A Journal for Ideas and
Criticism in Architecture

Published for The Institute
for Architecture and Urban Studies

By The MIT Press

Fall 1977: 10

OPPOSITIONS

In this issue:

A Journal for Ideas and
Criticism in Architecture

Published for The Institute
for Architecture and Urban Studies

By The MIT Press

Fall 1977: 10

OPPOSITIONS

In this issue:

Oppositions 9–12
Subscriptions: one year (quarterly)
Students (photocopy of current I.D. required): $25
Individuals: $35
Institutions: $50

Oppositions 5–8
Students (photocopy of current I.D. required): $30
Individuals: $40
Institutions: $55

Oppositions 1–4
For information contact
The Institute for Architecture and Urban Studies

Make checks payable to *Oppositions* and send to:
The MIT Press Journals Department,
28 Carleton Street, Cambridge, Mass. 02142

All orders must be prepaid.
Add $3 for postage for each foreign subscription.
Replacement copies: $15.
Please notify The MIT Press six to eight weeks in advance of any change of address in order to ensure proper delivery of the journal. Include old address and when possible, address label.

Application to mail at second class postage rates is pending at Boston, Massachusetts, and additional mailing offices.

OPPOSITIONS is a journal published for
The Institute for Architecture
and Urban Studies
8 West 40 Street, New York, N.Y. 10018
by The MIT Press
28 Carleton Street, Cambridge, Mass. 02142

Printed in the United States of America
ISSN 0094-5676

Oppositions

Behind The Mirror: On The Writings of Philip Johnson[1]

Peter Eisenman

1

1

1 Philip Johnson in the Glass House, 1960.

2 **In architectural works, man's pride, man's triumph over gravitation, man's will to power assume visible form. Architecture is a veritable oratory of power made by form.**
Friedrich Nietzsche,
quoted by Philip Johnson, "The Seven Crutches of Modern Architecture," 1954.

Philip Johnson may be the last architect of the Enlightenment.

Words tend to become tools of knowledge . . . tend to increase interest in the values of the description of things and not in things themselves . . . words are for the mind, not the eye.
Johnson, "Why We Want Our Cities Ugly," 1967.

Philip Johnson is an essayist, an anti-*philosophe*. After reading all that he has written, one has a sense of having been inundated with an erudition rather than confronted with a body of theory. His writings are a monument, perhaps more so than his buildings, to an education and culture that are no longer with us. His essays, while admittedly not of the belles-lettres tradition, nevertheless possess wit, charm, and devilish insight. What on first glance appears to be somewhat casual writing, tending in fact toward the facile, conceals a rapier-like fineness which, without drawing blood, slices the world into slabs of his measured content. For Johnson, words are thought, and art is feeling. His writing is a constant struggle to have beauty triumph over idea.

Ideas keep us from the agony of art.
Johnson, "Beyond Monuments," 1973.

This essay is not intended to be a discussion of the complete writings of Philip Johnson. It attempts to place his widely dispersed written *oeuvre* into some understandable framework, and thus for the first time tries not only to see the range of ideas inherent in Johnson's writings but also to give them their intellectual due; to demonstrate that they are not, as he himself would have us believe, merely the exotic banter of an elite connoisseur.

And, although Johnson would profess to the contrary, would disclaim all manner of knowing, it will be my contention that in his tremendous outpouring of words there is a highly selective attitude which subtly suggests another Johnson: the ideologue.

Words mean what you want them to mean.
Johnson,
paraphrasing Through the Looking Glass *in an informal talk at the Architectural Association, London, 1960.*

The writings discussed here are intended to isolate and position his ideology. In doing so, the usual classification of writings according to chronology or according to the building types of individual architects discussed in them is eschewed for a litmus of another kind. Thus, the subject matter here is not necessarily all of Johnson's best or even most important writing; some is not "vintage" Johnson. But insofar as any text contributes to our understanding of the ideological mind, it is worth considering.

What follows therefore is not simply an apologia for his activity in architecture. Nor is it merely a gesture to one of the few architects who from the 1930's to the present has stood against the philistinism of conventional practice, who created a climate for serious discussion of architecture, and who fostered a generation of young architects as few others in his position have. It is rather an attempt to make Johnson stand up and be counted, to be seen, despite himself, for the impact he has had on our architecture (not that we necessarily believe him, nor does he want us to), and to bring the force of his consciousness to the public domain. That consciousness must be seen for the seriousness of its discourse.

On the other hand, it is perhaps a little ironic to expose what turns out to be Johnson's self-made myth of himself as a counter-intellectual gadfly. Yet it is necessary to do so in order to allow history to write its own myths. Moreover, in a time of diffusion, a time of what many people would call post-modernism, the sensibility that is Johnson's needs to be identified.

The word kills art.
Johnson,
"Style and the International Style," Barnard College, 1955.

On Functionalism
All architecture is more interested in design than in plumbing.
Johnson, "Where Are We At?", 1960.

You can embellish architecture by putting toilets in.
Johnson,
"The Seven Crutches of Modern Architecture," 1954.

There can be little doubt that by the late 1920's Johnson, the young philosophy student out of Harvard traveling in Germany, understood and distinguished two intersecting currents in modern architecture: one, the moral sanction given to the forms of the machine aesthetic; the other, the political sanction given to the polemics of the machine society. These intersected and had a common root in the doctrine that was known generally as functionalism.

It is clear from his first published essay on architecture that Johnson recognized the potential for such a dual practice to have a certain paralyzing effect on any form of aesthetic idealism,[2] and it is this idealism that must be seen as the underpinning of his conception of architecture. Thus, in the brief period from 1931 to 1933, Johnson used his writings to construct a very intricate counterposition to functionalism. Careful, clever, moving among people and ideas in the half-light of the euphoria of the late twenties and early thirties, he cut quietly and subtly at the moral and political roots of the dual doctrine of modern architecture. He did so not with theory or polemic, but by infiltration—by developing a fifth column that paraded as the standard-bearer of that dual doctrine, seemingly marching alongside the cadre of architectural modernists who carried the enthusiasm of those early years.

It is only when one examines, with almost forty years of hindsight, the disintegration of that movement that one can see mirrored in the American context the cunning and efficacy of his activity. The substance of this activity and the tactics he employed can be pieced together from many of his texts. Johnson's reasons for writing them, however, are more elusive; yet it will be argued that it is precisely these reasons that remain the key to understanding the essential Johnson. In short, why should anyone seek to erode the basis of his own activity? That is, why should someone who is overtly propagandizing modern architecture at the same time be covertly eroding its basic tenets? This essay can only begin to probe the surface of such a phenomenon. It will remain for scholars and historians to elaborate the full implications of the paradox: the narrow distinction between ideologue and anti-ideologue, between artist and connoisseur.

To see Johnson's position in relationship to functionalism is the first step in unraveling this riddle.

For Johnson, architecture in 1931 had three attributes: first, it was progressive; second, it stood for originality and individual genius; and finally, it represented the practical expression of solutions to American building problems.[3] Now while we can read "progressive" and "practical expression" as two aspects of functionalism, the second attribute, concerning originality and individual genius, seems to contradict the other two. Moreover, when the architect said, "Can I make this building serve its purpose?" Johnson meant, "Can I make it look as if it is serving its purpose?" This *sotto voce* contradiction of functionalism belies a real desire for a return to some *Gesamtkunstwerk* conception of architecture.

Beautiful workmanship of the machine; . . . rather than imitation by the machine.
Johnson, Introduction to Machine Art, *1936.*

Beyond the practical advantages, modern architecture is beautiful. For while the modern architect accepts the machine age, he also transcends it.
Johnson, Built to Live In, *1931.*

Time and again, Johnson's technique is to drive a wedge into an apparently monolithic phenomenon. This technique is articulated for the first time in the two different versions

of his review of the Berlin Building Exposition.[4] Here he distinguishes between the empiricism and the positivism of the Anglo-German classical functionalism of Walter Gropius and the essentially Neo-classical idealism of Mies van der Rohe. Describing the house by Mies at the Exhibition, Johnson says that it is not, as so many American architects then preferred to think, *purely functional*. This he said at a time when the polemic that accompanied this building and many others like it was couched in strict functional dogma. For Johnson to recognize and expose the incipient hegemony of functionalism is not only characteristic of his personal style but also serves his own ideological biases well.

From this essay on, Johnson never loses an opportunity to use Mies as a cudgel against functionalism. His talk in 1961 honoring Mies is no exception.[5] In it he calls the functionalists "literal-minded believers in . . . *die neue Sachlichkeit*" who felt that "architecture was now at last purely functional."

The second architect Johnson uses to erode the underpinnings of functionalism is Karl Friedrich Schinkel. Johnson's identification with Schinkel is no mere stylistic affinity. His elevation of Schinkel to a position of primacy among all architects of the Western tradition goes beyond questions of historical accuracy or personal preference. At first glance, in the attribution of priority both to Schinkel over Soane, and Mies over Le Corbusier, there is suggestion of a desire to create a Germanic hegemony, raised simultaneously over the Anglo-Saxon and Latin worlds. But there are subtler implications in this association. For Schinkel has been considered by many to be the first modern architect; he was the first great eclectic. Following the historical sequence of the Renaissance, the Baroque, and the Rococo, styles with a formal consistency and an ideological imprint, Schinkel broke with both the sequence and the consistency. Yet in precisely the sense that Schinkel was modern he was also decidedly un-modern, for he was a Neo-classicist. And Neo-classicism in its concern not only for backs and fronts but also for sides of buildings, and thus for isolated blocks, was ideally suited to the romantic vistas of German nineteenth century landscape. And it is in the context of this Germanic Neo-classicism that many of the German architects of the twenties and thirties invoked Schinkel's name *against* the specter of modernism in Germany. This fact was not lost on Johnson. So while the selective and analytic eclecticism of Schinkel was in his own time modern, Johnson's invocation of Schinkel the Neo-classicist, as a representative of a sensibility which in a contemporary sense is decidedly anti-modern, is quite a paradoxical confection. Eclecticism was, for Johnson, anti-ideological. It represented an alternative to the first truly synthetic and consistent *Weltanschauung* since the Rococo—that of the International architecture of the Bauhaus. Thus it is with the term "eclectic" that Johnson begins to subvert the hydra-headed ideology of modernism.

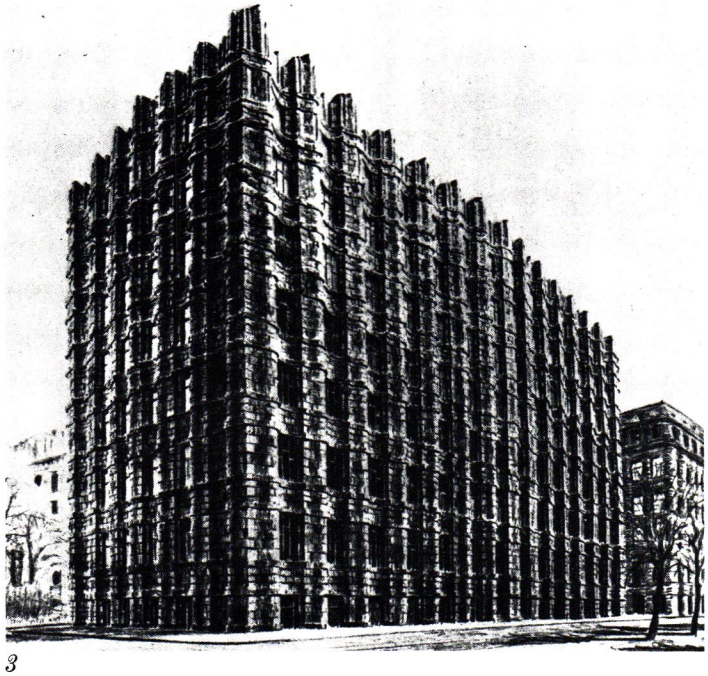
Now, having said all this, how are we to interpret Johnson's self-proclaimed image of himself, admittedly of a later date, as not merely an eclectic, but a "functional eclectic"?[6]

It is obvious in retrospect that "functionalist" was a vague characterization applied as an ethical balm to objects that might more appropriately have been called either expressionist or rationalist. Yet it is also true that functionalism with its moral imperative seems to deny anything that could be considered eclectic. Conversely, eclecticism by its own definition abjures those principles of "fit-to-form" that are the underpinnings of functionalism. Thus Johnson's self-invocation of the term "functional"—which he also rejects—must be seen to have several purposes. First, the pairing of the term "functional" with the term "eclectic" cuts the former's ideological edge. (It is no accident that Alfred Barr called Hannes Meyer a "fanatical functionalist," by which he really meant fanatical Marxist.)[7] Second, the term "functional" is useful to Johnson in that it identifies him with main-line modernism. But the operative term in the pair is in fact "eclectic," for it gave Johnson room to move.

Since eclectic architecture is an architecture of connoisseurs and not of purists, it serves to protect architectural borrowings from questions of principle. Thus, we see one of the effects of Johnson's multiple inversion. Eclecticism allows him to choose from history whatever forms, shapes, or directions he wants. In both his architecture and his writings it allows him the freedom of a first leap from the

2

2 Kline Science Center, New Haven, Connecticut. Philip Johnson and Richard Foster, architects, 1965.



3

3 Drawing for a bank, Dresden. Hans Poelzig, architect, 1921.

mainstream. And if one is as knowledgeable as Johnson, who knows his sources better than anyone, then one can create new images from little known references. Hence the scalloped, cylindrical pastiche on the tower of the Kline Geology Laboratory at New Haven (fig. 2) may be seen to derive from Hans Poelzig's drawing for a bank in Dresden (fig. 3), published in an obscure monograph by Theodore Heuss in 1939. The term "eclecticism" in this way provides a context that has no rules, for rules allow everyone to play; it makes for an elitist fantasy masquerading as a populist game.

Johnson's self-proclaimed pairing of functional/eclectic can now be seen to be cooperative with his equally fundamental linking of the terms "international" and "style." In the former pairing, "functional" is drained of its morality and "eclectic" seems to deny the ideology inherent in style. In the latter pairing, the ideology is taken from the term "international," and "style" is given a certain morality. The implications of these two pairs when taken together have a profoundly subversive impact on the concept modernism.

On Style

We might even question whether words like "value" or "morals" are applicable to an architectural style.
Johnson, "Whence and Whither," 1965.

A discussion of style in itself, even without the ramifications of "international," is not entirely innocent. To many, such a discussion involves not merely a search for beauty, as Johnson would have us believe, but often a modification of the architectural language itself. But in Johnson's pairing of the terms "international" and "style" there is an elision, which results in an even more elaborate ideological confection than "functional eclectic." For the combination is more complex, less obvious, and more intrinsically loaded. Like the pairing of "functional" and "eclectic," it combines what might have been thought at the time to be mutually exclusive terms.

Since the mid-nineteenth century, the discussion of style has exhibited two parallel tendencies. The one that became the central tradition of German art history since Gottfried

6 Semper was concerned with classification and typologies. The other, coincidental with the rise of the German state, was tinged with a latent nationalism—with the idea that Gothic and Baroque were German in their essence. Johnson must have been aware of this latter interpretation of style.

Nevertheless, as early as his first writings on architecture, Johnson used the term "modern style" to refer to the new architecture which up to then had been referred to in the European context as the "Modern Movement" or "Modern Architecture."[8] And at the same time, Johnson acknowledged its "international" character.[9] But as Johnson described this character, its attributes seemed less those of a principled appeal to internationalism than of a generalized machine culture. They were a mix of aesthetics and pragmatics—steel frame, glass wall, and flat roof; standardized construction made possible by mass production; the façade as a reflection of the more important plan. One year later, in 1932, Johnson along with Henry-Russell Hitchcock and Alfred Barr, using similar principles, replaced the term "modern style" with the uncomfortable liaison of "international" and "style." This was the ultimate reduction. From "Modern Movement" to "Modern Architecture" to "Modern Style" to "International Style":[10] in the first transformation, the ideological content implied by the word "movement" was neutralized by the word "architecture"; in the second transformation, the neutrality of "architecture" gave way to the non-ideological implications of "style"; and in the last transformation, the politically explosive term "international" became attached as merely an adjectival appendage to the notion of style.[11] Moreover, the final incarnation of the term did not even include the notion of "modern."[12] As will be seen, this sequence of subtle linguistic transformations holds a further key to Johnson's intellectual position.

The International Style, for example, needs no one to say it was good or it was bad. The International Style is its own justification.
Johnson, "Where Are We At?", 1960.

In most of Johnson's definitions, the International Style is seen as containing the same ingredients as the Modern Movement; and it is no mere accident that on first reading its principles seem to square with those of main-line modernism. In the catalogue *Modern Architecture* which accompanied the 1932 exhibition, the principles of the International Style, as first elaborated by Alfred Barr, are volume, regularity, flexibility, and a fourth principle comprehending technical perfection, proportion, composition, and lack of ornament. In the book *The International Style* of the same year, the principles are reduced to three: emphasis on volume; regularity as opposed to symmetry; and dependence on the intrinsic elegance of materials, technical perfection, and fine proportions, as opposed to applied ornament. The elaboration of principles in these terms conveniently allows Johnson and Hitchcock to elide modernism with the International Style and to group Mies, Gropius, and Le Corbusier together. But how, for example, does the principle of volume square with Johnson's own description of Mies? Volume is "space enclosed by planes or surfaces," says Johnson, a definition which really only befits Le Corbusier's early work; Mies, according to Johnson, thought of his houses as anything but volumes, as screens connecting inside and outside. Thus, even though the work of these two architects might have looked similar, both making use of a stripped-down, unembellished set of white planes, only the concerns of Le Corbusier seem parallel to other modernist activity. By grouping these two together, Johnson negates the unique significance and impact of modernism, namely the potential change in the nature and meaning of the architectural object, and the radical change proposed in the relationship of viewer to object.

Secondly, for Johnson to reduce "modernism" to a style is one thing, but to attempt the same tactic with the term "international" is quite another matter. For the word has a very complex currency. It had already been used by Walter Gropius, in his book *International Architektur* of three years previous, to signal the ascendancy of Bauhaus influence beyond the boundaries of Weimar culture. In another sense, the term was obviously imbued with the aspirations of the left. Thus when "international" was put together with "style," the two had a corrosive effect on one another. The moral and political force of "international" became compressed—its pulse was lost. It was now the

term "style" and not the term "international" which was injected with ideological content—not too surprisingly, in view of Johnson's particular sensitivity to the term "style," which he had put forward in the first place.

In this way, the Modern Movement was subtly transformed into the International Style. And indeed, the linguistic transformation marked an actual transformation which was to characterize American architecture until the late sixties. Furthermore, what can be seen in retrospect to have been a clever manipulation of the ideology of the Modern Movement in Europe transformed a pluralistic conception of the good society into an individualistic model of the good life and thus reduced a cultural alternative to a stylistic nicety.

This reduction of modernism to a discussion of style drained out the ideological implications of the European architecture of the twenties and packaged them neatly into a consumable fashion that was to burst rampant onto the American scene after World War II. Corporate imagery in the guise of modern architecture inevitably became an object for consumption. Considering the ultimately left wing ideology implicit in much of what was in the twenties the mainstream Modern Movement in Europe, it is not surprising that Johnson would have attempted to subvert these implications. Whether this transformation was a conscious endeavor is not at issue; the fact remains that in Johnson's writing this ideology is reduced to style.

