Miniaturize or Die! Paolo Soleri's City as Architecture

"In nature, as an organism evolves it increases in complexity and it also becomes a more compact or miniaturized system. Similarly a city should function as a living system....Arcology recognizes the necessity of the radical reorganization of the sprawling urban landscape into dense, integrated, three-dimensional cities in order to support the complex activities that sustain human culture. The city is the necessary instrument for the evolution of humankind."[1]

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MINIATURIZE OR DIE!

The fame—or infamy—of Arcosanti, Paolo Soleri's utopian community begun in 1970 in the Arizonan desert, has obscured the relevance to contemporary discourse of his trenchant critique of the dominant modes of postwar development. He expressed his critique most fully in *Arcology: The City in the Image of Man*, the lavishly illustrated volume of drawings and writings that he published in 1969.[2] This book collects his visionary drawings of cities or "arcologies." In this theoretical work which preceded Arcosanti, Soleri (1919-2013) described a concept of the city as architecture that addresses, ahead of its time, the twenty-first century consciousness of environmental sustainability. *Arcology*, a term of his own invention, referred to a fusion of architecture and ecology. Soleri's arcology was not intended to radicalize city planning, but to densify urban living so as to promote intensive social interaction with a minimal impact on nature. In so doing, he addressed the ruination of the natural landscape that had occurred as a result of unrestrained development.[3] Soleri believed, in concord with the zeitgeist of the time, that the metastasizing of urban sprawl was destroying the planet.[4]

His visionary projects always propose immense but dense, high-tech yet ecologically sensitive "arcs," a term that conflates the words "architecture" and "ark." These projects were often intended for harsh and uninhabitable locations: Novanoah for the ocean; Veladiga, perched on a hydroelectric dam; Babel IID, located outside of New York City; and even Asteromo, for habitation in outer space. Soleri leaves us not simply a collection of building plans, but an entirely different lexicon for imagining how cities and the natural world can coexist.

Soleri's admonition "Miniaturize or Die!" is the guiding principle for what he claimed was an anti-utopia, an ecologically balanced idea of settlement he attempted to realize at Arcosanti. Soleri proposed the contraction of cities to a dense miniaturization in response to the obscene sprawl of the postwar, late capitalist city.

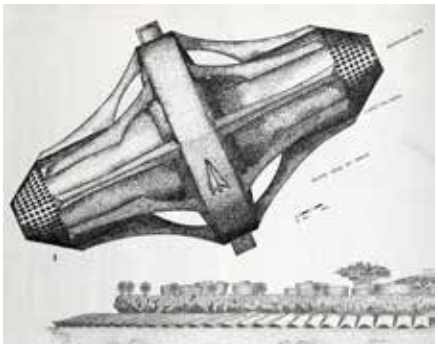

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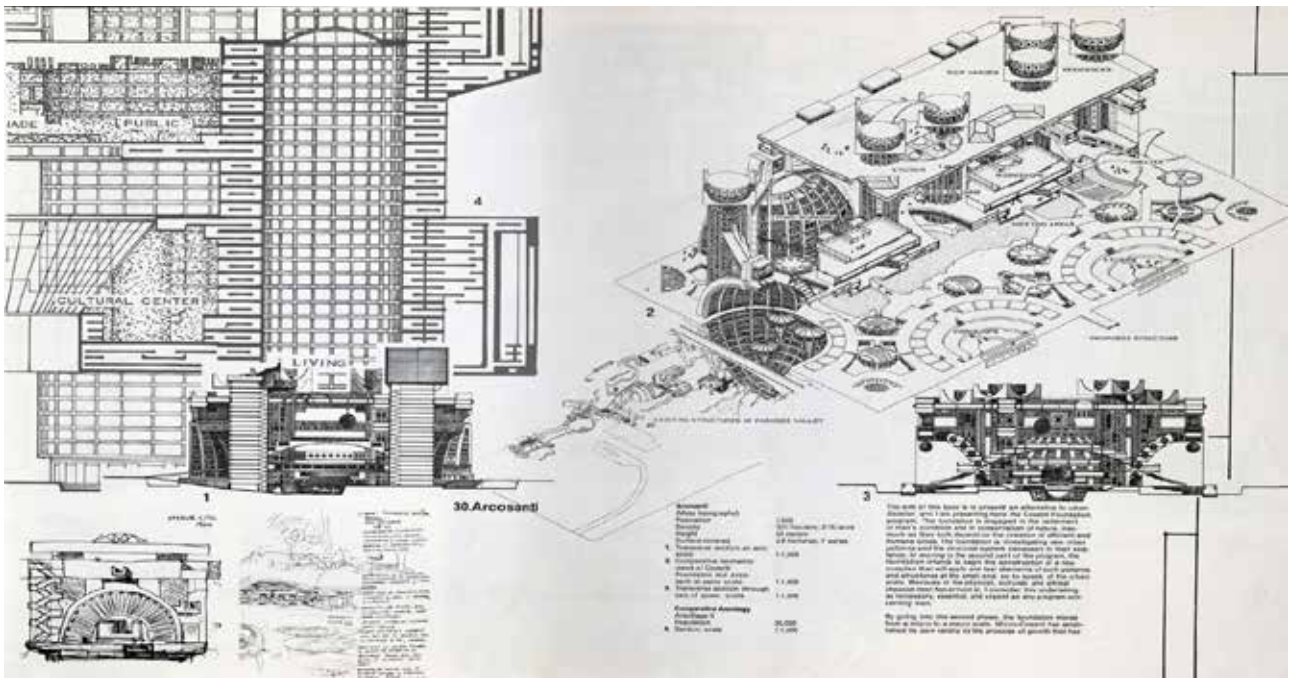
Figure1: Paolo Soleri, *Asteromo* Residential/ research facility in deep space. Paolo Soleri, A*rcology: The City in the Image of Man* (Cambridge, MA: The MIT Press, 1969).

