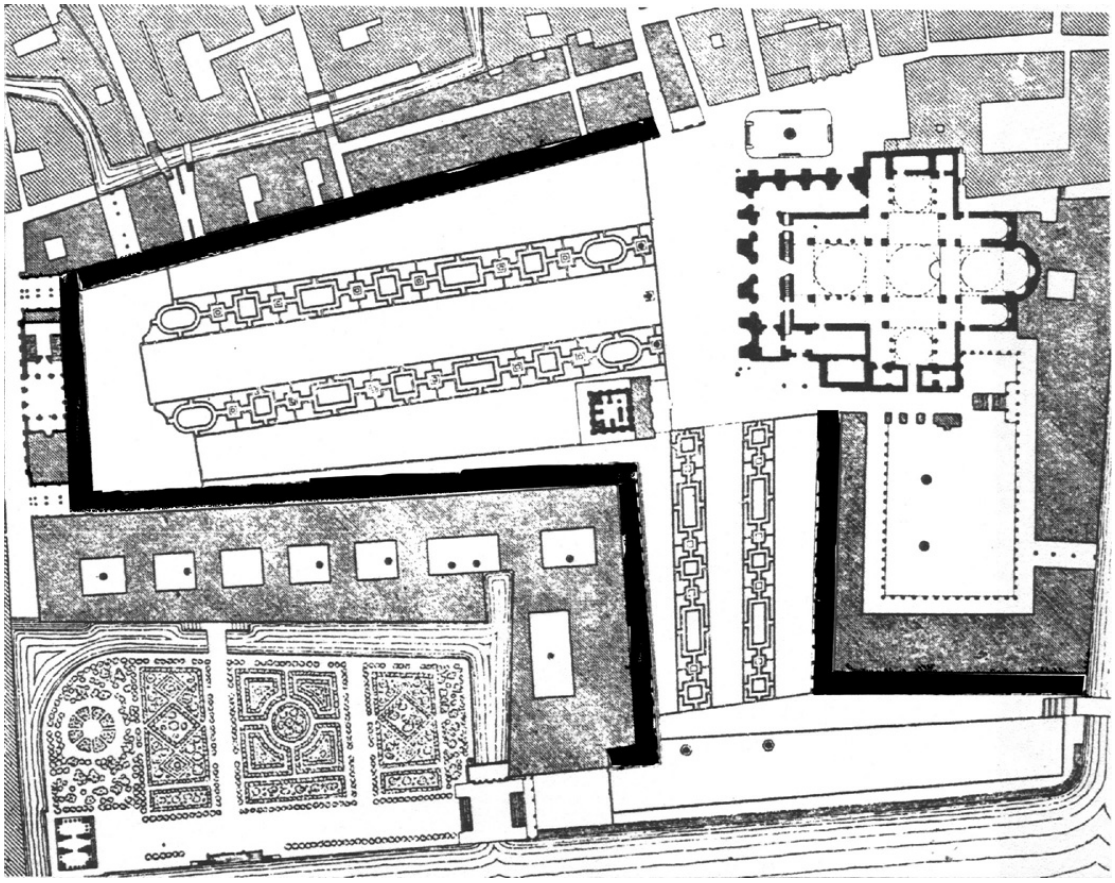
cycle 9



cycle 10

You see, in each cycle, the pink cloud is a latent center, and it guides the formation of the next step of building. In cycle 3, the pink clouds together form a space: and the blue spot they indicate as a salient center to repair and intensify those latent centers, is what becomes the campanile. those things are done. In cycle 4, it is the later version of St. Mark's itself, which gets built. In cycle 5, the whole square is enlarged, expanded out into the Grand Canal. The sequence of ten cycles, as I have drawn them, give us a morphogenetic view of the evolution of the square as a whole, all be it in this case of over a thousand years. So this very beautiful structure that was created, was actually created by patient attention to which places have life, and how people make themselves aware of the latent centers that are there, and how these latent centers may be judged and then enhanced. Which are the latent centers which are capable of, or likely to have life? And what has to be put there to enhance that life?

The Basilica of St. Marks



Plan of St Marks Square, c. 1620

The people and the place. A view towards the Grand Canal

And what we get from all this morphogenesis is not just beautiful geometry, but life, beautiful life. Probably you all know it, but it is important to emphasize that the successful end-product of morphogenesis is a living connection between the people and the place.

X Morphogenetic Unfolding of a Window In a Texas House

I'll show you another example of morphogenesis in architecture. It is a window: a window at the end of a dining room in a house we were building in Texas. The window overlooks Lake Travis, in Austin. What you see in the first picture is the rough window opening, with a few studs showing, that we had already placed, after discussing the subdivision of the opening. Then we began to experiment with the way the window might be designed. To do this, we used surveyor's tape, pinning it up, looking at it, only moving on when we felt something had improved. The five pictures below are from a movie I made of the sequence unfolding. [5] (See the DVD). The movie is a record of the steps we followed. Then at the end, I show the actual tape as it was by the last step (unfortunately I didn't take pictures while we were doing it, so it had to be reconstructed). , a whole lot of tape -- something that in the States is called surveyor's tape. I don't even know if it exists here. But anyway it's just a kind of inexpensive ribbon type thing, which is really useful for making mock-ups of all sorts. In the photograph you see how we pinned lengths of tape, to help ourselves visualize the layout of this window overlooking lake Travis in Austin, Texas.