It is in this context that style becomes architecture for art's sake. His conception of style allows Johnson to break from the implicit ideology of modernism to his own iconoclastic eclecticism. But to situate modernism in a modern style—and thus, to remove its ideological content—implicitly transforms his own latent eclecticism into an ideology. Paradoxically, and as a final turn, the International Style must then be defined by Johnson as a counter to the confusion of a continuing eclecticism.[13]

The circle has closed. One is left with no opening, whether we opt for Johnson on style or Johnson on eclecticism. For, in fact, his attack is on the ideology of "modernism" and not on the politics of "international." Again he is clearing ground for himself, and the International Style is the cover for the operation. The International Style thus becomes both the label and the sanction for his own latent ideological beliefs. Often in such games of hide and seek the smokescreens become confused with the reality. One often falls into intellectual traps that in fact were set for others. But in Johnson's case, the strategy places him outside the modern canon not only functionally, but also formally. Again this is Johnson the iconoclast driving holes into the bottom of the ship of modernism, rocking it, and then jumping before anyone realizes that the boat is sinking.

On Architects

Architecture, one would think, has its own validity. It needs no reference to any other discipline to make it 'viable' or to 'justify' its value.

Johnson, "Where Are We At?", 1960.

If we were to leave Johnson on functionalism, and on style, we would be leaving the paradox he has introduced into these terms without a plausible explanation with respect to his own architecture. However, a third category of discussion, on architects, while it presumably leaves the world of ideas for the world of people, exposes a set of ideas on architecture that are perhaps more easily accessible to us. For much of what Johnson says about other architects will, in reality, reveal more about his own architecture and in turn will begin to create the lens that we must inevitably focus on him. For in fact, when Johnson is speaking about the work of other architects, he is often speaking about himself. This produces a kind of reversal of historical roles, whereby it is "Boswell" who becomes a surrogate for Johnson, the biographer who becomes autobiographer. Therefore, while his body of writing seems to be yet another attempt to distance himself not only from his own architecture but also from himself, in fact it brings us closer to him. And it is through this surrogate of other architects that another inversion in Johnson's writings can be noticed. For example, when speaking of "functionalism" or "style," terms which are supposedly laden with idea content, he seems to be trying to undermine their principles. But when he is speaking of other architects, supposedly a more subjective category, he appears to be consciously elaborating

his own principles. Taken separately, there is nothing unusual in either of these activities. But what is rather incongruous—and perhaps unconscious on Johnson's part—is the combination of the two: the simultaneous urge to reduce the idea content in terms which are generally thought to contain ideas and, conversely, to infuse ideas into the context of personalities. For example, the set of recurring themes that appear in Johnson's architecture, which would most appropriately be discussed in the context of the International Style, are not; instead, when he turns to another architect such as Buckminster Fuller, one of Johnson's favorite targets in the post-World War II period, the first of these themes—the problem of entry and approach—becomes a primary issue. How does one put a door in a dome, he repeatedly asks. Let's not call Fuller's work architecture but sculpture, he says. (Again he makes a distinction that on other occasions he refutes.) Sculpture is not architecture precisely because it does not have the problem of how one gets in and out. Entry—the problem of the door in the wall and the approach to the wall—is fundamental to the nature of Johnson's architecture.

Let Fuller put together the dymaxion dwellings of the people so long as we architects can design their tombs and their monuments.
Johnson, "Where Are We At?", 1960.

While the same irony and superficial disdain are also manifest when Johnson speaks of Le Corbusier and Frank Lloyd Wright, his discussion of these architects again reveals several of his own preferences. Johnson seems at his most elusive in dealing with Le Corbusier, giving and taking away simultaneously, seeming to reduce ideas to personalities. For example, in his talk at Yale about the postwar work of Le Corbusier,[14] he begins by implying that some people would call Le Corbusier's work "sculpture" in the pejorative sense of the word; he then opines that the difference between architecture and sculpture is purely semantic, and then he goes on to call Le Corbusier's work "space sculpture." Continuing the same vein, he observes, "People who do not like Le Corbusier would say . . ."; and then he will parenthetically remark that he, of course, likes Le Corbusier, sometimes.

His discussion of Le Corbusier, however, also reveals a second pervasive and obsessive theme, that of ideal form. In one such text Johnson will speak of the pilotis of the Villa Savoye as a means for Le Corbusier to expose the sixth and most difficult side of his *prisme pur*;[15] in the same text he will speak of the oversized pilotis of the *prisme pur* of the Marseilles Unité d'Habitation as a play of fantasy versus discipline—the pilotis are like the hands of vaudeville weightlifters, which by their oversized straining give one the intense feeling of mass; and in a third instance, looking at the law courts at Chandigarh, he says the *prisme pur* is turned inside out like a glove—the tricks of the Marseilles roof and the pilotis are now put inside the volume. Here in a flurry of words is a history that has never been written, a capacity to see that cannot be taught, and a sense of his own architecture that has never been elaborated.

When Johnson turns to Frank Lloyd Wright he is somewhat more direct. Typically, his remarks will begin with what seems to be a profound compliment, but delivered in such an offhand manner as to give one pause. He will then follow with something like "and he is also a great nineteenth century architect" or "he belongs to another generation." If the meaning of this was lost on Johnson's audiences, it certainly was not lost on Wright. Johnson's writings are scored by allusions to the continuing antagonism between himself and Wright.

These examples are merely a hint of a method of operation that is relentless in its constancy, which at every repetition diminishes and distances its subject. But it is Mies van der Rohe who provides the key to the essential Johnson. Of all architects it is Mies to whom Johnson refers without any of his customary irony. Yet it is not a simple connection that can be made, for while there are obvious similarities in the work of the two men, these are used by Johnson as a foil for their less obvious differences. For example, when Johnson talks about Mies's Seagram Building he again reveals one of his own major preoccupations—the problem of the corner. There are three important corners, says Johnson: the corner against the corner, the corner against the sky, the corner against the ground. This attitude toward

the corner distinguishes his concept of the *prisme pur* from that implied by the taut frontal surfaces of Le Corbusier. For Le Corbusier, the notion of the skin neutralizes the corner as it wraps around it and, in its suggestion of containment, gives character to the space inside and creates a dialogue between the internal spaces and the surface; whereas for Johnson, the concern for the corner reduces this dialogue and concentrates its energy in the intersection of the four planes rather than in the planes themselves. For Mies, on the other hand, as for Johnson, the articulation of the corner is primary; yet again there is a difference. While for Mies the corner reveals both structure and connection, for Johnson the corner involves a detachment of the form from its structural function and an isolation of the form from the internal and external volume of which it is traditionally an integral part. Thus to see the kind of Neoclassicism he creates at Lincoln Center as having anything to do with Mies, or for that matter with his disaffection with the International Style, is to miss his idea of the surrogate, which now is also in the form itself. Thus, while Johnson's corner seems to mean "Mies" or "Schinkel" at first glance, in fact it means something which is quite the opposite. This duplicity in the form is, of course, completely parallel to the technique of duplicity in the writing. One has only to see the hanging columns in the Founders Room in his addition to The Museum of Modern Art to understand that the attempt to detach the structure from the form—to take the supporting function from the column—is not mere wit or capricious mannerism, but rather a way to signal a different attitude to the form "column." For here the form becomes its own *Ding an sich*: this is Johnson the product of German nineteenth century philosophy playing a modernist theme.

How long ago it was that Goethe said the pilaster is a lie! One would answer him today—yes, but what a delightfully useful one.
Johnson, "Johnson," 1961.

On Johnson
But in the end, it is not the reality of columns or corners but the metaphor of glass which gives us Johnson on Johnson. Yet is it the transparency of surface or the reflection of mirrored depth which permits us to understand that the cracks in the surface may ultimately be closed by pulling them farther apart? Are we seeing the transparency of Hegelian idealism or the "opacity" of a reflecting mirror telling us something about ourselves at the same time that it conceals something about itself?

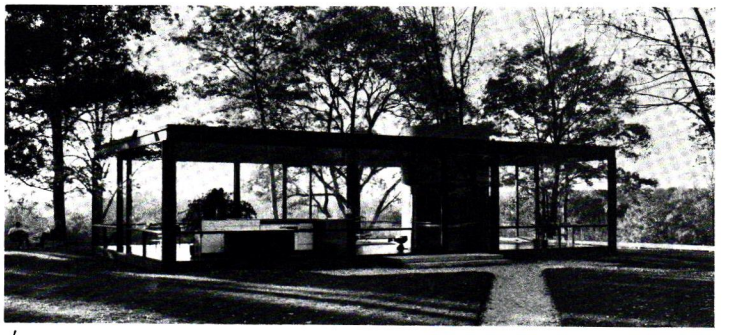
I am a historian first and an architect only by accident and it seems to me that there are no forms to cling to, but there is history.
Johnson,
Informal Talk at the Architectural Association, London, 1961.

Johnson is at his most opaque when he is speaking of himself—the historian speaking of the architect, the critic reviewing his own book, the architect presenting his house. It is Johnson as a surrogate for Johnson.

One finds the often repeated cadence, particularly in his presentations to university audiences, of Johnson taking off on Johnson, of Johnson being flippant at his own expense. For example, his apparently innocuous introduction to a lecture at Barnard College[16] becomes a key to understanding much of what would seem to be Johnson's wit. His words, seemingly casually chosen, are diabolical mirrors. Not only do they mask his intentions, they also strip and fracture his audience. They beam yet another multiple inversion. Words and audience: first, belief; second, irony and disbelief. So far this is obvious. It is the third mirror that is crucial. It penetrates beneath his own façade. It is his own attempt to make himself believe what he is saying—to suspend his own disbelief. For in this final turn, words attempt to cover the fragility of Johnson's own uncertainty about himself and his own art. Whether he can deceive us or not he can never wholly deceive himself. He alone lives locked within the reality of his works—they reveal to him what his words attempt to hide.

Thus for Johnson, the text is a critical instrument. It is the script that distances the performer from his audience. The text forbids the audience access to the reality of the person who is behind the character they are confronting on the

4 Glass House, New Canaan, Connecticut. Philip Johnson, architect, 1949.



stage. But further, it does not allow the actor to know himself. It distances what he says from what he is. For it is from his center—from his own private self—to a periphery of detachment that Johnson must move to make his most incisive contributions. The text provides that generative impulse.

It is Johnson's nature to be always one step ahead, astride every situation while others are off balance. And it is this capacity to understand and pinpoint where that balance is at any given time that gives Johnson the opportunity to remove himself from the center, to be on the edge, and to be able to jump aside to yet another delicate periphery when the center has caught up to his former position. Thus it is not only the ideology of an anti-ideologue, but perhaps also, and even more importantly, a temperament and an insight that makes him impatient with the status quo. His iconoclasm is rooted less in political, social, or any particular aesthetic belief, than in the "Prince" inherent in him—the aristocrat who serves neither ideological principles nor historical events.

How often dislikes and personal preferences of aesthetic form can engender meaningless rationalistic criticism—an attempt to confirm personal taste through generalized logic.
Johnson, "Correct and Magnificent Play," 1953.

Johnson is never trapped by such personal rationalizing. For he remains always away from his own center. In his writings he is never caught in the web of his own conceits. He is detached, almost distant from himself. So acutely aware of this separation of his own person from himself is he that he often cites it in others—"the publicist Le Corbusier writing for the architect Le Corbusier."[17] Perhaps he has to be two Johnsons—one the cultural critic, the other the architect—to survive. Perhaps it is this Janus-like capacity which affords him such an unerring view of the cultural landscape as it exists at every moment of its being.

I consider my own house not so much as a home (though it is that to me) as a *clearing house of ideas* which can filter down later, through my own work or that of others.
Johnson,
Quoted in Selden Rodman, Conversations with Artists, *1957.*

Johnson is at his most transparent—the lucid ideologue—when speaking of his own house. Certainly his 1950 presentation of the Glass House at New Canaan in the *Architectural Review*[18] is an architect's way of presenting his own architecture. It is at once modest, straightforward, and telling. It is obviously the model used by James Stirling in his article "Connexions,"[19] which consists of parallel photos showing historical precedents and examples of his own work. But while Stirling seems interested in acknowledging precedence, Johnson seems interested in the reverse, in creating a patrimony. It is now Johnson who, while following these antecedents in time, by his particular use of them makes them seem as if he were the originator of their use.[20]

Here Johnson the historian acts to re-situate themes that have been continuous in the work of Johnson the architect. For example, in his linking of ideal form to the intellectual revolution of the late eighteenth century, he places himself in a lineage of humanist abstraction, yet in his concern for the oblique angle of approach to a frontalized building and the play of asymmetric rectangles he forges an eclectic union that places his work even before the precedent of Schinkel's work. This essay on the Glass House is the first instance in which Johnson talks seriously, without his usually self-deprecating irony, the first time that he talks directly about the nature of his *own* architecture.

In his article "Whence and Whither,"[21] Johnson further reveals this architectural paternity. He says, with his typically casual iconoclasm, that architecture is not the design of space, but rather the organization of procession; it exists in time. If one takes these two themes, space and procession, as the "brackets" of his words, then the Glass House in New Canaan (fig. 4) and the Pennzoil Tower in Houston (fig. 5) can be seen as the two poles of his work. They are in fact both preoccupied with the processional; the one pedestrian, the other vehicular. They are both glazed vol-

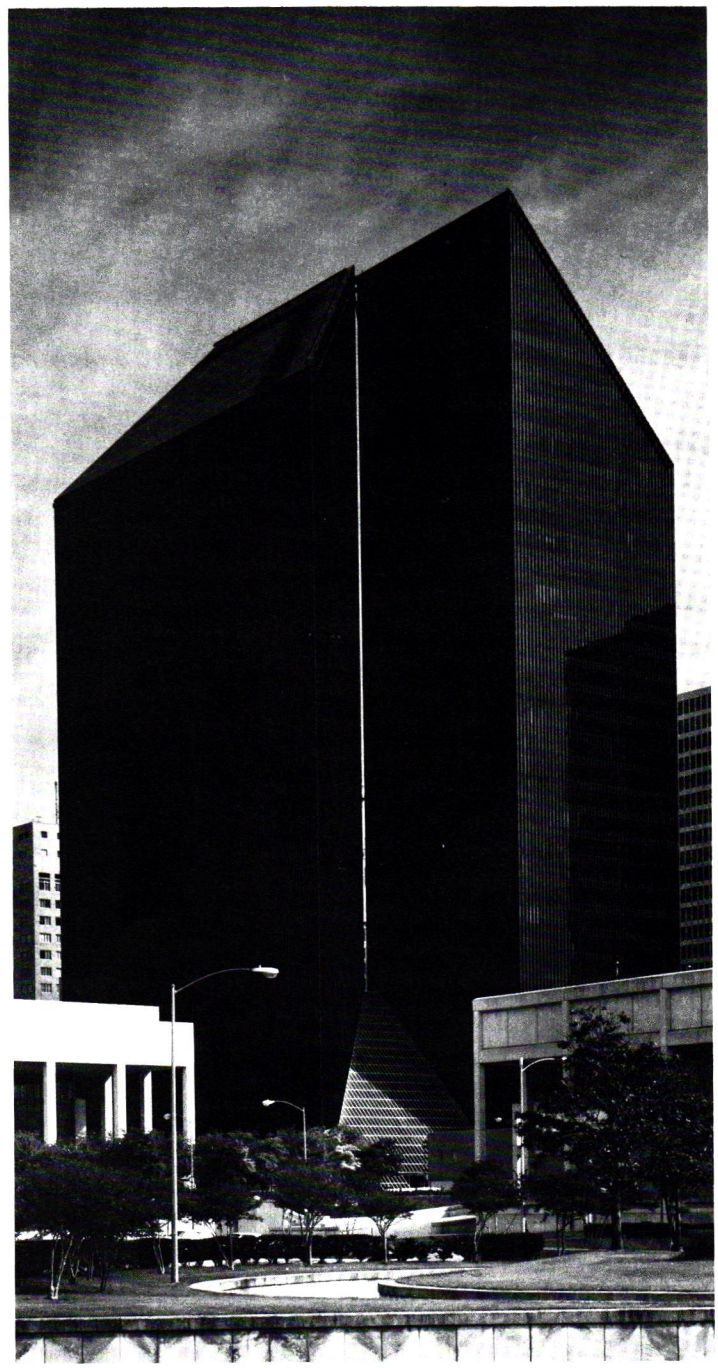
umes of non-space, the one transparent glass, the other opaque glass.

From the Parthenon through Schinkel, Choisy, and the Beaux-Arts, architecture was concerned with corners, not fronts; with perspective, not axonometric views. In linking the oblique processional approach to the frontal appearance of the Glass House, Johnson is also countering one of the classical canons of the orthodox modernism of Le Corbusier and Cubism: in the modern canon, the façade was to be frontal, space was layered vertically and understood stereometrically, stress was at the periphery. The Glass House layers space horizontally, and its conception is from the diagonal.

In the traditional sense both Pennzoil and the Glass House are a-spatial; the latter is a void and the former is a solid. But both lack the traditional energies—tension, compression, etc.—that mark architectural space. They represent the beginning and the end of modern architecture. The Glass House is transparent and the carrier of metaphoric imagery; Pennzoil is opaque, not metaphoric, not a polemic of the machine-made aesthetic, but rather the mute, unrelenting object itself.

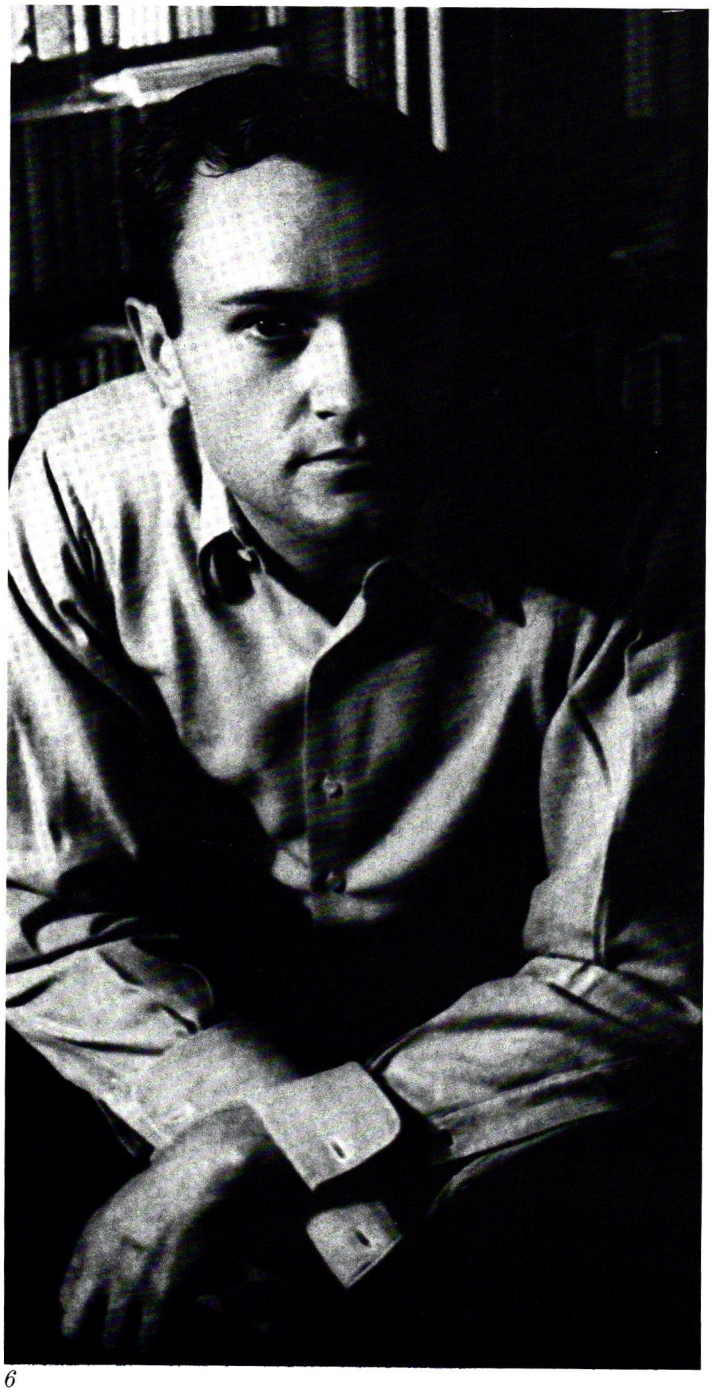
It is only the steel wainscot line on the Glass House that violates this principle of a-spatiality. It turns the glass into a membrane—a container of interior space and not a void. But in none of Johnson's writings on his house can one find a discussion of this very crucial and untypical architectonic gesture, which differentiates him from the Mies van der Rohe of the Barcelona Pavilion and the Farnsworth House.[22]

But ultimately, it is not in the context of his patrimony that one must finally return to Johnson's presentation of his own house.[23] For me, it is in the context of something much more profound that this article and this house are fascinating. For it is here that text, building, and person fuse to shatter the paradox. And it is in a casual text caption by Johnson that places the house and Johnson once and for all in a new context.