The radical contraction of cities had also been proposed by R. Buckminster Fuller, Yona Friedman, Kenzo Tange and others. But Soleri's work differed significantly from Friedman's projects, which were predicated on dwelling units being plugged into a vast open reticulated space frame. Soleri had more in common with Fuller's Tetrahedron Cities, as the projects were recognizable as highly complex three-dimensional objects—Platonic solids which gain scale only through the context of the landscapes on which the image of the cities are collaged.[5]

Miniaturization refers to compacting an enormous number of people into a very small area. In this way, miniaturization also means minimization: Soleri designed with the intent of minimizing and even reversing the damage to the environment caused by the sprawl of suburbanization, which had damaged the delicate balance of natural systems. Soleri's antidote was to miniaturize, by which he meant to build more compactly, following an organic principle of conservation analogous to the folding over of connectors within the human brain. He borrows this term from theologian Teilhard de Chardin who spoke about a divine aspect of the matter of the earth, of matter becoming spirit, something he refers to as the Divine Milieu, which is the evolution of matter into higher and higher forms of consciousness. Starting from the geological formation of the earth, he sees the evolution of living organisms culminating in the capacity of the human brain. He uses the brain as an example of the compaction of matter into ever greater concentrations, a miniaturization that compresses increasing levels of consciousness into increasingly less material form. Teilhard views the brain as an expression of the formula that nature produces consciousness through the compression of matter and that consciousness requires less matter as it evolves. Humankind is thus a "vast thinking (and conscious) layer" on the earth's surface, the "noosphere."[6] Soleri took this more spiritual idea from Teilhard and made it manifest in matter, in his ideas about miniaturization of cities. He writes:

> ...I had this insight, this eureka, about exploring the implications, in the design of a city, of complexity and miniaturization.

Figure 2: Arcosanti, Isometric drawing of the 1,500 person community. Paolo Soleri, A*rcology: The City in the Image of Man* (Cambridge, MA: The MIT Press, 1969).



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> Take one human brain, for example. If it were two-dimensional it might cover an area of twenty or so square miles. There's so much going on within it that you would need thousands of miles of connectors for it to function. But the human brain, as it has evolved, is an example of enormous complexity which comes about because of its folding over, three-dimensionally, back upon itself, and the notion of miniaturization is intrinsic to this process.
>
> What we've been doing, in a way, in cities like Phoenix and Los Angeles, and most other places—is like taking the brain and saying, "Well, we want this brain to be more in touch with nature," and unfolding it across the land. By doing that, we destroy the brain and destroy nature—we destroy the city and destroy nature—automatically. So I realized that I had to keep things packed together, and see what that does in terms of the richness of life.[7]

One only need think of Rem Koolhaas's analysis of the compaction of Kowloon Walled City as an example of a spontaneously developed instance of what Soleri proposed in his plans for cities. This mode of propagation enables a very local idea to develop into a global one, connecting miniaturization with immensely large scales. The city becomes a growing organism. Here Soleri again:

> Society must become a true organism that will perform adequately. This will be made possible through the power of miniaturization. The physical miniaturization of its container, the city, is a necessary step to this end....
>
> Society is still an awkward animal suffering from a kind of "flat giantism" that nails it to the surface of the earth. It is sclerotic, asphyxiated. It is poisoned by the wastes it profusely produces and cannot expel. It is troubled by inner strife, not so much out of exuberance as out of cellular self-centeredness. It is to a very dangerous degree unfit to live. But society may well be the only road open to man. Its miniaturization will make the difference between his confirmation or his death.[8]

Soleri's stance was a radical one during the period of postwar affluence, when the ubiquitous automobile enabled cities to dissolve and spread over the surface of the landscape, and supported by proposals such as Frank Lloyd Wright's Broadacre City. Soleri countered "flat giantism"with a proposal for architecture and city based on organic principles—rather than expanding endlessly, the city should fold back onto itself, to become more compact, the city would become miniaturized. He compares this to organic systems where one finds in concepts such as minimizing heat loss by having a minimum surface area in relationship to volume. Soleri adopts and applies this analogy from organic systems to his proposal for miniaturization. These cities paradoxically occupy a minimal footprint on the earth and move vertically, in what he claims is a liberation from the surface of the earth, which he believes is a step ahead in humankind's evolution. This compaction, Soleri's believed would contribute to the conservation of the earth and global resources.

Soleri's drawings are captivating in the sheer excess of detail displayed in the finely rendered sectional drawings, plans, and details seen both in his Sketchbooks and, especially, in *Arcology: The City in the Image of Man.* His drawings are not stand-ins for a future city, but blueprints for action, intended for immediate implementation to ensure the future of the planet and its inhabitants. His words are meant to be read in tandem with his evocative drawings in an exuberant meditation on the effects that miniaturization of urban sprawl would have on the earth.

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Figure 3: Paolo Soleri, Arcosanti, Model of Project, courtesy of Paolo Soleri Archives.

1. The implosive contraction of human communities would cause a proportional expansion of the earth. The continents, crossed by huge urban ribs would remain almost virginal or would return to that state, where they are not cultivated. A global process of "recovery" and conservation to the entire benefit of the human species and of the animal and vegetable kingdom.

2. The demographic explosion poses logistic and dimensional problems of entirely new scale, and which will be resolvable with intensely dynamic procedures possible only in tridimensional systems analogous to biological organisms.

3. The concept of an individual ubiquity which permits the individual to be at the same time city dweller and country dweller is intrinsic to the complexi-miniaturizing contraction.

4. The emotive-aesthetic possibilities which in the end are man's finalities would become explosive insofar as within the solid systems the new creative possibilities would be as big as they are unforeseeable.[9]

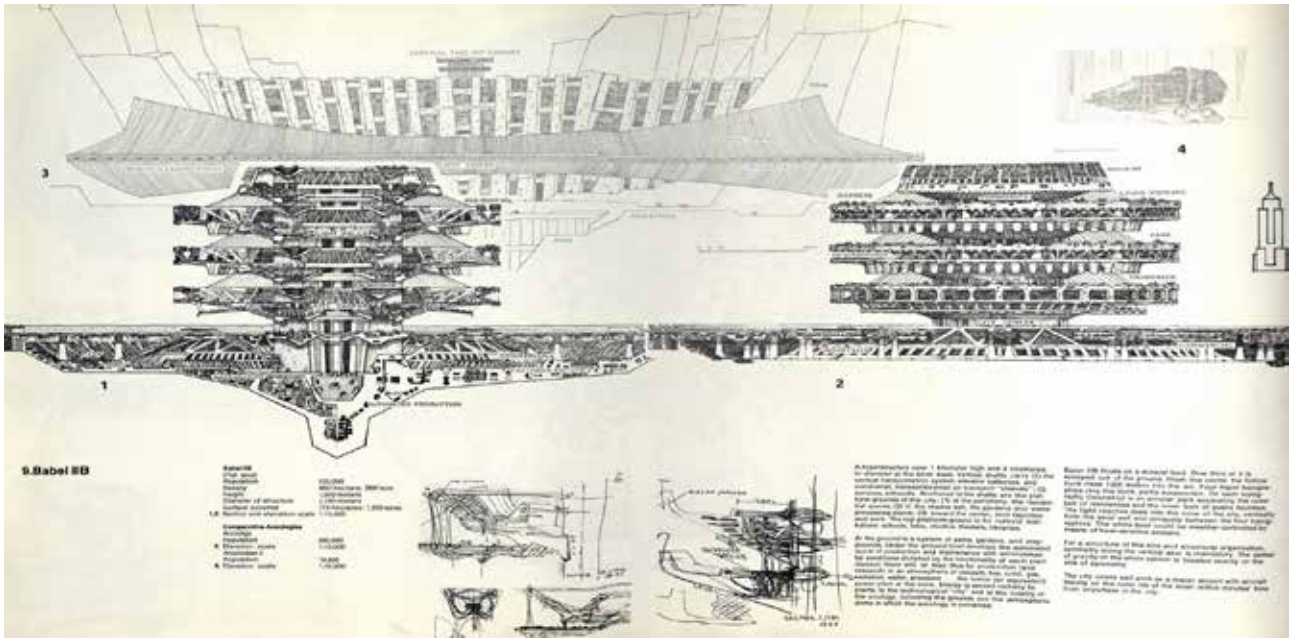
Miniaturization also proposes a new relationship to technology. Soleri blamed technology for its role in environmental degradation while also keeping faith in the technology necessary to build in an ecologically responsible and sustainable manner. Soleri believed that miniaturization would create an "urban implosion" and would have the most benign, if not a healing effect on the natural landscape. But building an Arcology, a miniaturized city is fully predicated upon the use of technology. Soleri justified this apparent paradox by stating that "the reason for the existence of technology is the necessity for the miniaturization of the world of man." Soleri argued that the technocrat did not understand the true necessity for technology; otherwise, he would have prevented the conspicuous mistake of the car and suburbia.[10]