5 Pennzoil Place, Houston, Texas. Philip Johnson and John Burgee, architects, 1976.

6 Philip Johnson, 1933.



6

The cylinder made of the same brick as the platform from which it springs, forming the main motif of the house, has not derived from Mies but rather from a burnt wooden village I saw once where nothing was left but the foundations and chimneys of brick.
Johnson,
"House at New Canaan, Connecticut," 1950.

How are we to interpret such a metaphor? Who builds a house as a metaphoric ruin? Why the burnt out village as a symbol of one's own house? But further, that Johnson should reveal the source of his imagery seems the most telling of all: the Glass House is Johnson's own monument to the horrors of war. It is at once a ruin and also an ideal model of a more perfect society; it is the nothingness of glass and the wholeness of abstract form. How potent this image will remain long after all of us have gone, as a fitting requiem for both a man's life and his career as an architect! I know of no other architect's house that answers so many questions, has such a symbiotic relationship with personal atonement and rebirth as an individual.

In a more general context, the Glass House prefigures for me the parallel anxiety of post-World War II architecture. It remains the last pure form, the final gesture of a belief in a humanism so debilitated by the events of 1945. And at the same time it contains, in the image of that ruin, the seeds of a new conception of an architecture that is not for the reification of an anthropocentric man, but exhibits a more relativistic condition, a parity between man and his object world.

A successful monument, Johnson has said, should partake of the past and of the time in which it is built.

A glass box may be of our time, but it has no history.
Johnson,
Statement concerning the Franklin Delano Roosevelt Memorial, 1962.

Johnson's writings, like his glass box, have the transparency of our time. It will remain for history to reveal their opacity.

1. This text was originally written as an introduction to the volume *Philip Johnson: Writings* to be published in Fall 1978 by Oxford University Press, New York. It is published here in a modified version with the kind permission of James Raimes of the Oxford University Press.
The original intention of this introduction was that it be a series of commentaries related to the individual texts by Philip Johnson. These commentaries were to be paired with those of Robert Stern in an effort to suggest two points of view, often contrary, for each of Johnson's texts. However, when it came to deciding which articles were to be included and how they were to be classified, a certain unresolvable opposition between Stern and myself developed. Therefore, it was decided that Stern would make the outline, select the articles, and write the commentaries, and I would write an introduction.
What follows is an essay developed according to my classification of Johnson's writing. It presents his writings not in any historical sequence or context, but rather as a series of ideas, grouped under these headings: On Functionalism, On Style, On Architects, and On Johnson; it attempts a view of Johnson which has often been obscured by personalities and events.
2. *Built To Live In*, a prospectus prepared for The Museum of Modern Art, March 1931. It is interesting to note that in his description of the forthcoming "Modern Architects" exhibition, Johnson says that Mies van der Rohe was to plan its installation.
3. Ibid.
4. Philip Johnson, "The Berlin Building Exposition of 1931," *T-Square*, January 1932; and "In Berlin: Comment on Building Exposition," *The New York Times*, 9 August 1931.
5. Speech Honoring Mies van der Rohe On His Seventy-Fifth Birthday, Chicago, 7 February 1961.
6. The term was first used by Johnson in his talk to students at The Architectural Association, London, 1960.
7. See Alfred Barr's introduction to Henry-Russell Hitchcock and Philip Johnson, *The International Style* (New York: Norton, 1932), p. 14.
8. *Built To Live In*.
9. Ibid. While it is obvious that Barr, Hitchcock and Johnson were all working in close collaboration during the period of 1931–1932, the important point in this context is that at the time of the publication of this article Johnson still uses the term "modern style" and not its imminent transformation to "international style."
10. While Alfred Barr is the author of the preface to The Museum of Modern Art catalogue of the 1932 exhibition "Modern Architects," in which the principles of the International Style were supposedly elaborated for the first time, Johnson had put foward principles of the modern or new style on at least two occasions, one in the prospectus for the exhibition, "Built To Live In," and the other in the article "The Architecture of the New School." Barr was in fact responsible for changing Modern Style to International Style, but he did so for its overtones of sixteenth century mannerism, and not for the reasons stated above.
11. The term "international" is "explosive" in the context of its use as a code word for "Marxist." In many cases it carried no such connotations (viz. the Rockefeller's funding of the International House for students; the existence of the Carnegie-backed Institute of International Education, etc.).
12. While initially there might have been more confusion concerning these terms, than the sequential substitution of one for the other that I have suggested above, my main intent here is not so much to establish patrimony for the term as to describe the process for bringing to consciousness a term that would then prove both ideologically useful to Johnson and well suited to his patrons.
It is interesting to note how by 1961, in Johnson's review of the book by Robin Boyd, *The Puzzle of Architecture*, the principles of the International Style have become structural honesty; repetitive, modular rhythms; clarity, expressed by oceans of glass; the flat roof; the box as the perfect container; no ornament. The *Architectural Forum*, June 1966, p. 72.
13. "Retreat From International Style to Present Scene." Talk at Yale University by Philip Johnson, May 9, 1958.
14. Lecture at Yale University by Philip Johnson, "Post-War Frank Lloyd Wright and Le Corbusier," May 2, 1958.
15. Philip Johnson, "Correct and Magnificent Play," *Art News*, vol. LII, September 1953, pp. 16–17, 52–53. (A review of Le Corbusier, 1946–62.)
16. "Style and the International Style," speech at Barnard College, April 15, 1955.
17. Johnson, "Correct and Magnificent Play," *Art News*.
18. See "House at New Canaan, Connecticut," *Architectural Review*, vol. CVIII, no. 645, September 1950, pp. 152–59.
19. See *Architectural Review*, September 1975.
20. This is similar to the concept of swerving articulated by Harold Bloom in his book *The Anxiety of Influence* and later by Vincent Scully in his lecture at Columbia University on the "Shingle Style Revisited."
21. "Whence and Whither," *Perspecta* 9/10, 1965, pp. 167–78.
22. This idea was first expressed by Johnson publicly in the three-part television series with Rosamond Bernier for CBS's Camera Three in 1976.
23. "House at New Canaan, Connecticut," *Architectural Review*.

Figure Credits
1 Courtesy Philip Johnson. Photograph by George Holton.
2 Courtesy Philip Johnson.
3 Reprinted from Theodore Heuss, *Hans Poelzig: Bauten und Entwürfe* (Berlin: Verlag Ernst Wasmuth, 1949).
4 Courtesy Philip Johnson. Photograph by Y. Futagawa.
5 Courtesy Philip Johnson. Photograph by Richard Payne.
6 Courtesy Philip Johnson. Photograph by Carl van Vechten.

Reflections: On Style and the International Style; On Post-Modernism; On Architecture

Philip Johnson

Peter Eisenman and I use the word "style" in different senses. There is first of all a great difference between an art historian or critic looking back over a period and identifying the existence of a "style" and the consciousness of architects themselves working in that period. I was always delighted to find that no architects included in our rubric of the International Style thought of themselves as working in a style. Indeed, I never so did myself, except when I was doing my propaganda work. Then, of course, I was puritan and pure. While the Glass House, for example, is International Style, I do not think that as an architect one can have a feeling of working in a style. I think that pure architecture has to be created from the wellsprings of one's own inspiration.

From this point of view, one could see the word "style" as a restriction. It is in fact much more of a description. And we—Henry-Russell Hitchcock, Alfred Barr, and myself—who used the word were not at the time architects, but critics—all three of us. As critics we were looking taxonomically at the work. For me "style" is a description of similarities. It is a taxonomic device to isolate and define certain close similarities that are accreted and are centripetal in their reaction to existing conditions, as they were, for example, in the twenties. Even as I don't know a flower until I know its name, I don't really understand an architectural style unless I know its taxonomy, unless I know the other roots that are similar. It helps a great deal with a work of art or architecture to place it in a story line. Here, however, there are always exceptions. By the time Christopher Wren was building, for example, he could easily use "Gothic"; even with quotations around it, however, it is still identifiable as "Wren." The Tom Tower at Oxford is interesting for this reason.

There are actually very few styles. The "New Tradition"—to use Hitchcock's rubric for that short period before the International Style did settle on a name, or a direction—never became a "style" in Hitchcock's or even Barr's meaning of the word. Hitchcock often used the word "style-phase" for things that happened within a style. Such a phrase helps to characterize difficult periods, such as that of the English Baroque or French Classicism. Now the Romantic Classicists—as Hitchcock described them—range all the way from Ledoux, Soane, Dance, Gilly to Ludwig Persius, which is quite a wide range. And what they produced was hardly a style, in the same terms that the International Style might be defined as such.

The International Style for Hitchcock was the first recognized international style since the Gothic. If the Renaissance was an explosion, this was an implosion.

The twenties witnessed an enormous gathering together—in Europe, because it didn't really happen in America—an implosion. It is this implosion which Alfred Barr described with the word "style." Barr introduced us to this word in his role of a scholar trying to further the study of art history by the normal taxonomy necessary to any academic discipline.

It still seems to me that Barr was right. The work of the twenties does strike one as similar—at least all over Europe there appears to have been no other movement of that time that could be a logical rival. The word "style" in this sense concentrates on recognizable similarities: in our book, *The International Style,* we tried to do this by using those always inadequate words to define methods and characteristics, such as lack of mass, and so on.

In re-reading *The International Style,* its strangest aspect now seems to be our definitions, our rules, our "how-to" recipes for design. It would be interesting—and equally beside the point—if someone were to write a comparable "how-to" book on the Gothic by attempting to isolate its elements. Even the pointed arch itself is not necessarily Gothic.

This seems only fair enough since it was, despite our foolish attempts to describe the "rules of the style," something that most of the good architects (most, I would have to say now, not all) of the twenties were pulled into. For example, Erich Mendelsohn was not by nature an International Style architect, but he had become one by the time he built his house in 1929. His much more interesting expressionist

phase had changed. He became forced simply by the implosion that had occurred in 1922 and 1923 to employ that style at Columbus Haus and his department stores. Actually he did more building in the 1920's in the International Style than any of the so-called International Style "greats."

Hugo Häring is another example. Häring was an original. A fascinating architect even though Mies van der Rohe always used to make fun of him. He would tell the story of asking Häring, "How did you build Gut Garkau?" And he said Häring replied, "I watched the way the cows walked." Mies thought that was a ridiculous way to design a building, but I think now it was rather fun. Even Häring, though, if you study his whole *oeuvre*, is not very interesting or convincing and neither is his International Style work. But he was forced into it, of course, at the Weissenhof Siedlung by Mies and by the Werkbund. It is extraordinary that *a* style, whatever you might name it, should become so official, so fast, that even Behrens should adopt it. In fact the only people to whom it came naturally, who were without question International Style architects at the Weissenhof, were Le Corbusier, Mart Stam, J. J. P. Oud, Walter Gropius, and Mies.

The buildings at the Weissenhof were all International Style buildings because Mies van der Rohe decreed it. It is interesting, though, that Mies's sketch of 1925 for the group of buildings was "Italian hill town," not International Style.

This kind of divergence occurs all the time. Yet while the Weissenhof Siedlung was the first official notice that the style was finally accepted, nevertheless I think it probably started disintegrating in about the same year—certainly by the time of Le Corbusier's De Mandrot House and Mies' Barcelona Pavilion which was started in design that year. The idea of the floating horizontal planes of the Barcelona Pavilion or the rubble walls of the De Mandrot House were certainly not a part of the original idea of the style. So instead of a style lasting over ten years, we are perhaps talking about a certain congruence which has a much longer life span. In this sense, the International Style had a longer life span than the fifteenth century International Style—that high point of the Gothic.

But if "style" is to refer quite simply to architectural forms that look amazingly alike during a certain period, then the International Style is a style. Certainly, it was as much a style as Gothic. The Duomo in Florence does not look very much like the brick hall churches of the Hanseatic cities of the north, but no one says they are not both Gothic.

There has been much discussion of the title of our book *The International Style*. While the chauvinists of the period disliked the word "international," Stalin, Hitler, and Roosevelt all condemning it, few others have objected to the word—the style was never parochial, regional, or nationalistic. The sobriquet "style," on the other hand, has connotations that still raise hackles. The more socially conscious critics of the Modern Movement—especially Lewis Mumford, our lone American architectural social critic—found it a term too artistic, too restrictive, too prescriptive to allow for the natural development of social architecture.

In contrast to the International Style, the Modern Movement for me came from England. For me, it means Ebenezer Howard, the Arts and Crafts and William Morris. The *roots* of the Modern Movement may have been pan-European, but it was finally bound up with English do-goodism, which is exactly what we did not mean by the International Style. We used the International Style propagandistically to sharpen this difference. For us, this kind of labeling helped enormously. The characterization of "mannerism" by Wittkower and Pevsner, and more recently the idea of "neo-mannerism" introduced to describe the work of the Edwardians have allowed us in a way to understand the essential traits of these architectures. Thus, we could say that while "style" implies a recognition of similarities, at the same time it is a way of recognizing the critical differences between phenomena.

The "International Style" is a perfectly good term, unless of course you are an architect. Then of course you say "who is tying me down to a style?" And of course I practiced the same thing when I became an architect: "What do you mean, I do the International Style?" Eisenman thinks of

style, strangely enough, in the way that the International Style architects thought of it. They all thought that we—Henry-Russell Hitchcock, Alfred Barr, and myself—were wrong to use that word. "We don't work in a style," they said, "we just work from the program." In fact, of course, they worked in just the opposite way. They were very conscious of what they should or should not do—that they should not use ornament, whether they should use stucco or introduce a flat roof. The masters, however—Le Corbusier and Mies—could do what they wanted. The first person to use a roof other than a flat one was Le Corbusier in his Errazzuris house. It was the epigones—the Czechs, the Balkans, and the Russians—who all practiced very much according to the letter. They said in effect, "we are learning this great new thing from Le Corbusier, Mies, and the Bauhaus," so they were all more strict than the strict.

To understand the evangelical nature of my campaign in the thirties, however, we must go further and analyze the nature of the contemporary "enemy." In 1930, the International Style was unheard of in this country. It was "foreign," and foreigners were, well, foreign. The enemy was what we called the "moderne" or "modernistic" much more than it was the eclectic or revivalist. It was, as Eisenman says, a hydra-headed monster, but not the one which he imagines for me. Rather, for us it was the existing 1920's modern. There were three separate strains that, in combination, drove us to do battle for "our side." With the benefit of fifty-year hindsight, those former "enemies" now look more interesting, more rich in associations, in metaphor, in decorative abundance, than the style which we espoused. The "modern" of the twenties that looks best to me now is the "skyscraper style" crystallized by Raymond Hood and Eliel Saarinen in the early 1920's and lasting through Rockefeller Center in the 1930's—a vertical, Gothic-inspired piling of elements that still gives New York its New York look.

Second, there was the "moderne" styling of the streamlining designers: Raymond Loewy's railroad trains, the three linear moldings on movie marquees, the round-cornered projections of many a Greyhound terminal, and the like. Fascinating richness (but lumpy when applied to pencil sharpeners and refrigerators!). In revolt, we at The Museum of Modern Art called our exhibition of useful objects "Machine Art."

Third, there was the decoration derived from the 1925 Exposition des Arts Decoratifs in Paris. We puritans found this movement shocking for all of its ornament; but there now are books illustrating its glories in technicolor. These pictures have far more glamor today than any picture of the Seagram Building! But as nostalgic as these movements now seem, to us in 1930 they were only surface treatments, often self-contradictory. They also turned out, even with the help of the 1933 Chicago Fair designs, to be ephemeral. By contrast, the International Style swept the country, and even in 1978 flat-topped glass boxes for office buildings are the characteristic marks of the proliferating new city centers all over the world.

My final dissatisfaction with the International Style was based on its simple straight lines and simple geometric shapes and boxlike forms. It struck me, as one interested in history, that much good architecture paid no attention to Ruskin, Morris, Semper, Viollet-le-Duc, Laugier, or Gropius. While in the 1940's my favorite theorist had been Geoffrey Scott, who in *The Architecture of Humanism* of 1914 had inveighed against Morris, Ruskin, et al., I have gradually come to realize the virtues of a more inclusive attitude. This does not mean, however, that when one begins to discuss the "rationalists" in Italy, or the "post-modernists" in America, that I do not take the other side altogether and I will say how perfectly horrible labels are. The word "rationalists" I cannot use except with quotation marks or in the same way as Hitchcock used it. In Italy now, it refers much more to an eighteenth century nostalgia, or a love of De Chirico; that is why their cemeteries are so good.

But now for the counter-story. The flat-top boxes have triumphed, but for a whole generation there have grown theoretical and practical objections. The Bay Region style of California in the late twenties was billed as a new regionalism. Churches and houses especially, being almost

impervious to box architecture, were designed by some great men like Bruce Goff and Frank Lloyd Wright the way *they* wanted. Junk architecture flourished. Historical revivalism raised its head again. The culmination among the theorists has been quite recent. Charles Jencks, Robert Venturi, and Arthur Drexler now mount counter-drives too.

As for the term "post-modernism," what it does, even for me, is to legitimize my wanderings. What it refers to precisely is, in this sense, less important. Because in the twenties, thirties, and forties, at the time when I built my house, there were no means for legitimization; I was merely developing another view about modern architecture, one drawn from history. Post-modernism is then a legitimization of some feelings that reach beyond the puritanism of modern architecture. It suggests that the ideology of the Modern Movement is dead; that we want to get away from the moralism of modern architecture. What post-modernism is really doing is legitimizing eclecticism, which is paradoxically essentially pre-Modern Movement.

Although I had stated at Yale that "you cannot not know history," I still feel that some of my fifties work was not my best. The label "post-modernism," however, merely allows me to feel better about it and to understand that I could do a not-modern architecture and still be considered pretty good because it's legitimized by having a label. In the end, maybe I was a post-modern all along with Venturi.

In the fifties, trying to find out where I stood, I called myself a "functional eclectic." All such terms are part true, part fictional, part self-serving, part earnest attempts at self-knowledge. The "functional" meant, and means, that I cannot free myself from starting designs with the program as outlined by me or by my clients. I know that other periods have begun with shapes and only later shoehorned the uses into shapes. I am too "modern," too puritan for pure form. I am, in spite of speeches to the contrary, a functionalist; but perhaps, in contradiction, also an eclectic. "Eclectic" means to me that I am free to roam history at will, and that brings with it a new sympathy for the "style-for-the-job" attitude. (I can almost believe that a bank should be Doric, a home should have a sheltering roof look; almost, but not quite. I am not sure that an airport should look like a bird.) Further confusions come among the new "eclectics"; I often find myself trying out ideas from Charles McKim's Boston Library and Mies's 1921 glass towers as crutches to an identical program.

Eclecticism in this sense is merely a veneer: indeed, if you hear Venturi or Robert Stern explain their buildings, they sound like modernists.

It is very hard to use these terms however. What part of "modern," for example, is modern? And what part is functionalist?

Now it seems to me if you look at Venturi and Stern, there is no new sense of plan, no new space in the section. They are still using what is essentially a modern plan. A Beaux-Arts architect looking at it would say, "that's not Beaux-Arts"; it is not fifteenth century or nineteenth century—it is not Palladio, it is not Ledoux. Venturi and Stern are essentially coating modern architectural space with a new dress. In fact for me post-modernism is Venturi's decorated shed. Pennzoil, if you like, is a duck and A.T.&T. is a decorated shed.

There is another reason that post-modernism does not mean very much. Any label is merely a device for convenience. The International Style was a style even without its being announced in the book. Jencks's use of post-modernism ends up just being a device because it is not a positive statement. There is no centripetal movement. It is like trying to say that the Edwardian is a style. You can tell an early nineteenth century building, for instance, based on the small windows that are widely spaced. As the century went on the windows got bigger and closer. But these are just little marks, they are not a basic change in approach.

The designs of the past that strike closest to my senses are those of Romantic Neo-classicism, beginning with Ledoux and going through to 1845 with the death of Ludwig Persius. Soane and Schinkel, for no conceivable theoretical

reason, touch me closer than do Borromini, Gaudí, or Brunelleschi, no matter how enthusiastically I react to the greatness of the latter.

My Glass House of 1948 is, of course, a very late example of the International Style—influenced as it was by the Farnsworth House that Mies had already designed. By that time, much had happened to change the sensibilities of the twenties. I myself made many sketches for the future Glass House in which the main theme was a series of low—almost Syrian—arches cut into a blank stone façade (shades of Romantic Neo-classicism!). And there are anomalies in the house as built that Mies would never have tolerated: the round brick element that "anchors" the design, and especially the chair rail that ties the house into an enclosed composition rather than an indoor-outdoor Mies design.

The story of the mid-fifties led me through a sporadic, superficial historicism mixed lightly over an International Style base. This phase culminates in the design for the A.T.&T. tower on Madison Avenue with mixes, derivations, and allusions to periods from Rome to the 1920's. Thus we have Johnson of the Glass House—which is the bird cage, the trapping of space—and, second, we have Johnson of the Pennzoil—the minimal sculpture.

At A.T.&T., we have the third Johnson. A new use of eclectic choices to suit the place and program: the base an open colonnade (Brunelleschi?) for scale and human reference; the middle a shaft from the twenties (Raymond Hood?); and the top a broken pediment complete with cornice (late Rome?).

Most of our firm's recent office buildings, however, are still on the Pennzoil model—shaped minimal geometry. We keep the glass skin but play with the geometry both in plan and in the third dimension; this culminates at Pennzoil. The tall building for Lehman Brothers has a keystone plan that developed from the peculiar shape of the site (admittedly exaggerated for architectural reasons). Also at Lehman Brothers there is a "gouge" under one side of the building to emphasize an enclosed pedestrian street. The principle of "gouging" volumes, as opposed to the piling of elements merely for a picturesque effect, from the tops, from the side, and under the volumes occurs in many of our most recent buildings. For example, in our "Itel" building in San Francisco the spatial play is devious though the geometry is absurdly simple. The gouging and slicing seem to stop the eternal directionlessness of round buildings and create a silhouette with more character.

At the age of seventy-two I no longer feel obligated to please anybody. I no longer feel obligated to further modern architecture. I no longer need the moral backing of "progress." I do not have to better anything. And I have always loved moldings and history. While this might lead to the accusation that architecture is little more than taste, there are some of us, of course, who feel that architecture has always *been* taste. I now think in terms of pleasing myself and not reforming society or developing any kind of moralist vision about the impact of my work on society.

At the same time, however, even as this new freedom gives me distance in terms of experimentation and stylistic play, there inevitably is a starting point underneath—in the drawing, in the making of the building, in the postulating of something which is in the end a public act. In this sense I am still a modernist. I cannot get out of my skin. Although I rail against progress, I think there still is social change, also a change toward progress. However, I do not think this change can be carried out by the new city dreams of a few years ago. Those of us who are still Calvinist enough to worry about these things still feel, "I have got to better the world." I am of my age and I think it will show in me that I am still a functionalist.

Source Note
This text was developed from a series of taped discussions between Philip Johnson, Peter Eisenman, and Anthony Vidler in January of this year, supplemented by pieces taken from hitherto unpublished writings of Johnson.

The Idea of Architectural Language: A Critical Inquiry

Jacques Guillerme

Translation by Hélène Lipstadt and Harvey Mendelsohn

In 1967, in a book lacking neither in subtlety nor erudition, one could read that "the analogy between architecture and language has been less popular in recent years than it was from the middle of the eighteenth century to the middle of the nineteenth century."[1] Such an assertion might seem surprising, especially as the author invokes by way of contrast the "importance now given to the linguistic analogy in the interpretation of the other Fine Arts."[2] If architecture seems to him to have escaped in large measure this metaphorical treatment, that is most probably because it has been spared all kinds of bad analysis. In this matter, the linguistic analogy is chiefly a Latin speciality.

The confusion that reigns today in the repeated assimilation of architecture to language obliges us finally to question the foundation of this analogy, as well as to search out its origins and proper uses. Such is the object of this article.[3]

The semiologist Umberto Eco has seen "architectural language" as an "authentic linguistic system obeying the same rules that govern the articulation of natural languages."[4] Following Eco, A. Silipo has applied a conventional definition of grammar to architecture, in his words: "considering architectonic activity to be a set of operations designed to establish cognitive relationships by means of spatial realities, and (considering) the architectonic organism as a structure, an instrument of communication and of knowledge, *grammatical* analysis becomes the principal critical instrument at the disposal of whoever seeks not only to grasp the entire range of signification of a particular spatial structure, but also to "historicize" it by going back to the methodological matrices that have determined this structure, and by grasping the relationships that exist among the figurative, technological and functional elements that make up the structure and the more general historical, social and economic, and artistic context to which it refers. . . ."[5]

Grammatical analysis is thereby claimed as a universal, critical instrument for architecture.

Paolo Portoghesi has similarly utilized the linguistic analogy in historical writing, demonstrating, for example, the virtuosity of Borromini in terms of antithesis and oxymoron, anastrophe, and epiphoneme;[6] this despite the fact that the first paragraphs of his book seem to mitigate the effect of this rhetorical equipment (where Portoghesi states that, "the analogies between architecture and language have often been advanced, as have those between architectural civilization and language, and attempts have often been made even to transfer linguistic terminology to architectural criticism. The most authoritative conclusions of these experiences have been, however, ambiguous and limited").[7] All the same, this work has undoubtedly done much in France to acclimatize the 'linguistic' commentary on architecture, a commentary till now divorced from any serious requirement for scientific rigor.

Finally, Bruno Zevi has recently commented on the fate of the "fashion for grammar," which for ten years has pervaded Italian criticism. Despite the popularity enjoyed by "the studies of architectonic linguistics," Zevi notes, and the fact that they have produced "results which are often brilliant," they have nevertheless not been marked by "any resounding effect," since they have not "ploughed the specific field of architectonic language." And Zevi attributes this relative poverty, not without some unintended humor, to the fact that the scholars have been too concerned to "find in architecture the ingredients and laws of verbal language."[8]

It is clear that Zevi is noting the insufficiency, but not the ultimate utility, of the *organon* so highly vaunted by Silipo. Perhaps the most significant contribution made by Zevi, however, is his invoking of a "specific field" of "architectonic language" within the general linguistic domain. Here he raises a factual, and scientific, criterion in the face of a hitherto applied and fashionable analogy. In this regard, we are entitled to inquire as to the specific mode of knowledge presupposed by this "language."[9]

The antecedents of this doctrine of analogy between architecture and language can be traced through the last two centuries, though they are perhaps less numerous and widespread than Peter Collins leads us to believe. Among the overt statements of the eighteenth century, Collins was

scarcely able to cite more than the surreptitious remark of Germain Boffrand: "The sections of moldings and the other parts which make up a building, are, in architecture, what words are in a discourse."[10] Francesco Milizia, at the end of the century, repeated the comparison explicitly, applying it, however, to the materials of building themselves. He wrote, "the materials in architecture are like words in discourse which separately have little or no effect and can be disposed in a despicable manner; but combined with art and expressed with a motive and agile energy are capable of unlimited effects."[11] J. B. Papworth a little later revived the idea in much the same terms: "Materials in architecture are like words in phraseology, which, simply, have little or no power, and may be so arranged as to excite contempt; yet when combined with art, and expressed with energy, they activate the mind with unbounded sway."[12]

Traditionally, architecture was associated with the art of drawing; it then found itself beset by the influence of other affinities and began to cultivate those specific associations from which it would ultimately profit in the field of social competition. Reference to language and to the forms of literary creation, both learned and popular, was required in the often lively debates on questions of style that gradually opposed the champions of classicism to those of rationalism and eclecticism. The first of the doctrines that linked architecture with language consequently appeared in France, in the course of the eighteenth century, in the writings of men of letters seeking to subsume all the arts within a universal theory of expression.[13]

Each time it appeared, however, the analogy was employed for no other purpose than to *validate* competing morphological choices by grafting on them the prestige of literary creation.[14] It was concerned simply with making explicit the *process* of *combination*, the constituent of every architectural project, by relating it to a fundamental and commonly held knowledge of grammar. This mode of didactic commentary thus corresponded, to some degree, to the desire of architects to legitimize the poetics of their architectural composition. Examples of such an aspiration are found in Ledoux who declared that "architecture is to masonry as poetry is to belles-lettres,"[15] and in Quatremère de Quincy who supported a new aesthetic theory of the assimilation of genres which was, by the mid-nineteenth century, to end up as a commonplace.[16] Quatremère gave all "honor to the architect who not only hears but speaks the language of buildings in their relation with the type and character of institutions. . . ."[17] But this kind of comparison was unable to sustain any marked theoretical development. It was paramountly unscientific and analogical. In other words, following the definitions of Quatremère himself, recourse to language appeared at first on the level of *example* or illustration and not at all in terms of a consistent *model*.

Indeed, any conception of the relations between language and architecture which tried to assign an exact value to language as a model for use in architectural composition could, of course, make no headway during the prehistory of linguistics; the development of theory within the specific discipline of linguistics itself was an indispensable condition if language was to serve as a model for the field of architecture.

On the other hand, the relatively primitive nature of pretwentieth century attempts to make a language out of architecture should not necessarily lead us to assume that the succeeding and apparently more sophisticated forms of linguistic theory are any more capable of legitimating the analogy. The more or less ingenious attempts made since Saussure to provide theoretical underpinnings for the use of the linguistic model demand a rare theoretical genius. A perfect resolution of the theoretical problem would inevitably require the adoption of Hjelmslev's axiom of isomorphism in which each system of signs (or of communications) is "isomorphic" to each other.[18] But of course this implies the total lack of specificity of the structures and functions of different expressive systems relative to the organism of verbal language.

Lacking a satisfactory theoretical model, however, each attempt to assimilate architecture to language must be judged according to the strength of its own foundation or, better, according to its usefulness in the practice of those who repeat it and claim its efficacy.

It is clear that there are obviously many ways of assimilating architecture to a language. One may claim, for instance, that a rigorous comparison is possible; such a concept would be based upon an exact similarity of structure and function between architectural signs and the signs of 'natural' language. The difficulty here, of course, consists in agreeing upon the nature of an architectural sign,[19] and in composing an appropriate collection of them—one which does not simply coincide with a group of trivial descriptive terms. The arrogant hypothesis that sees architecture as an "authentic linguistic system" in itself is in these terms obviously untenable.

G. Morpurgo-Tagliabue, for example, noted as early as 1968 that "what this pretended architectural language lacks in order for it to be a language is precisely the primary factor of *semiosis*: the heterogeneity between the signifier and the signified."[20] Twenty years ago, G. G. Granger had already rejected any identification of language and art, on the grounds that the latter in no way aimed at "constructing discrete linear sequences carrying information."[21] This objection is equally valid for architecture: it is difficult to see how to construct a repertory of formal elements with semic value that would function like the classic units of linguistics. Besides, the syntax of language is powerless to model the syntactic relationships between architectural "signs," which are, in any case, perceived in ways very different from those of speech.

Here one is following closely the classic distinction made by G. E. Lessing between *narrative* and *presentative* modes of expression. In his *Laocoön* of 1766, Lessing differentiated between a poetic (narrative) mode, which is progressive in its manifestation, its elements appearing in sequence, and a visual (presentative) mode, the elements of which are simultaneously juxtaposed in space.[22]

Theoretically, one could try to construct codes of architectural forms, which are distinct and even classifiable in paradigmatic series and which take into account the necessity of discontinuity in the process of establishing meaning. Each series thus formed could be called an "architectural type." The primary operations of this kind of analysis are the selection of a building and its assignment to one or several types. If these type characteristics are then linked with certain other characteristics, such as those of function, economy, or ritual, they evidently generate meaning in such a way that a cultivated observer looking at a building belonging to his cultural universe has the ability to come close to grasping the architect's intention, or, more precisely, the intention of that particular social collectivity that has incorporated and determined this architect. This is demonstrated very simply by the experience of tourists who are ignorant of the local culture and thereby misread its artifacts.

Thus, while one cannot in any way deny that perceived forms communicate information, it is clear that the variety of the systems of expectation in the domain of perception within a given community, and even in a single individual, makes it unfeasible to attempt to establish a comprehensive code of architectural signs. Since the abundance and varied character of the messages confuses their decipherment, nothing is in the end advanced by the lofty claim that architecture is *message*.

Other questions, however, should be raised with regard to the problematic or architectural communication. Firstly, if perception effectively presupposes conditions of differentiation, one may wonder whether the signified elements of a message ought to be equally differential. As Mikel Dufrenne asks, "is it certain that signification, when it is analogical . . . implies discontinuity and is judged by paradigmatic series? Is it certain that the need to clearly distinguish between the signifiers in order to transmit them distinctly implies that the signified is distinct in the same way?"[23] On its own, a doubt of this kind is enough to scramble the equation of art and language, even if, on the other hand, it gives comfort to efforts toward constructing an infinitely extensible descriptive code. Privileging the ontology of meaning is indeed a good way of demoralizing the tacticians of communication.

There exist still other arguments against the theses of linguistic analogy. Demonstrating that the plastic arts or architectural work does not possess the constituent prop-

erties of an articulated language is perhaps not sufficient to convince the champions of the analogism that they abuse the metaphor. It is necessary, further, to insist on the fact that the relationship of the creator to the visible work and to its beholders is not the same as the relationships of interlocutors to their language. The production and use of a language, like its variation, imply an intersubjectivity; they presuppose a virtual dialogue, realizable at any moment, between subjects who, in principle, are symmetrical, possess the same code or the same fraction of a code, and who, by virtue of this community, participate in the same kind of synchronic cutting of the world.[24] Now, while it is true that architectural constructions carry a considerable amount of information that is both available and capable of being symbolized in various ways,[25] it is difficult to see how the recipient of the architectural 'message' could find himself in a dialogue with a transmitter who is almost always hypothetical. At best, one might conceive that vision, if informed and educated by the descriptive 'metalanguages' of the building or of its representations, might be led to modify the perception of the work and the understanding of the project diachronically. This is, after all, what does happen in fact, and it explains why there is always something with which to rewrite the history of architecture and every other form of cultural production.

It is well known and important to note that the analogy between architecture and language is not a thesis developed by linguists,[26] but rather by aestheticians and architects. To declare, in effect, that architecture is a language, when everyone knows, however confusedly, that this "language" sustains, and essentially can only sustain, a one-way communication, is to stigmatize beyond doubt the doctrinaire architect as having a desire for power that cannot naturally find its outlet through the modeling of material or through the social recognition that is henceforth its condition of being. One could even maintain that this doctrine of assimilation displays, in addition, the workings of magical thought. To claim that architecture is a language is indeed, in some way, to erect it as a rival of a Nature teeming with signs and enigmas that are subordinated, definitively, to a theology of the Word. Such a notion returns us to the ancients who proposed esoteric meanings for architecture, or to Viel de Saint-Maux in the late eighteenth century who revived this tradition: "in ancient temples," he wrote, "everything lends itself to analysis; everything there represented symbols and mysterious types." The "order of architecture" for Viel was no more nor less than the "speaking poem" of agriculture, the first economic system of man's dominance over Nature.

Indeed, following this argument, it is possible to see that "the emergency of the problem of language at the heart of architectural criticism" should no longer be considered simply, as Manfredo Tafuri so nicely puts it, as "an exact response to the crisis of language in modern architecture";[27] but it should also be seen, and perhaps fundamentally so, as a response to a socio-professional crisis of identity.

Thus an interest in language can be related dialectically to the contemporary social conditions, which accord favor to these analogical theses. It might be said that the success of the analogy between architecture and language occurs during critical periods of socio-professional stratification, expressly when the task of the architect appears to be taken over by the activity and talents of the engineers.

Thus the linguistic analogy arose first during the upsurge of technological rationalism which marked the emergence of the first generation of polytechnicians; and again during the last twenty years or so, when a crisis in the doctrine, teaching, and practice of architecture has developed in successive waves.