Soleri's projects are thus predicated on an idea of progress through technology. He believed that a radical symbiotic relationship between the city and its inhabitants could be attained through technology; cities would use solar power and other renewable resources to be self-contained and self-supporting. In Soleri's vision, each city would remain isolated and compact, generating its own power, utilizing local materials, and reusing its own waste, aided by the use of technological means. Each city was meant to be an isolated entity, separated across the landscape and oceans, allowing all the land and water between each city to return to its primordial state.

Since the publication of *Arcology: The City in the Image of Man*, only Arcosanti has been built. Or rather, a portion of the much larger project has built. It was Soleri's home until his death last year and its life still continues. Recent plans have been to create a live/work community for the Paradox Program, who are "digital insiders" creating spaces within the internet, living remotely, yet connected to the outside world. An enormous "energy-apron" that would spread below the entire site will utilize advanced solar technologies to harness natural energy and bring the complex in harmony with the environment. In this revised idea of an arcology, technology is necessary to be self-sufficient in energy needs for day-to-day life but also to power a proto-internet of remotely located shepherds of the land.

Soleri embraced the role of technology as inherent to the human organism of urban life.[11] He believed that the giant structures of his cities would function as a "superorganism in the service of a physico-mental mass made up of the

innumerable feeling individualities which inhabit and constitute it."[12] The city, a conflation of sentient and sapient beings and their biological bodies, would be merged with the technological. His metaphor is direct: the city, like its inhabitants, is made of cells, functioning as a cybernetic, self-organizing system.[13] This idea then relates the scale of an organism to the scale of the city and to the scale of the earth, understood through technology. This was his vision for Arcosanti and was his great dream to have a pristine natural earth dotted with remotely located dense cities that would be connected by an ephemeral digital network.



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In *Arcology: The City in the Image of Man*, Soleri proposes thirty cities, the last one being the initial design for Arcosanti. Throughout the book, one has a sense that Soleri is not presenting the cities as unattainable utopias, no matter how fantastical they may seem. His designs are detailed and highly articulated geometrical studies, not "ambiguous objects" but blueprints of projects to be constructed over time. He begins with Novanoah I, a direct reference to the building of a contemporary ark. Novanoah I, a city for 400,000 persons with a density of 60 people per acre, 1,000 meters high, covering 6,800 acres, was designed for the continental shelf or the open ocean. It is a floating city, whose subsurface structure calls for an automated industry, "extracting and harvesting" from the sea the "food stuff, animal and vegetable, water and minerals and chemicals" while "its upper structures would be for living, learning, and working."[14]