It is very clear that in this unstable course of development, the recent vogue for analogies has produced a variety of effects that seem to serve contradictory purposes. On the one hand, the assertion that architecture is a language obviously helps to shore up the image of the artist-architect. It thereby prolongs the effect that had formerly been sought by literate architects who knew how to clothe their art with the dignity accorded to the humanities. Under this guise, the survival of the type is assured, as much as it can be, in the name of its own poetic capacity, with a view toward preserving the architect's place and function in the organizational chart of tasks and social benefits. On the

other hand, the maneuver is by nature double-edged. For, by insistently invoking a linguistic competence—and not only the expressiveness of natural language—the theoretician-architect clothes himself in the mantle of pure "science"; and this specialization gives him the hope of preserving a place for himself in the "techno-structure," as an expert in social communication. In effect, this is simply revealed as a maneuver to resist once more the imperialism of the engineers.[28]

The power of professional interests cannot, however, explain everything: any careful analysis must avoid a vulgar economism, i.e., determinism, if it is to put into perspective the sequence of discursive formations in the development of the theories at issue. How can one fail to remark, from this point of view, that the fashion for comparing architecture and language follows the exhaustion of that erudite academicism, which is contemporary with a catastrophic reduction in the semantic field. We have in mind the definition given by Jost Trier, who said, "the group of arbitrary and contingent terms, related neither etymologically, nor by individual, psychological associations, which, by juxtaposition, precisely cover an entire and well bounded domain of signification, constituted traditionally or scientifically by human experience."[29] We are therefore dealing, first of all, with a *lexical field* whose composition is inseparable from the pragmatic exercise of the architectural composition and which also defines the multiple conditions of such exercise. Now, as the canonic forms of classical architecture and its eclectic derivations have fallen into disuse and oblivion, the lexicon of the art, the repertory of its descriptive elements, has shrunk considerably. It is clear that the rise of the linguistic disciplines, with their theory of structural relationships, came at just the right moment to fill the vacuum in representation following upon the diminution of the classical vocabulary. As a result, the invasion of the language of criticism by the syntagm, architecture-language, can be seen to mark, in the first instance, the disappearance of that about which one could no longer reasonably speak, except in terms of archaeology, and subsequently, to mark the place of something about which one does not know how to speak at all.

The fact is that disciplines that comment on man's creative activity always incorporate enigmatic vocabularies, whose role is to represent and to mask the inexpressible. Indeed, it is possible that such representations are necessary to the industry of commentary. In other words, it might well be that ritualized use of such a vicious formulation (as is that of the "architecture-language" syntagm) reveals the powerlessness of any descriptive language to reach its goal without stamping it with errors.[30] Consequently, we are obliged, henceforth, to embark on a new course, one that will try to bring descriptive languages to their unattainable point of perfection. Then, the wholly academic comparison of architecture and language will appear in succeeding centuries to be without object.

Notes

1. Peter Collins, *Changing Ideals in Modern Architecture* (McGill University Press, 1967), p. 173. 1st ed. pub. 1965.
2. On this matter cf. René Passeron, *L'Oeuvre picturale et les fonctions de l'apparence* (Paris: Vrin, 1962); cf. also the clever review of this book by Georges Mounin inserted in his *Introduction à la semiologie* (Paris: Éditions de Minuit, 1970).
3. There is no point in giving an exhaustive list of the cases that illustrate the respect, as excessive as it is confused, that is enjoyed today by the linguistic analogy. We shall confine ourselves to a few exemplary instances. In his book, *Il Razionalismo* (Milan: Tamburini, 1966), P. Scurati-Manzoni, wishing to grasp the very nature of architectural activity, defines it as a "research in a visual language," p. 140. In an article cited below (note 4) Umberto Eco maintains that "every work of architecture must be able to be considered as a message that—on the basis of a code—'denotes' something . . . while, at the same time, 'connoting' something else." The analogy is apparently extendable without difficulty to urban planning, as Aldo Rossi makes clear: "The significance of the permanent elements in the study of the city can be compared to something similar in language; this is particularly evident as the study of the city presents analogies with those of linguistics, above all with the complexity of the problems of modification," *L'architettura della città* (Padua: Marsilio, 1973), 3rd. ed., p. 14. Nor is it surprising that the predilection for metaphor reappears in the guise of an assimilation of the urban tissue to some kind of *writing*; see on this subject, Jean-Marie Benoist's contribution to the Colloque d'Esthetique Appliquée au Paysage Urbain, held at Arc-et-Senans, September 1973. According to Benoist, "the urban signifier, constituted as a lacunary text, is given as text or polysemic writing and is not fixed; by which an intro-textural accessibility is produced for the diversity of figurative codes that are related to each other by a theory of shifters." There the analogical figure subsides into a theory that claims its own right to determine the causal relationships of its own objects, within its own discourse, conceiving itself as definitively axiomatized.
4. Umberto Eco, "Linguaggio architettonico," *Dizionario enciclo-*

pedico dell'architettura e dell'urbanismo, ed. Paolo Portoghesi (Istituto Editoriale Romano, 1968 and 1969), vol. 4.

5. A. Silipo, "Grammatica," *Dizionario enciclopedico dell'architettura e dell'urbanismo*, vol. 3.

6. Paolo Portoghesi, *Borromini, architecture, langage* (Paris: Vincent Fréal, 1969), pp. 376–378.

7. Portoghesi, *Borromini, architecture, langage*, p. 7.

8. Bruno Zevi, "L'architecture muette à la recherche d'un langage," *Architecture*, 395, February 1976, p. 10.

9. After Zevi has emphasized that "the true artists, ancient and modern (are) all naturally anti-classic," he bewails the lack of a proper code to explain their productions and, therefore, "the impossibility of elaborating a scientific criticism of architecture," ibid. Hence, on the one hand, one is tempted to agree with him, but, on the other hand, his recourse to a vocabulary specific to linguistics leads him inevitably to depend on some kind of pataphysics.

10. Germain Boffrand, *Livre d'architecture civile . . .* (Paris, 1745), p. 18.

11. Francesco Milizia, *Principi d'architettura civile* (Finale, 1781).

12. J. B. Papworth, *Rural Residences*, 2nd ed., p. vii. Papworth seems to copy Milizia very closely.

13. On this point the usual reference is to Abbé Batteux, whose doctrine is expressed in his *Les Beaux-Arts réduits à un même principe* (Paris, 1746). However, the words of François-Hughes d'Hancarville are perhaps of greatest significance: he was able to "see the connection of the figures of discourse with those of art," *Antiquités étrusques, grecques et romaines*, vol. 4, 1767. But in the relations that were eventually to be established between literature and art, the notion of *style* served increasingly as the guiding principle. Charles-François Viel, in his *Principes de l'ordonnance et de composition des batiments* (Paris, 1797), was aware of the utility of this concept: "However the word 'style' is used in literature, one makes equal use of it in our present subject. It consists, in relation to literature, in that arrangement of words, that disposition of phrases which render diction pure and elegant . . . this word and its different qualities are applied with as much truth to the other arts and singularly architecture," p. 96. This idea of style as *mediator* was destined to enjoy a lasting success. In a recent text, N. Luning Prak declares: "The different styles are different languages often as hard to understand for a modern spectator as a foreign tongue," *The Language of Architecture* (Den Haag, 1968), p. 15.

14. As, for instance, the way in which J. P. Schmit described the invention of Gothic forms: "This new artistic language, so long awaited, appeared one day—rich, poetic, brilliant, complete; so that its first words were masterpieces, and it only perfected itself by becoming corrupt, as do all languages when they have attained their perfection," *Les Eglises gothiques* (Paris, 1837), p. 46.

15. C.-N. Ledoux, *Architecture considerée sous le rapport de l'art, des moeurs, et de la législation* (Paris, 1804).

16. Quatremère de Quincy, *Notice historique sur la vie et les ouvrages de M. Gondoin*, read on October 6, 1821. Cf. *Notices historiques . . .* (Paris, 1834), p. 200.

17. Indeed, this naive identification of architecture with eloquence is no more than a commonplace. Georges Gromort gives several examples of this doxology in his *Lettres à Nicias* (Paris: Vincent Fréal, 1950). Before this, writers like Alain or Paul Valéry illustrated this topic with examples of enduring luster: one is reminded of Alain's famous claim for architecture as the most powerful language without opposition ("14e leçon sur les Beaux-Arts," 18 February 1930). As for Valéry, his *Eupalinos; ou, l'architecte* may be considered as a classic reference; cf. *Oeuvres*, vol. 2 (Edition de la Pleiade), p. 93.

18. Hjelmslev, *Prolegomena*, first published in 1943 in a Danish edition, first English translation by Whitfield, 1956.

19. On this problem one can refer to Emilio Garroni, *Progetto di semiotica* (Bari: Laterza, 1972), esp. p. 83ff. In his *Architettura come linguaggio* (Florence: Edizioni Teorema, 1974), Giuliano Maggiora aims at overcoming the difficulties of this topic on the grounds of his definition of the architectural sign as intended "'connection' between substantial academicians and the movement of man," p. 126.

20. G. Morpurgo-Tagliabue, "I problemi di una semiologia architettonica," *Bollettino dell'Istituto Internazionale di Studi d'Architettura Palladio* (Vicenza, 1968), X, p. 290.

21. G. G. Granger, "Pensée, logique, langage," *Hommage à Gaston Bachelard* (Paris: P.U.F., 1957), p. 35.

22. Gotthold Ephraim Lessing, *Laocoön* (Berlin, 1766), Ch. XV.

23. Mikel Dufrenne, "L'art est-il langage?" in *Revue d'esthetique*, XIX, 1, 1966. On this problem of the differentiation of the signified, one can refer also to an article by Noel Mouloud, "Le sens de l'oeuvre et le langage de l'art," *Revue internationale de philosophie*, 81, 3, 1967; there, Mouloud envisages a theoretical field free from the rhetorical procedures of an articulated language; for it would lead in his view to "a layer of symbolic representations . . . underlying language," so that we could approach "the source of aesthetic language where the signifier and the signified cease to be distinguished in the domain of the 'pure image'." Then "art would not have to speak to us metaphorically or by stylistic clauses"; it would be "the symbol which speaks by itself," p. 128. So be it. However, is this not to forget that art depends on a principle of reality for its materialization and subsequently that a form cannot spontaneously give up its whole significance?

24. B. L. Whorf, *Language, Thought, and Reality* (New York, 1958).

25. Viel de Saint-Maux, *Première lettre sur l'architecture* (Brussels, 1779), pp. 16–17.

26. It is known, however, that Saussure could be held equally responsible for some confusion on this topic: I allude to the famous passage in the *Cours de linguistique générale* where he wrote that "a linguistic unit is similar to a determined part of a building," p. 171. In his book, Garroni makes it clear how erroneous it could be to maintain this analogy and that Saussure cannot be held accountable for it. Garroni, *Progetto di semiotica*, p. 84.

27. M. Tafuri, *Teoria e storia dell'architettura* (Bari: 1970).

28. In addition, one must take into account the ability to form specific strata within the whole of the profession; the emblems of a sort of "science" are necessary for innovative reproduction.

29. Georges Mounin, *Les problemes théoriques de la traduction* (Paris: Gallimard, 1963), p. 72.

30. Likewise, each true proposition is settled by at least one that is false: "every description leads to false consequences," André Regnier, "Linguistique et methodologie," *L'Homme et la société*, 37–38, December 1975, pp. 215ff.

Commentary: Jiří Kroha and the Crisis of Post-Modernism

Kenneth Frampton

Between the publication of Kroha and Hrůza's *Sovětská Architektonická Avantgarda* in 1973 and the more recent debate, crystallized to a large extent by the appearance of Charles Jencks's polemic *The Language of Post-Modern Architecture*, there runs a surprising link, which brings one to recognize, once more, that history repeats itself—if not as tragedy then certainly as farce—and that the contradictions we had once comfortably consigned to the past now return to haunt us. And lest we should suffer additional delusions, let us acknowledge that this is not the first time we have been plagued by old ghosts, nor presumably will it be the last; nor for that matter is it an isolated incident peculiar to the architecture of our own age. Between Pugin's anguish of 1840 at the prospect of the universal Panopticon, and Michel Foucault's most recent thesis as to the repressive and ubiquitous nature of power, there runs a connection which transcends the field of architecture as such.

Those who insist for ideological reasons on maintaining the fiction that there is no link of consequence between the nature of a society and the quality of its architecture will not be gratified by the substance of this book, which, it is hoped, will come to be translated and published in the near future by a dedicated house. For Kroha and Hrůza are Marxist architects who have been tempered by the actual experience of social revolution and who now, at the close of their long careers, have found both the opportunity and the distance to write an objective account of the evolution of the Soviet avant-garde.

The architectural aspect of this history is inextricably bound up with their own careers as practicing architects. Both men came to their professional maturity under the pre-war Masaryk regime and, of the two, Kroha was old enough in 1928 to have designed a remarkably elegant, if modest, "constructivist" work—an elaborate industrial pavilion for an exhibition in Mladá Boleslav. Aside from his reputation as a designer, Kroha gives more than adequate proof of his capability as a theoretician, establishing once again that a capacity for theory by no means excludes an ability to practice.

Kroha's highly perceptive and well argued account of the failure of the Soviet avant-garde turns out to be surprisingly relevant not only to the concerns of this journal but also to the wider spectrum of the current debate in architecture; the debate that is now variously enjoined as modernism versus post-modernism or as formalism versus realism. It is as much for this reason as for its length that we have decided to place Dluhosch's review in the main body of the journal rather than in the book review section.

The crisis of the Soviet architectural avant-garde, the eclipse of its discourse,

and the state inauguration of Social Realism in April 1932, is by now well known. What is less readily recognized, however, is that the argument then raised in both intellectual and official circles turned exactly on those issues which now, over half a century later, have again become the central problematic of the architectural debate. The only difference is that this time the argument is taking place in the West.

Broadly speaking and much simplified, the central features of this complex problematic are as follows: 1) Is architecture as a 'science' or as a 'praxis' or as an 'object' to be rationally determined as an autonomous discipline with its own laws and procedures which when fully developed may embrace function as well as form within a single unitary method? Or 2) is it merely an instrumental reflex that can only reflect, so to speak, the form-force of the empirical demands that cause it to come into being in the first place? And 3) if it is either of these mutually exclusive alternatives, how does this in and of itself affect its emotional and psychological reception at the hands of the populace? It is hardly in the nature of today's popular, not to say populist, discourse to formulate the debate in these terms, but nonetheless these are the terms in which, according to Kroha, it emerged in the second half of the twenties in the Soviet Union, and in my view it represents a sufficiently complex formulation of the problem as to be convincing. Nothing could be in greater contrast to the current post-modernist line, which, when stripped of its semiotic or sociological mask, amounts to the culture of "consensus populism." One may even speak of the consumerist version of the old Social Realist position. The assertion that "main street is almost all right" suggests that there is nothing that cannot be repaired through the spontaneous application of supergraphics.

Kroha's account of the ideological conflict and eventual demise of the Soviet avant-garde lies extremely close to an analysis made of the same phenomena by Berthold Lubetkin in 1956 when he wrote: "it was against the subjectivism of the formalists (ASNOVA) that the reaction which now set in was mainly set. It had become obvious that the subjective, idealist trend was more often associated with painters than architects, if indeed it was defensible at all in a Marxist society. . . . The theoreticians of the new trend, later to be called the functionalists (OSA) . . . came to regard man as now more than ever an appendage of the machine, dependent on it in all respects including the aesthetic." Postulating that the sole purpose of architecture is "the isolation, organization, and enclosure of space with the maximum economy of means (Ginzburg, *Style and Epoch*, 1934), the functionalists reduced architecture to the level of activities of certain species of insects and mammals."

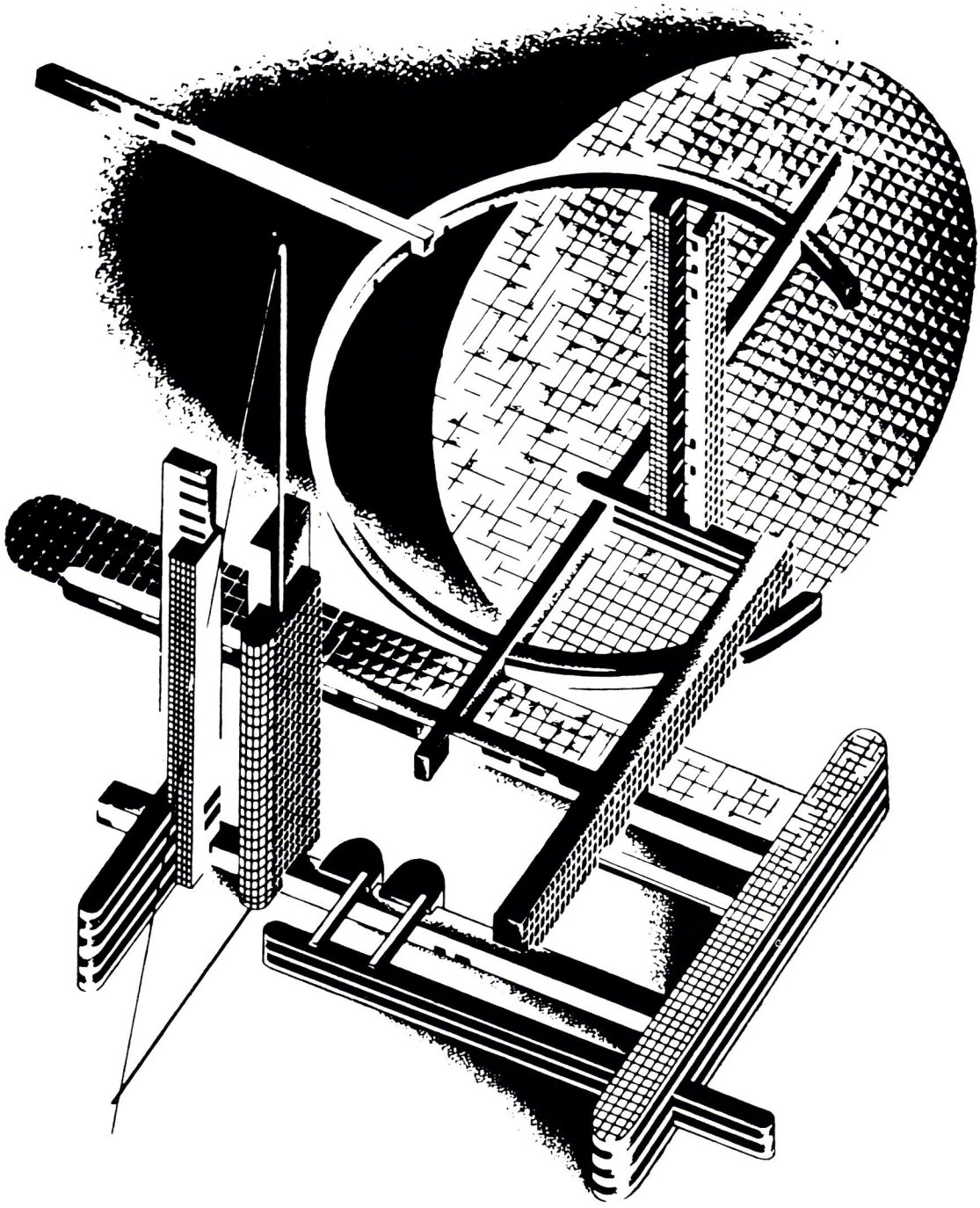
Later Lubetkin was to continue: "The simple classical concepts of internationalism underwent a considerable change toward the end of the twenties when hopes of immediate world revolution receded and the more autarchic stage of 'the building of socialism in one country' was initiated. Simultaneously, the exuberant romantic conception of technique gave way to a sober realization that technique, in Russia, meant a hard uphill struggle to transform a peasant economy. . . . The disparity between the vision of a super-charged technique and the reality of a primitive and backward building industry . . . led others to a hollow and insincere aestheticism, indistinguishable from that of the formalists they had set out to replace, inasmuch as they were forced to reproduce the adulterated forms of an

advanced technique in the absence of the real media. All the aggressive self-assertion with which the functionalists enunciated their creed could mask neither the barrenness of their doctrine nor the sterility of their practice. . . . But the public was no longer to be ignored: the public had become the patron, and now loudly voiced its disapproval and impatience with both the theory and the practice of functionalism."