An important aspect of miniaturization is building complex three-dimensional structures verticality on a relatively small footprint. The lack of verticality in Novanoah I is explained by the nature of floating and self-propulsion required on the sea. Yet Soleri was looking for the even greater densities afforded in taking advantage of the three-dimensional surface. As a scalar device, each arcology is shown in the book with a silhouette of the Empire State Building. Interestingly, the skyscraper had already been conceived of as being a simultaneous exemplar of minimization and maximization. But in Soleri's case, the skyscraper as a minimizing/maximizing typology is taken to an entirely different level. Rather than a city made up of separate skyscrapers, his concept of miniaturization is

Figure 4: Paolo Soleri, Babel IIB, a city for 520,000. Surface covered, 1,920 acres, height 1,050 meters. It sits on a mineral bed, with a central power plant and the whole bowl could be weather-controlled by heat-sensitive screens. From: Paolo Soleri, *Arcology: The City in the Image of Man* (Cambridge, MA:The MIT Press, 1969).

predicated on a super-building, a skyscraper that is at an unprecedented scale in which all of the various constituent elements of the city are contained. While Novanoah I is "merely" the height of the Empire State, his Novanoah II was to be as much as three times the height of the Empire State Building, with a population of 2,400,000, a maximum height of 1,600 meters, and a coverage of only 6,900 acres with a density of 345 people per acre. And, at almost four times the height of the Empire State building, Babelnoah I is even taller.

Soleri's comparison of his arcologies to the Empire State Building, is key; the juxtaposition shows that he considered them objects as much as cities, and that they therefore conflate architecture and the city.

The arcologies that fill the pages vary in population and typology but are particular to specific geological configurations. Arcoforte, for instance, is constructed on a cliff that is too harsh for individual dwelling. As Soleri states, "an arcology is the ideal way to counteract difficult climactic situations."[15] Herein lies one of the great contradictions of his proposals. Soleri's structures are so massive that they create their own climate, both within the arcology and without. Soleri optimistically discusses this impact in his description of Babel IIA, a city of 800,000 destined for flat or marshy land. With a height of 1,150 meters, a density of 263 people per acre and an overall area of 3,085 acres, eight residential live/work towers hold apart two platforms, the lower designated for industries, shopping, and the like, and the upper for cultural institutions. The upper platform, 4 kilometers by 2 kilometers,

> Projects an enormous shadow on the space below....A substantial climatic alteration is thus produced....The energies derived from waste processing and from industrial surpluses can be used for further conditioning of the land surrounding the city. In this way the city climate is a milder reflection of the regional climate.[16]

Waste, like agricultural production, clean water, raw materials and fuels, points to the implicit question of an arcology's ecologic relationship to the planet. Did Soleri deceive himself? How does this impact differ from the waste heat expelled

Figure 5: Arcosanti, courtesy of Paolo Soleri Archives.

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from buildings in a city that gives both the building and the city a different and more noxious microclimate? Doesn't the return to a pristine and wild planet as Soleri suggested ignore the necessity for the consumption of water and raw materials, the basic life support systems required for life within an arcology?

These contradictions were exemplified at Arcosanti, the imperfect realization of Soleri's theoretical project. Begun in 1970, the settlement was intended to accommodate 1,500 inhabitants in the desert seventy miles north of Phoenix, Arizona. For Reyner Banham, Arcosanti demonstrated a disconnect between territory and inhabitation:

> In the end, it seems to me, neither Wright nor Soleri has produced structures that are, in any normal sense, sympathetic or proper to the desert. Both brought an inherently alien vision with them and imposed it on the desert scene, and the results are, in their way, as foreign as the mad townscape of Las Vegas.[17]

This is perhaps not fair. Soleri imagined his project was built in tune with nature, much as he observed in the Anasazi cliff cities. Soleri was clear in stating that the projects in *Arcology: The City in the Image of Man* were to be built over time, but one can question the ultimate scale of the city. Only a small portion of his visionary plan for Arcosanti has been built, and this invites reflection upon the applicability of any of his projected cities. It is perhaps in this way that Soleri's work is not a utopia in the sense of the modern movement (i.e., visionary schemes that are not intended to be fully realizable). Perhaps Soleri's ambiguous relationship, a critique of, yet a dependence upon existing the existing economy and technologies opened him up to critique even as he began building.

Soleri's position vis-à-vis technology has been objected to at various times over the last forty years, even if he had good intentions regarding comprehensive design, a humanized technique and a sensitivity towards the harnessing of natural phenomena such as wind and sun.[18] More recently, Arcosanti has come under criticism as new utopic proposals regarding ecology and green strategies have come into vogue. His proposal assumes some very unsustainable practices if one thinks of placing a large population in a desert where water is scarce, and far from existing urban centers. Despite these criticisms, it is certainly worthwhile to look again at Soleri's work and particularly his many theoretical writings in a contemporary moment in which we must respond to the effects that urban overdevelopment have wreaked on the earth's ecological balance.