Each in his turn—Lubetkin, Kroha, and Dluhosch—leave us in no doubt that it was the *vox populi* that was finally decisive, either within or without the Party, and that the imposition of a single cultural line under the aegis of Social Realism—the proclamation that "proletarians also have a right to colonnades"—was nothing if not a masterstroke of political strategy. At the level of sloganeering, the final difference between ASNOVA and OSA turned on the debate as to which factor was to be the ultimate measure of architecture: was it to be architecture itself—that is, the relatively autonomous discourse of form as in the classical era; or was it to be man—that is, the development of architecture as an anthropological synthetic discipline? Yet irrespective of this division both groups came into being out of the mutual "modernist" recognition that modern man can no longer express himself in the language of the past, and it was precisely this common bond, of course, that finally led to their suppression.

The fundamentals of this conflict are surely as much present today as they ever were, even if the political context, the specific protagonists, and the terms in which the argument is formulated are now totally different. And while the chances for the evolution of a typological and/or anthropological culture of built form are now perhaps greater than before—that is, while the *theoretical* conditions for an environmental culture, in which the "encoding" of production is matched by the "decoding" of its reception, are by now better known—the fact remains that the short-circuiting strategy of Social Realism or of post-modernism has a much better chance of producing results; if by results we have in mind immediate social gratification and control. It is not that the critique now being mounted against the Modern Movement is without justification, but rather that the supposed panacea of Social Realism masquerading as post-modernism is unconvincing. In the last analysis it merely substitutes one kind of reduction for another.

1 (frontispiece) Architectural fantasy. Y. Chernikhov, architect, 1930–1933.



1

The Failure of the Soviet Avant-garde: A Review of Sovětská Architektonická Avantgarda by Jiří Kroha and Jiří Hrůza[1]

Eric Dluhosch

The brilliant rise and the apparently abrupt demise of the Soviet architectural avant-garde in the early thirties has fascinated Western historians, critics, and architectural theorists ever since those dramatic events took place.

Soviet and Eastern European interest in this subject is of more recent origin—at least officially. It coincides roughly with the period after the death of Stalin in 1952, and has reached the West by means of published material from academic and archival sources which became accessible to Soviet and Eastern European scholars after the "thaw" initiated by Khrushchev's secret speech to the twentieth Party Congress in 1956 in which he denounced the "cult of personality" in both politics and the arts, and which opened the door to a more open approach in art and architecture in the Soviet Union and its East European dependencies.

The recent book by Jiří Kroha and Jiří Hrůza, entitled *The Soviet Architectural Avant-garde,* is an example of this new interest and is one of the most serious contemporary attempts by East European architectural critics to come to terms with events which took place in the Soviet Union some fifty years ago, not only in purely descriptive and chronological terms, but also from the point of view of the broader intellectual, political, social, economic, and cultural issues which played their role in the life and death of this important architectural movement at that time. Such a balanced approach contrasts with much of the past and present Western criticism of this period, which is inevitably colored by biases and prejudices developed in the study of the evolution and fate of the Western wing of the Modern Movement without a corresponding experience of the realities and subtleties of its counterpart in the East, especially during the years of Stalin's grip on all facets of Soviet thought and life.

This general treatment of the intellectual and conceptual aspects of the Soviet avant-garde is supported by a balanced and carefully documented chronological account of the organizational and institutional complexities of the growth; that is to say, of the amalgamation and eventual dissolution of the various factions and architectural directions which made their mark on avant-garde developments in the Soviet Union after the October Revolution.

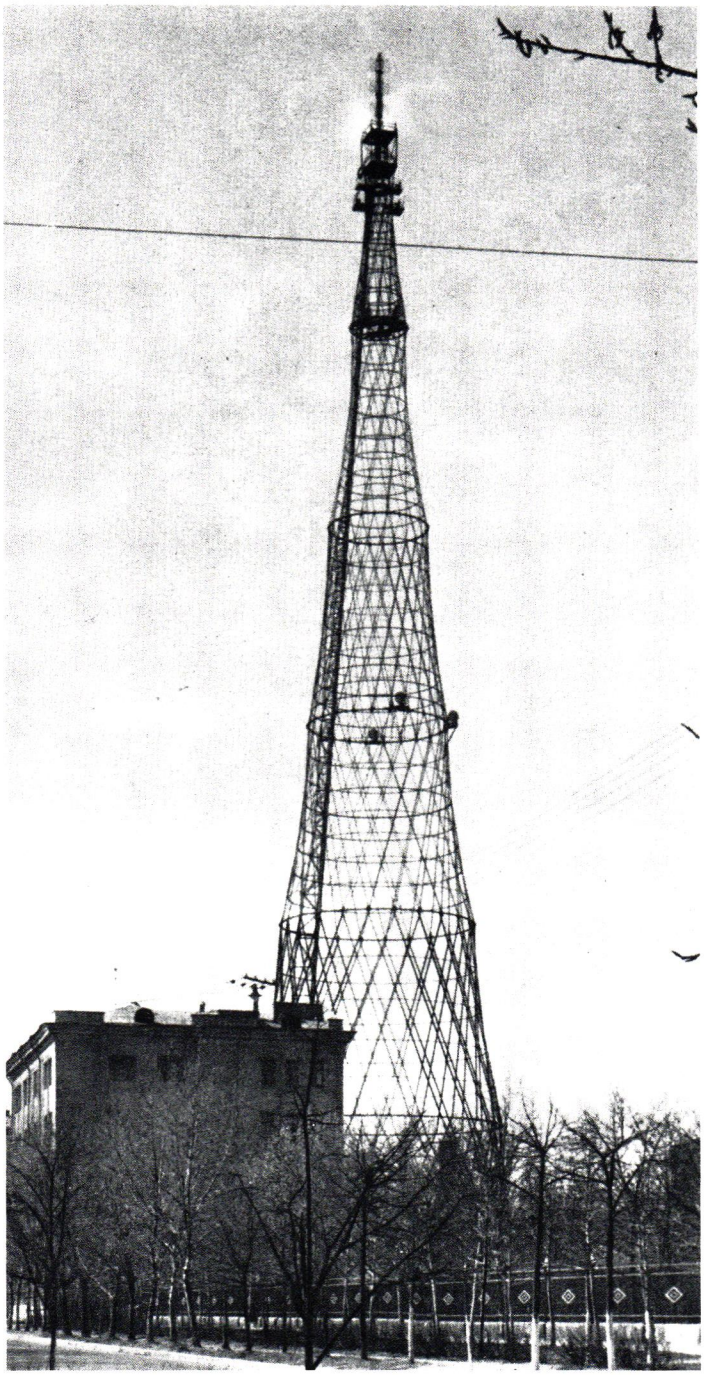
The fact that both Kroha and Hrůza grew up as socialists in prewar capitalist Czechoslovakia lends considerable depth to their arguments, allowing them to take cognizance of the Western point of view without relinquishing their Marxist convictions. This, in turn, makes it possible for the authors to deal with their subject matter in a comprehensive and global manner often absent from Soviet literature on this subject. The modern democratic tradition in Czechoslovakia sets the whole tone for this study. The authors do not conceal the fact that the suppression of the Soviet avant-garde was not only a cultural tragedy for the evolution of truly revolutionary architecture in the USSR, but also a great loss to world architecture as a whole. Having said this, they are both agreed on the central thesis that informs the entire book. They maintain that the seemingly unexpected collapse of this brilliant movement was virtually inevitable not only as a result of the special conditions existing in Russia and Europe at that time, but also due to the general inability of the avant-garde to resolve the conflict between architecture and revolution. The book tries to untangle this complex web of particular and general contradictions by searching for answers in the conditions and realities of the Soviet Union of that period, as well as trying to search for the deeper meanings of that avant-gardist notion of "architecture as idea," in the broadest cultural and historical sense of the term.

The tendency of Western historians and critics to look at the story of the Soviet avant-garde through the eyes of Western theories and achievements and to judge its results on the basis of Western standards of architectural criticism is categorically rejected by both authors. They readily admit that for a brief period the aims of the Soviet architectural left and its counterpart in the West seemed to have taken a parallel course, and that the two movements initially shared some of the same goals. However, such a symbiosis, if it ever existed, proved to be illusory after it became clear that Western Europe would remain in the capitalist camp. Contrary to early hopes in the Soviet Union, the bourgeois states of Europe did not disintegrate, and the Western branch of the previously united avant-

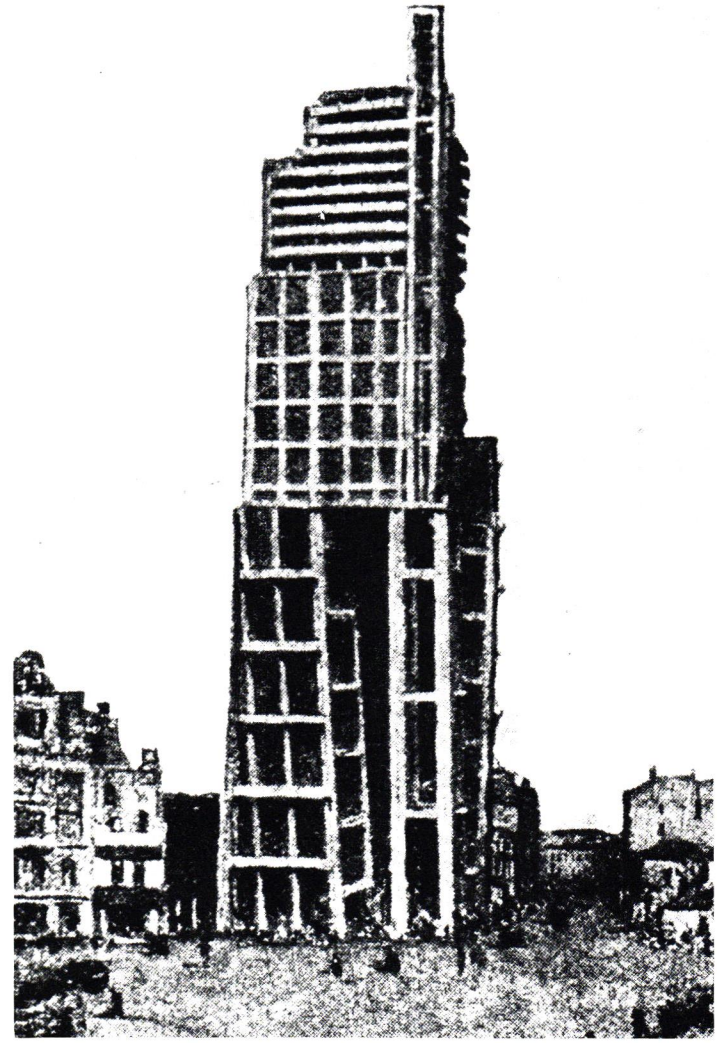
2 Announcement for the Petrograd exhibition of the model of the tower for the Third International, 1920.

garde soon made an accommodation with its powerful clients, seduced by the technically superior capability of the highly developed capitalist industry of the West. Eventually, this accommodation changed into genuine cooperation, with the result that the abstract geometry of the moderns soon became the official architecture of business and institutions alike. Any lingering feelings of guilt for having abandoned the early dreams of an architecture based on socialist notions were soon erased by the much publicized events leading to the suppression of modernism in Russia after 1930. This, and the temporary alliance between Capitalism and Communism during World War II, induced a remarkable memory lapse in the collective psyche of many if not most founders of the Modern Movement in the West as to their original social commitments and views. The "suppression by Ukase" by the Central Committee of the Communist Party in 1932 also provided a convenient outlet for self-righteous Western breastbeating and sermonizing, usually in the form of self-congratulatory editorializing about the "victory" of "free" architecture in the West. Today, many architects are beginning to realize that this may have been pyrrhic victory, and that by abandoning its revolutionary social mission, the Modern Movement of the West is presently facing an equally serious crisis of survival as did the Soviet avant-garde of the early thirties in the East. It must be evident to any serious students of modern architecture that the movement has by now lost much of its élan and confidence and that questions concerning the fundamental raison d'être for modernism are being asked with ever increasing insistence by theoreticians and practitioners alike throughout the industrialized West. For this reason alone, the work of Kroha and Hrůza is important, providing a case study of great insight and clear analytic reasoning by patiently and methodically dealing not only with the causes which led to the failure of the architectural left in the Soviet Union, but also with the deeper questions concerning the essence of architecture as such in our own industrial present.

Kroha and Hrůza analyze not only the formal aspects of architectural appearance but questions of essence. That these questions are being asked now as incisively as this by architects from the East, however veiled in party jargon



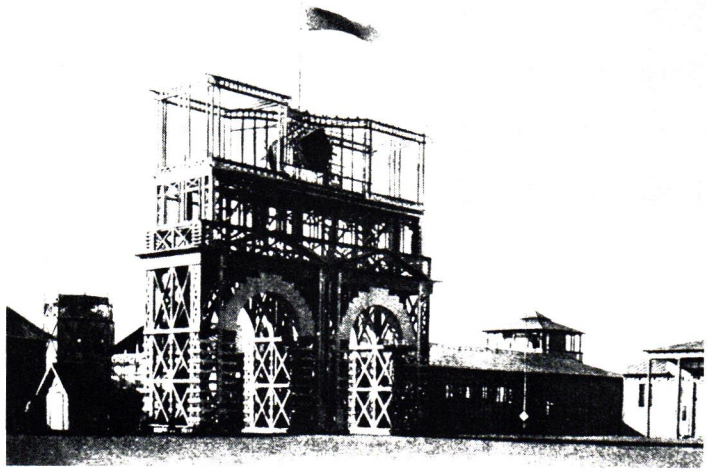
3 Radio tower in Moscow.
V. Shukhov, engineer, 1919–1922.



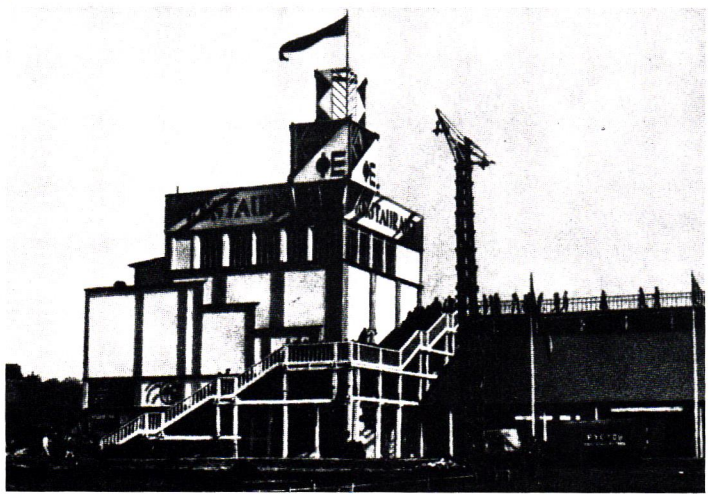
4 Photomontage of a skyscraper project, Lubiansky Square, Moscow.
V. Krinsky, architect, 1923. A Vchutemas project, carried out under Ladovsky, showing the initial effort to invent an architectural language de novo.

5 Main entrance to the All-Russian Agricultural Exhibition, Moscow. I. Zholtovsky, architect, 1923. An example of primitive wood 'constructivism' whose skeleton evidently intends a reference to the lost classical vocabulary.

6 Pavilion of the foreign department in the All-Russian Agriculture Exhibition, Moscow, 1923. V. Shchuko (with J. Kolli and A. Gushchin), architects, 1923. Primitive wood construction used as the point of departure for a new architectural language.

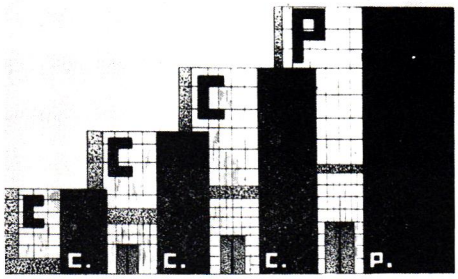


5



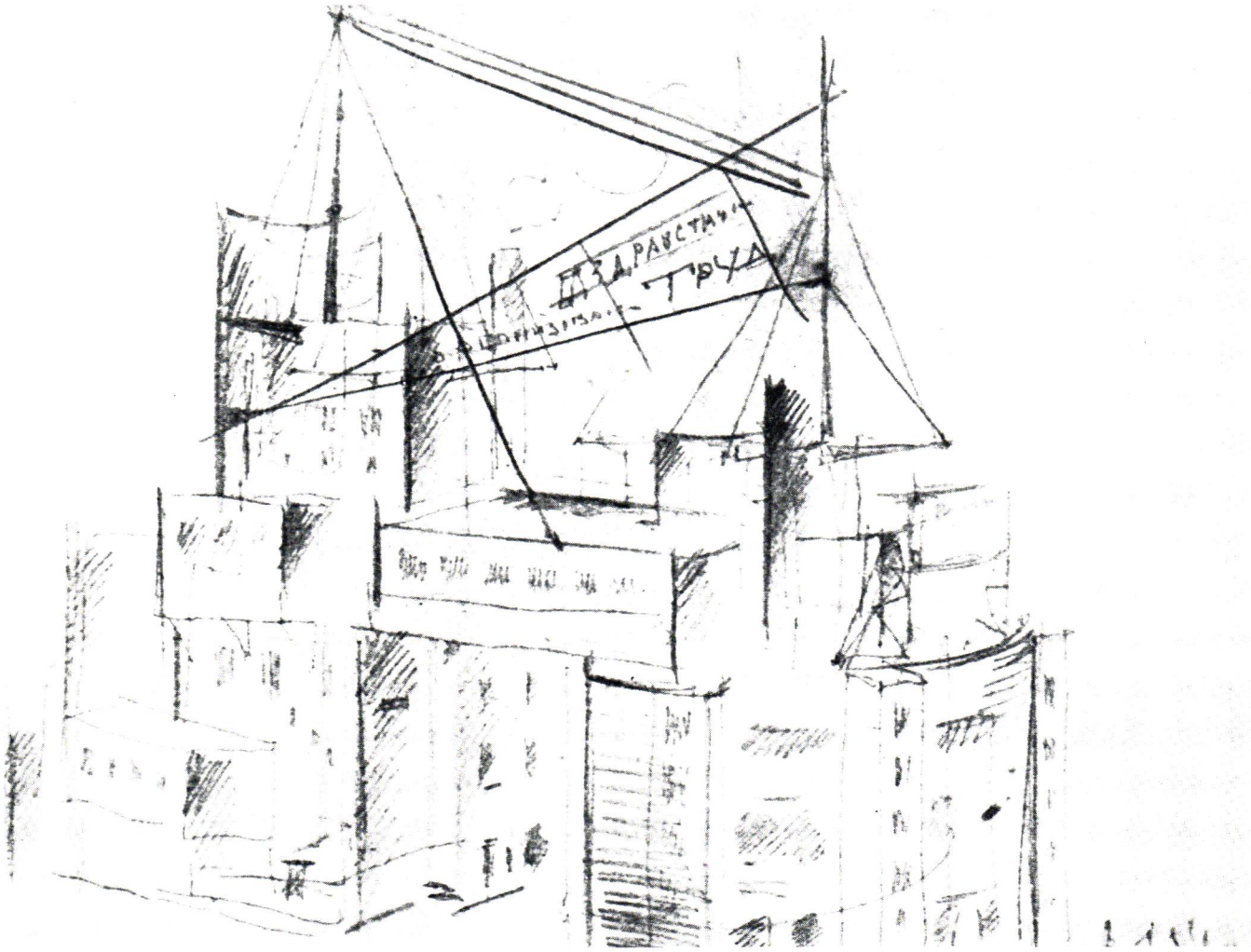
6

and obligatory lip service to Soviet suzerainty, is of crucial significance. For underneath, the argument is solid and directly relevant to the architectural situation of both East and West; the questions asked by these two authors are questions of the spirit, purpose, and ideals of "architecture as idea." In the face of the pseudo-questions increasingly asked by contemporary theorists about the significance of this or that statistical procedure of constructing questionnaires, or learned discussions about behavioral maps, or the manipulation of ever more "responsive" environments within a global situation that daily grows ever more boring and banal, Kroha and Hrůza envision a more majestic horizon for architecture. They search for the underlying relations that link the overall social and economic organization of society to culture and history as transcendent realities of human destiny. They understand that the production of socially significant artifacts is linked to cultural labor in *all* areas of a society, including the political one. They are concerned with analyzing the means by which a society purposefully begins to utilize its combined technical and economic resources to achieve specific social and cultural goals. At the same time, they recognize that the West seems at present unable to define its political, social, or architectural goals. One of the perennial sources of Western fascination with Soviet avant-garde architecture has been the fact that not only was an amazingly rich vocabulary of new architectural forms and types created, but that these new forms were the result of the new ideals and visions of the Revolution. Such a condition gave Soviet avant-garde architecture a deeper social and political significance beyond the formally grounded categories established in the West. In that sense, for a brief period in history, Soviet avant-garde architecture held the promise that it could and would become an instrument in the transformation of culture as a consequence of becoming a voluntary and conscious participant in the transformation of the social and economic reality of a whole era. This contrasted with the role of its avant-garde counterpart in the West, which, in theory if not in practice, submitted readily to limited social and economic constraints even during the early years of its activities. For Kroha and Hrůza, it is high time to reassess the heroism of the "heroic period" of the Modern Movement in both the East and especially the West. It serves no



8 Competition design for the Soviet Pavilion for the Exposition des Arts Decoratif, Paris, 1924. N. A. Ladovsky, architect, 1924. Second Prize. Typical geometrical progression of the ASNOVA school.

8



7 Competition design for the Palace of Labor in Moscow, 1923. Vesnin brothers, architects, 1923. Third Prize. "To create the architectural expression of a new palace—the palace of the popular masses . . . such an expression can only be found by the honest arrangement of the plan and by the social and utilitarian transformation of architectural functions, which express the content of the object . . . the material and spatial composition, which concretizes the image of a palace of the people." Vesnin brothers.

purpose for future research to perpetuate this myth and imbue the men of these early decades of the century with the status of either martyrs or saints. Moreover, there is no clear evidence that they saw themselves as such. The authors begin to place these questions in perspective, for they neither conceal the fact that it was the resolution of the Central Committee which officially put an end to all avant-garde experiments in Russia by decree, nor do they gloss over the inability of the architectural left to sustain their position by refusing to abandon their utopianism. Their romantic visions of a "perfect" socialist society failed in the end to come to terms with the full complexity of the historical moment in which Soviet society found itself after the Revolution: a moment which called for the maximum mobilization of the nation's productive energies, not only in architecture but in *all* fields of social and economic labor. All this had to be accomplished in a country which had no industrial base and which had swept aside its aristocratic cultural elite without having developed a broad bourgeois middle class to fill the vacuum in the interim. Unlike the West, with an industrial history of over a century and a broad middle class ruling structure, Russia had a population that had just emerged from serfdom and autocracy; a society in which the aristocratic model was the sole embodiment of all that was considered best in culture and style of life. These were the bare realities of Russian life in the early revolution and not the phantasies of a small group of avant-garde intellectuals trying to outpace the industrialized West. The story of this cultural "misunderstanding" is the main theme of the book.

The book is valuable for another reason: namely, that both authors spent their formative years in a milieu determined by the ideas of Western architectural modernism, that is, in Czechoslovakia before it was incorporated into the Soviet orbit after World War II. Both were professed socialists in their youth, and thus their book may be regarded as a testament and a case study of the realization of a dream of a socialist-communist program in a Western European context, to which, until 1948, Czechoslovakia belonged both economically and culturally. In this sense the authors speak from a deep understanding of the evolution of the Modern Movement in both the West and the East. Their effort must further be seen in the light of a broader Central European problem, namely, the problem of building a bridge between the Byzantine culture of the East and the Roman culture of the West.

The book is divided into two major parts; the first by Jiří Kroha is entitled "Struggles," and the second part written by Jiří Hrůza carries the title "Annals." A supplementary section is devoted to documents, and contains the manifestations, decrees, and program statements of the various architectural associations which were active during the years 1917–1932. This is followed by an alphabetic annotated index of biographical and historical data dealing with the architects and architectural associations of the Soviet avant-garde.

The following analysis will focus on the first part of the book since it is the more conceptual and also because it represents a remarkable, intellectual exercise in explaining and tracing the phenomenal trajectory of the rise and fall of the Soviet architectural avant-garde.[2]

Kroha's central thesis is his assertion that, while many of the formal inventions of the early period of Soviet architecture were not realized, the essence of the program then developed has not been abandoned, and that the social dynamic of the Revolution will eventually lead to the reemergence (though in modified form) of the discoveries made in the early years of the Revolution. The initial avant-garde years thus provide Soviet architecture with an inexhaustible source of energy for creating continuing solutions for the evolving socialist environment. Kroha's thesis thus begs the question of revolutionary cultural continuity. He attempts to reconcile the two opposing tendencies of revolution: the desire to destroy the old, and the need to select from the old those elements which remain useful and necessary to society for compelling reasons.

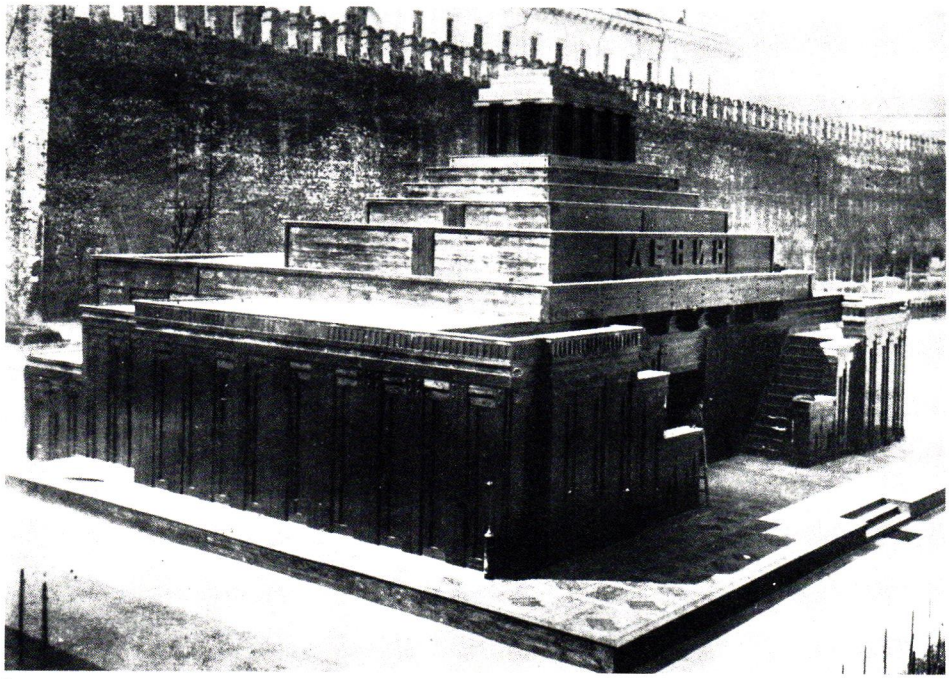
The problem of revolutionary cultural continuity was, as Kroha notes, first summarized by El Lissitzky, who postulated the four necessary steps in this process: the *negation* of all antagonistic forms of work, life, and thought; the *propagation* of the classless society; the *destruction* of all

life-negating forces and structures; and finally the *construction* of a new life environment in the free space created by the Revolution. These would be the essential tasks which had to be accomplished in order to bring about both radical change and at the same time preserve cultural continuity. Kroha sees the contradiction embedded in these requirements and the consequences of the actual working out of this schism between the necessity to destroy and the inevitability to preserve as one of the main cultural-historical causes for failure of the Soviet avant-garde. This group not only refused to accept historical continuity as part of their program but were later reluctant to assume the problem as to how to assimilate the positive aspects of the past into the new order.

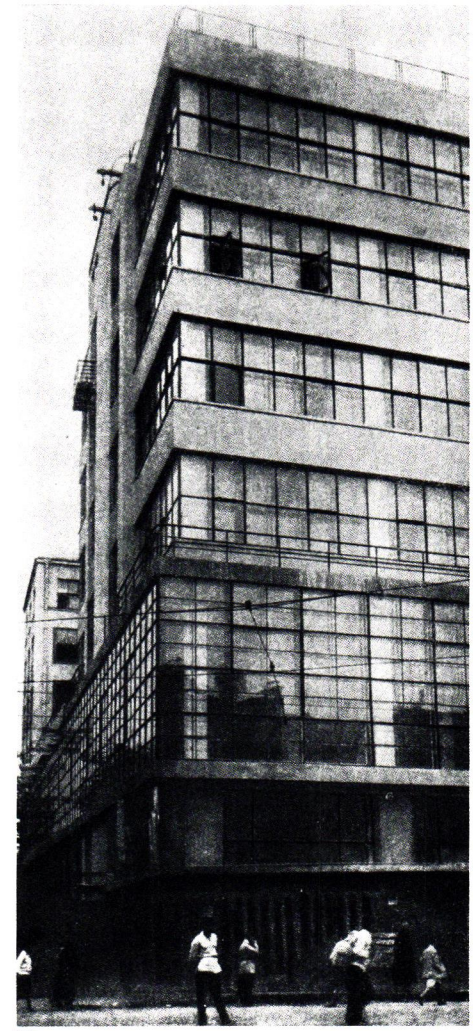
Thus, the initial success of the Soviet avant-garde in inventing exciting and original forms for the new tasks and the new societal needs of Socialism contained from the very beginning the seeds of its later rejection, not only by the Party, but also by the population at large. By proposing forms of uncompromising novelty and by consciously eliminating any reference to the past, the new architecture appeared strange and hostile not only to the old order, but to life as such. Even if it were possible to induce an intellectual amnesia concerning the past, it soon became apparent that existentially, emotionally, and habitually this was not possible. The past continued to live in the hearts and in the feelings of the masses. Social life in the early years of the Revolution was sustained by and later continued to take place in the architecture of the old order. The Party, being a body politic, was aware of this. There was no intention on its part to dismiss the problem of historical continuity lightly, either in architecture or in the other arts. The only point to be argued was *which* elements of the past were to be preserved and taken over to serve the interests of the coming classless society so as to coincide with its broadly agreed upon social and cultural goals.

This contradiction between the necessity to destroy and the need to preserve is defined by Kroha as the root cause of the ensuing political struggle. This struggle, which took place in the 1920's, turned upon the nature of the legitimate transition from a "critique by means of force" to "cultural revolution by means of criticism." The terms "critique" and "criticism" as understood here had special meaning in the contemporary Soviet situation. They should not be confused with Western interpretations of the term "criticism" which tends to make "good form" the basis of their observations, and which, in turn, are reinterpreted in terms of "good taste" (generally defined as upper middle class) versus "bad taste" (usually attributed to the petite bourgeoisie). In Soviet Russia "form" was, and is, seen as the architectural codification of social injustice and the material manifestation of class antagonism in capitalist society. A dialectical relationship is proposed between the revolutionary impulse to destroy the structure of the old political and economic order for the purposes of creating free space for the new order and the corresponding imperative to provide psychological and historical continuity by selecting elements of the old from the shell of the past. This dialectic will hopefully provide the foundations for the future socialist environment. The inability of Western critics to fully comprehend this dialectic has led, on the one hand, to romantic exaggerations of the significance of the avant-garde in terms of their influence on architecture throughout the first decades of the Revolution, and, on the other, to a corresponding overemphasis of the utopian aspect in their work.

Such exaggerations have led Western historians to underestimate the significance of the Soviet avant-garde movement by tending to dismiss it as a highly fascinating but more or less peripheral episode in the main evolution of Western modern architecture. While the former interpretation ignores the bleak social, economic, and psychological realities of the two decades in Russia after 1917, the latter sees the relationship between East and West during that period simply as an effort on the part of the Soviet avant-garde to join the mainstream of the Modern Movement in the West, in order to arrive at a new conception of architecture based on the rhythms and dynamics of the new Machine Age. Although Western critics who have espoused these hypotheses have made some allowance for the elements of social relevance claimed by the architectural left for their program, it is nevertheless accepted as a foregone conclusion that both East and West arrived at essentially similar formal results despite their overtly different social

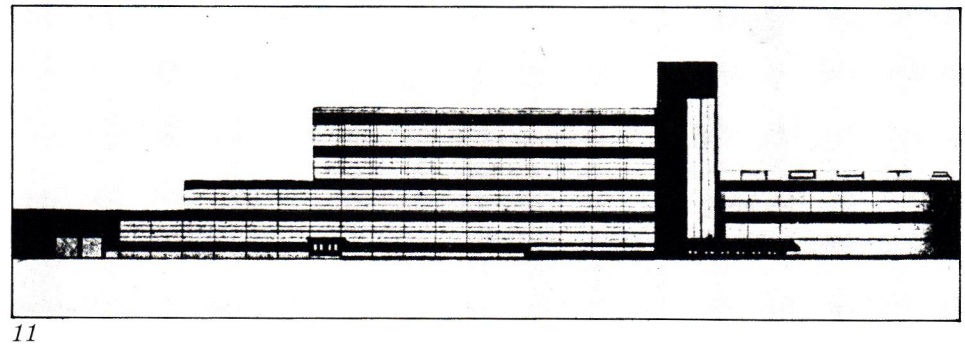


9



10

9 Temporary wooden mausoleum for V. I. Lenin, Moscow. A. Shchusev, architect, 1924–1930. Since neither classicism nor constructivism was felt to be an appropriate syntax, the design attempted to recreate the form of an ancient Asian tomb.



11

10 Administrative headquarters of Gostorg, Moscow. B. Velikovsky, architect, 1926–1928. One of the earliest realized projects of the Soviet avant-garde.

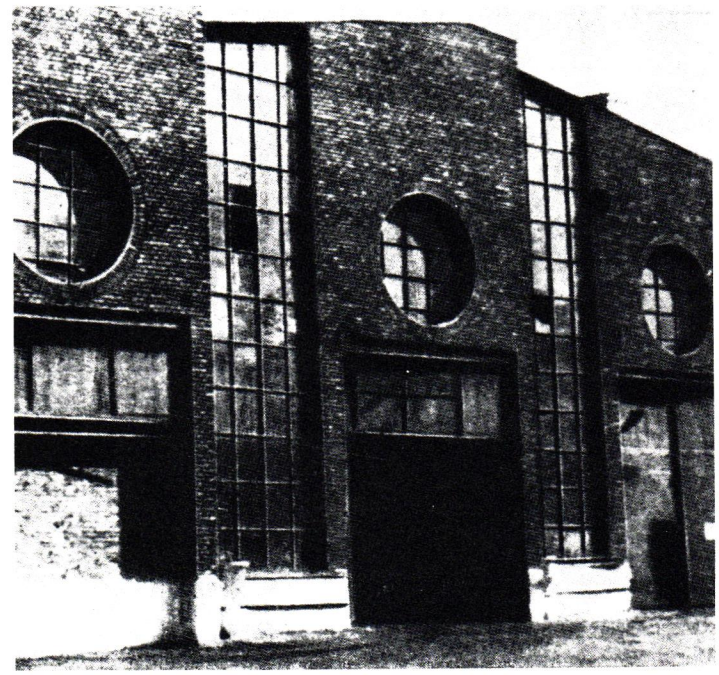
11 Post office building, Kharkov.. A. Mordvinov, architect, 1927–1929.

12 Garage on Bakhmateevsky Street, Moscow. K. Melnikov, architect, 1926.

13 Frunze Club and cinema, project, Moscow. K. Melnikov, architect, 1927.

aspirations. This is perhaps best exemplified by the simplistic Western slogan "form follows function" and the barren conception of architecture as the vehicle for technical and formal virtuoso performance without a critical questioning of the social and economic foundations upon which such a world view is constructed. Against this Kroha states: "the center of gravity in architectural creation is not to be found in a mechanical parthenogenetic elaboration of current conventional and 'pleasing' emotionalism in world architecture, or in a pseudo-intellectual defense of phenomenological architecturalism, . . . but in the creation of an architecture as the highest symbiosis of Marxist convictions and its realization by means of a deep knowledge of the (real) development of socio-political and ideological forces shaping socialist life and its (man-made) environment"; that is, not *architecture as story*, but *architecture as idea*.

He argues that once one accepts the proposition that the Modern Movement was indeed based on a new programmatic agenda anchored both in industrial production and in social realities of the twentieth century, the whole question of architectural "functionalism"—the building "telling a story about its function"—has to be reopened. The dialectical relationships between revolution, culture, history, technology, society, *and* the formal character of the man-made environment together tend to deny determinism. Current Western debate is avoiding this question by ruminating about anti-planning or about user participation in dwellings as such (but not in the field of controlling the means of production and distribution), about advocacy planning as an adversary and essentially class-antagonistic process, and finally about the discrediting of professionalism. Seldom does one find a serious concern about architecture, as a consciously chosen *subjective* will, able to differentiate itself from accepted clichés and thereby to become capable of intellectually circumscribing our epoch's relationship to objective nature and the man-made world. As it is, there is a tendency in contemporary debate to deny this concern for idea, preferring to ascribe qualities to nature which are often nothing other than distorted reflections or idealistic reinterpretations of quasi-religious articles of faith. Alternatively they are vulgar simplifications of scientific discoveries or infantile simplifications of



12

13

14 Cultural center, Kharkov. A. Dmitriev, architect, 1929–1932.

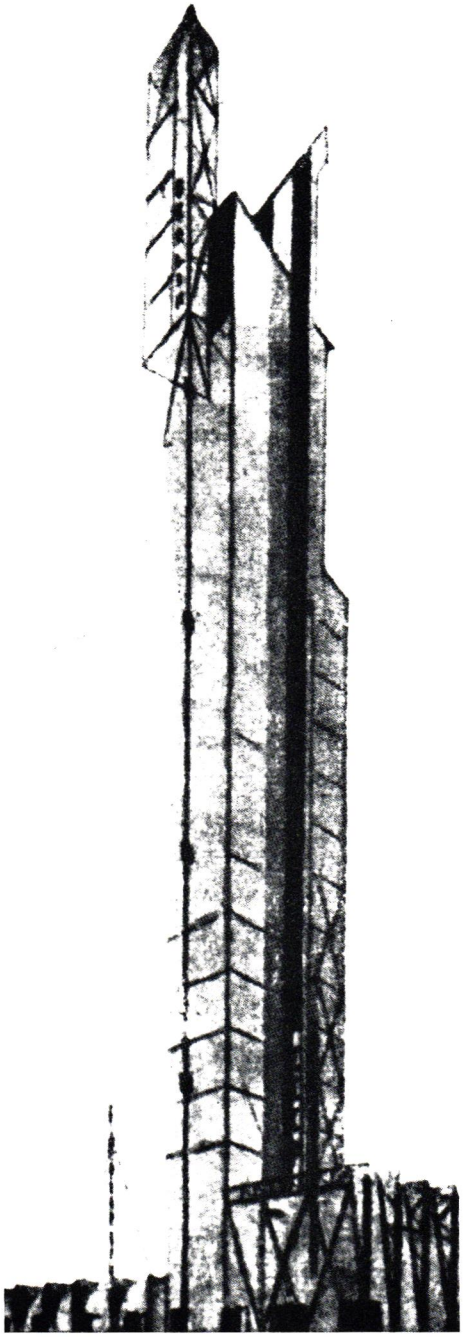
15 Lenin Library, Moscow. V. Shchuko and V. Gelfreikh, architects, 1928–1941. A clear example of an assymetrical constructivist composition executed in a classical vocabulary.