Despite the impracticality of Soleri's arcologies, their theoretical basis was extraordinarily prescient. His view of the dense urban center as a vehicle for sustainable development is one that has come increasingly to the fore in recent discourse. His ideas offer a corrective to the many architectural projects that are promoted as sustainable but use the energy efficiency of their envelope and systems to disguise their contribution to suburban sprawl and inaccessibility to public transportation. While Soleri's ideas were impractical in their dissociation from the context of the existing urban cores, a melding of his advocacy for miniaturization and his belief in the benefits of harnessing technological progress offers a model for the development of the contemporary landscape. One problem among many remains the lack of a political apparatus for effectively implementing this approach.

ENDNOTES

1. Paolo Soleri, *Introduction to Arcology,* arcosanti.org/Arcology.
2. Paolo Soleri, *Arcology, The City in the Image of Man* (Cambridge, MA: MIT Press, 1969).
3. Soleri attributed this destruction to what he termed "woman-kind's" excesses. This term is one of scores of neologisms coined by Soleri, a reworking of language that he felt necessary to speak of a contemporary society based on a new spiritual, social, ecological, and political order. Paolo Soleri, "Wo-Man—Space—Justice," in *Technology and Cosmogenesis* (New York: Paragon House Publishers, 1985), 23-32.
4. Soleri, *Arcology,* 13.
5. Examples include Fuller's grounded Tetrahedron City in Yomiurilland, Japan (1968); a floating Tetrahedron City of one million inhabitants (1965); and the Cloud Structures, 1.5 mile diameter floating cities of 1,000 inhabitants (1962).
6. Soleri is influenced by Teilhard de Chardin, whose concept of the "noosphere" has been interpreted to be a prescient idea about digital connectivity, i.e. global consciousness, a collective brain, etc. See Teilhard de Chardin, T*he Divine Milieu: an essay on the interior life* (New York: Harper, 1960).
7. Paolo Soleri, "Beginnings, Ends and Means: An Introduction, with John Strohmeier and Kathleen Ryan, December, 2000," in *The Urban Ideal: conversations with Paolo Soleri*, John Strohmeier, ed., (Berkeley, CA: Berkeley Hills Books, 2001), 34.
8. Soleri, *Arcology,* 5.
9. Soleri, "Utopia e o Revoluzione: Utopia and/or Revolution," (sic) Translated by Jules Noel Wright. *Perspecta* 13 (1971):284. The selection in *Perspecta* refers to from the conference proceedings of the *Utopia e/o Rivoluzione* conference at the Polytecnic of Turin in April 1969. Participants included Gruppo U e/o R, Ronaldo Giurgola (sic), Paolo Soleri, Architecture Principe, Archigram, Yona Friedman, Utopie, and Archizoom.
10. Soleri, *Arcology,* 5.
11. With this in mind, and on a more theoretical level, he discussed two crucial points: first, that "The legitimacy of the city has its own origin in the nature of man (in the vectorality of life)," and second, that "the city has to discover its own morphology within the discipline that governs each physical, biological, and mental phenomenon." In Paolo Soleri, "Utopia e o Revoluzione," 281.
12. Soleri, "Utopia e o Revoluzione," 5. *"La città è un superorganismo al servizio di una massa fisicomentale costituita delle innumeri individualità senzienti che l'abitano e la costituiscono."*
13. The reference to this text is from Dana F. White "The Apocalyptic Vision of Paolo Soleri," *Technology and Culture*, Vol. 12, No. 1 (Jan., 1971): 80-81.
14. Soleri, *Arcology,* 37.
15. Soleri, *Arcology,* 48.
16. Soleri, *Arcology,* 52.
17. Peter Reyner Banham, *Scenes in America Deserta* (Cambridge, MA: The MIT Press, 1982), 61-62. Cited in Alessandra Ponte and Marisa Trubiano, "The House of Light and Entropy: Inhabiting the American Desert," *Assemblage*, 30 (Aug., 1996): 27.
18. Jeffrey Cook, review *"Arcology: The City in the Image of Man* by Paolo Soleri; The Sketchbooks of Paolo Soleri by Paolo Soleri," in *Journal of the Society of Architectural Historians*, Vol. 31, No. 1 (Mar., 1972): 73.