14

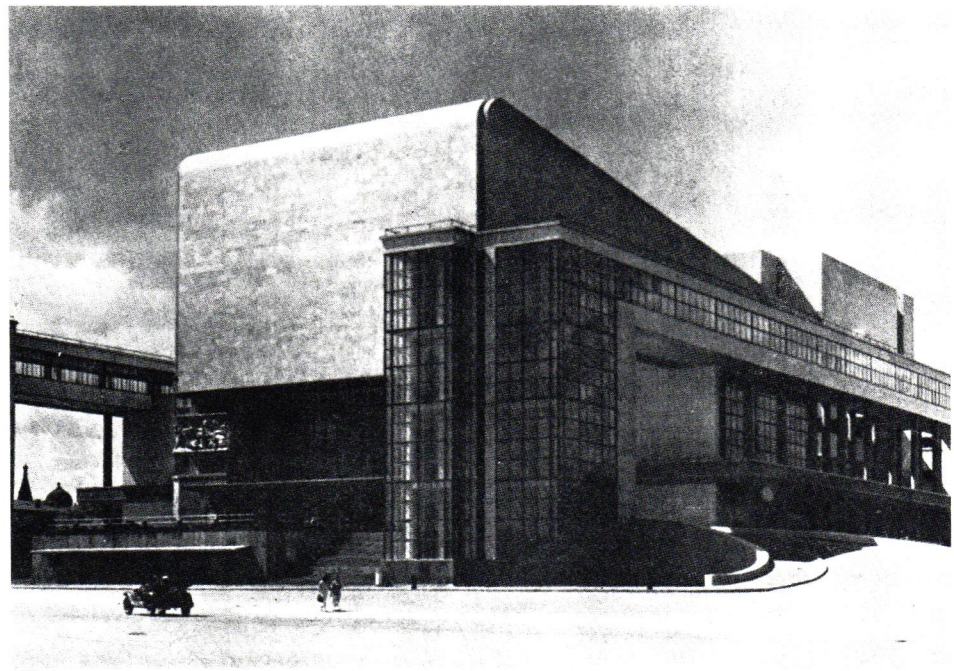
15

"alternative" pastoral utopias, rather than objective deductions from socio-economic facts. Human purpose is being relegated to secondary status and is rendered subservient to the "natural" laws of the spontaneously existing environment, without acknowledging the relative dependence of any idea on socially-dependent objective conditions that are comprised by economics, social relations, politics, and culture.

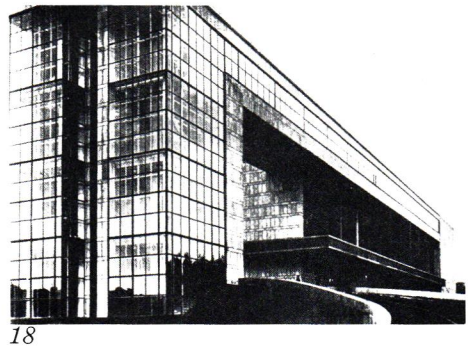
Architecture as *idea,* on the other hand, can only exist in the *subjective* juxtaposition of the man-made world view in opposition to the *objective* "chaos" of natural creation. This relationship does not necessarily presuppose either opposition or domination. Architecture as idea may well draw its inspiration from nature, searching for humanistic analogies to natural creation, but this does not imply any simple imitation of nature or a return to some unspecified state of natural grace. The translation of "idea" into "ideal" can proceed solely by means of subjective humanistic effort, distilling those characteristics of the natural environment which are compatible with the social and economic goals of humanity. A new cultural experience is created only if these characteristics are then recombined in such a manner as to provide society with a valid, symbolic, material expression of its new interpretation of the world—to be recognized as beautiful by all. Kroha maintains that such a synthesis can only be accomplished when architecture as idea regains its orientation in conformance with both the historical genius of our time (which he sees as Socialism) and the fulfillment of the best potential of its technical and economic resources. Once contact between genius loci and objective reality is lost, architecture as idea becomes ossified, and architecture as "objective reality"—functionally determinist—retreats into dogma, defining its existence through academic posturing and dependence on form. The result is a new "modern" eclecticism, shorn of historical ornament and considerably less self-assured than the eclecticism of the nineteenth century. The period of historical eclecticism immediately prior to the birth of the Modern Movement provides a good example of such a process of cultural reification. Then, as now, architectural production tended to coincide with the efforts of the bourgeoisie to resolve the contradictions inherent in class antagonisms by



16 Izvestia printing shop. I. Leonidov, architect, 1926. Student project carried out in the studio of A. Vesnin.

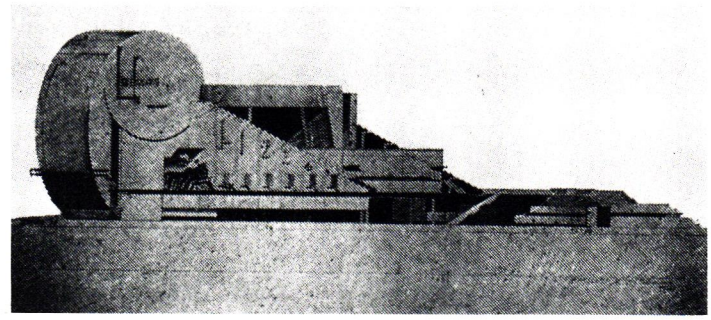


17



18

17, 18 Theater, Rostov-on-the-Don. A. Shchuko and V. Gelfreikh, architects, 1930–1936. Competition project of 1930 realized at the end of 1936 despite its constructivist affinities.



19

20

19 Theater MOPSP, Moscow, project. K. Melnikov, architect, 1932.

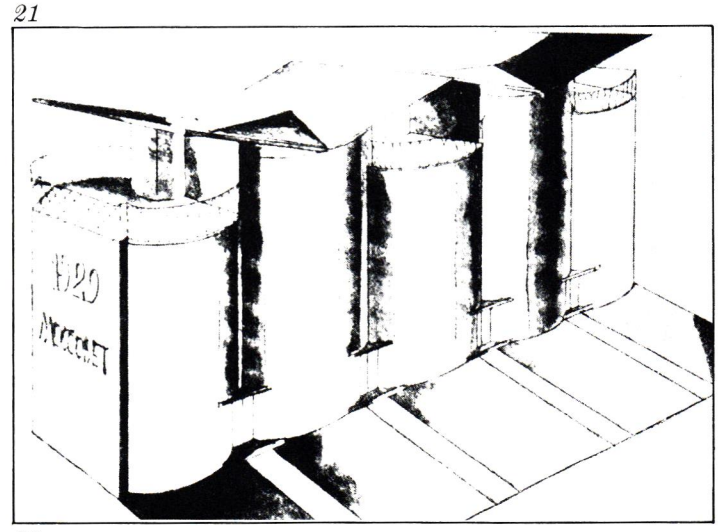
20 Pravda building, Moscow. P. Golosov, architect, 1930–1934.

21 Communal housing project, Moscow. G. Volfenzon, architect, 1928–1930.

22 Cylindrical dwelling for Mossoviet, Moscow. K. Melnikov, architect, 1929. Competition project. A variation of Melnikov's own house of 1929 as a series of interlocking units.

adorning them with its relative values. Within this perspective, such movements as the Jugendstil and the Secession must be considered as the last stage in the capitalist "consumption" of historical styles; styles which had been already exhausted by progressive devaluation and which then required new "inspiration." This was initially supplied by a "free" improvisation based on natural forms, rather than by the repertoire of classical antiquity. In this process, what Kroha defined as architecture as idea became deformed by its reduction to decoration. This reduction, Kroha notes, was intensified by the confrontation that occurs in capitalistic societies between the technical rationality of the means of production and the social irrationality of its class structure; a situation which forces a captive architecture to mask this disparity by exploiting form in isolation and stressing its decorative aspects. This preoccupation with form and decoration eventually resulted in the neglect of the newly emerging spatial and utilitarian needs of the society which had been created by the new industrial age. "As a consequence," writes Kroha, "the new ethical and aesthetic factors which are a necessary prerequisite for the humanistic creation of man-made environments were not absorbed into architecture until the beginning of the twentieth century." [3]

21



22

Against the currently fashionable criticism of the Modern Movement as a misguided failure, Kroha sees the single-minded élan and energy of the moderns as the instrument by which the primacy of *architecture as idea* was finally reasserted over *architecture as decoration.* In his view, the Modern Movement accomplished this by making architectural space the primary locus of functional purpose, thus positing the question of architectural appropriateness in terms of function and utility based on the humanistic needs of the new industrial society; while finding an expression for this through a spatial vocabulary borrowed from modern art. Purpose and function were linked in a new space-time continuum and developed through new materials and new structural conceptions. The human environment was rendered in abstract elemental forms and colors and these constructive-spatial redefinitions were accompanied by a re-evaluation of the various *contents* of architectural space. Content was broadly defined in terms of the concrete phys-

ical and psychological needs of the age, according to the fusion of constructive functionality with a utilitarianism of equipment and furniture. Despite their later devaluation and co-option into consumerism, functionalism, and utility, this content must be regarded as the unique and vital contribution of the Western European Modern Movement toward the accomplishment of architecture as idea. Why then, Kroha asks, did the Modern Movement fail to become truly integrated into the everyday life of the masses who were, in theory at least, to benefit the most from its cleansing liberation? It is Kroha's contention that the reason is to be found in the failure of the Modern Movement to solve or to recognize the underlying social problem of functionalism. It passively accepted the different "standards" developed from the technical advances of the mature capitalist system, and claimed that scientific technological production was the sole "objective" source for design, without comprehending the antagonistic social base on which the system had been founded. This led to the new differentiation of space, function, and equipment, but without specific reference to humanistic or socially beneficial criteria. Thus, if the nineteenth century had denied scientific technological advance as an explicit and necessary component of architecture as idea, then the avant-garde of the first half of the twentieth century may be accused of having tried to reconstruct the concept of architecture as idea without taking into account the emerging socio-economic characteristics of the period.

As a result of this omission, the concept architecture as idea has again become problematic. As modernism tends to dissipate its energies by defining elusive categories such as "architecture as pure art," or "architecture as an exclusive subjective-intuitive method of composition," so the result is confusion, loss of self-confidence, an obsession with restoration, and a preoccupation with novelty for its own sake.

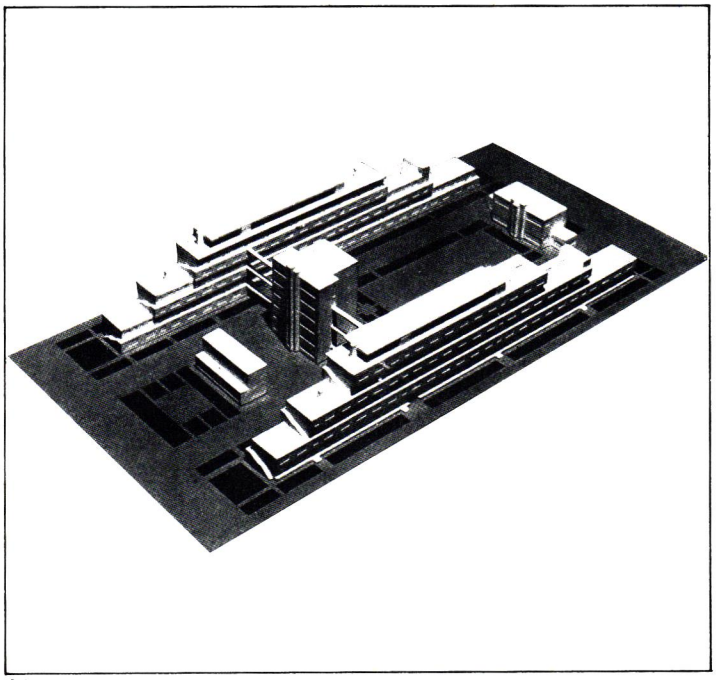
Western interpreters of the Soviet avant-garde have generally assumed that similar forces were at work in the left wing of the Modern Movement. But in fact substantial differences may be identified and were at the time seen to exist between the West European and the Soviet wings of the Modern Movement. As early as 1922, during the International Congress of Arts in Düsseldorf, El Lissitzky presented to Western architects the full program of the so-called constructivist movement with great emphasis on the independent course pursued by the Soviet avant-garde and the difference, from the outset, between the path taken by the Russians and that taken by the Western avant-garde. The Soviet avant-garde, like their Western colleagues, saw architecture as the vehicle for the creation of new forms of human life; but they saw it *based on the new revolutionary organization of society according to socialist and communist ideals*, and not merely as a new content in an old container. This means that the concept of architecture as idea was extended for the first time to include not only technical and economic change, but social transformation as well. The social order was seen as an active and dynamic element in the co-determinism of architecture as idea.

The development of the avant-garde in the USSR was determined to a great extent by the actual state of technology in Russia. While the architects of the Western industrial nations took technology for granted and, in fact, made it one of the main tenets of architecture as an idea, the Soviet avant-garde could only work with the *promise* of technology and industrialization as an essential precondition for the realization of its program. They had to share this promise with all other sectors of the economy as the minimum basis upon which to create and express the new socialist society. The designs of Malevich and Tatlin are a good example of this desire to *evoke* technology as the signifier of a potential reality rather than as the artistic transmutation of an existing reality. Here, the whole opposition between "art as the articulation of the visionary" and "art as the symbolic interpretation of existing reality," is brought into focus. In this sense, much of the formal vocabulary developed by Western modernism is essentially based on *deductive* patterns of thought in terms of a reification of the elements of a pre-existing technical reality, while, in the same sense, a great deal of the form language of the Soviet avant-garde may be considered as *inductive*. Both may be accused of considerable naïveté with respect to their ignorance of the realities of modern industrial technology in terms of the inate forces which govern mass production and automated output. The methodological approaches required for de-

signing machine tools, and those required for the design of habitable human space are subject to different laws and are not rendered isomorphic by simply inventing a machine-like aesthetic, or by attempting creative leaps through intuition and artistic empathy—as in the case of Tatlin. An objective instrumental application of scientific methods cannot be subjectively transferred to an application of similar methods to the design of the human environment. Fifty years later, this selfsame confusion about means and ends persists both in the profession and in the universities, where it is again hotly debated, to the detriment of architecture both as an art and as a science. The whole argument, in any event, revolves around a pseudo-problem, rather than focusing on the real question, i.e., the issue as to what should be the relation between "architecture as science" and the other established sciences. At any rate, the emphasis on the machine-like forms of the new architecture, notwithstanding their underlying utilitarian and aesthetic content, has led to the dead end of an academic formalism in the industrialized West and to the degeneration of architecture into propaganda in the Soviet Union. In both cases, as soon as the utopian novelty had worn off or as soon as the new forms were surpassed by technical reality, the idealistic machine aesthetic lost its evocative power as against the real majesty of the Gorki Combine, the Dneiperstroi Dam, the River Rouge assembly plant, the Golden Gate Bridge, the Hoover Dam, and numerous other engineered works realized during the course of the century. It was in just such an epoch of intense industrial expansion that the majority of the Soviet public and its party leadership began to question and eventually to reject the theories and projects of the architectural avant-garde.

In many ways, the tension which developed between the "rational functionalists" (also "creative rationalists") and the "constructivists" during the early years of the Soviet avant-garde was little other than an attempt to come to terms with this dilemma. Kroha defines the "creative rationalists" as those members of the Soviet avant-garde who believed that "*architecture* is the measure of architecture" while the constructivists proclaimed that "*man* is the measure of architecture." The constructivists rejected—especially in the early years of their activities—the "formalism" of the rationalists and accused them of "seeking to bring about by metaphysical means, the distillation of the concrete essence of architecture which would remain valid and unchanged for centuries." The constructivists did not seem to realize that the program of the creative rationalists was not to be interpreted as the ossification of certain architectural forms in time, nor as some sort of fixed, *a priori* method of composition. The constructivists failed to understand that the "rationalists" were involved in a profound endeavor to conceive architecture as the sum total of a much broader range of "functional" forces and elements, which could not be translated directly into objectively "absolute" results. The rationalists stressed the notion of architecture as idea rather than as the constructed counterpart to mere function. It should be noted that the term "composition" was used by the creative rationalists in the broadest possible sense, i.e., it included function, utility, and construction. Thus, the creative rationalists were searching for a new definition of architecture in a scientific age which would have included science as part of a new synthesis, rather than allowing architecture to become another subsidiary branch of science. Whether the result would be *scientific architecture* or *architecture as science* is more a matter of labels than substance. The important point is that the rationalists saw architecture as a relative, rather than as an absolute consequence of the interaction of socialized man with scientific technology. They saw it as a dynamic process in which the architect would be called upon to *subjectively* synthesize segments or wholes into so-called *objective* built forms. They believed that architects must create architecture rather than blindly adapt to objective conditions, especially since some of these conditions may turn out to be partially or totally anti-humanistic or anti-social. Finally, it must be said that although the difference between the two camps was real, the line between them was never so tightly drawn as the above would suggest, and the many shifts in opinion that occurred throughout the stormy period of the twenties and early thirties are described by Krůza in the second part of the book.

The debate about these issues persists to this day in the division between those who believe that architecture is nothing but *anthropometrics*, and those who conceive ar-



23

23 Housing project for Yerevan. K. Alabian and M. Mazmanian, architects, 1929–1931. A dom-kommuna *(housing project) designed as a variation of the perimeter block.*

24 Narkomfin building, Moscow. M. Ginzburg and I. Milinis, architects, 1928–1929.

24

chitecture in broader *anthropological* terms. The accusations hurled by the former against the latter and vice versa are nothing but warmed up versions of the acrimonious battles which took place half a century ago. Nevertheless, a significant difference between then and now must be noted; for while fifty years ago the avant-gardes of East and West were dealing with the initial impact of technology, the current debate is decidedly *déjà vu,* for the evidence is now clear for all to see. There is a corresponding loss of innocence which cannot be masked by righteous posturing on either side. The agenda should no longer be this schism, but rather the way in which the discrepancy between the objective and subjective phenomena in mass culture can be brought into balance by new visions of architecture as idea. It is important to challenge objective conditions in both the East and the West that are in effect anti-human and anti-progressive in that they block the release of energies essential to subjective human self-realization in harmony with the objective goals of society as a whole. All great periods in the history of architecture are characterized by this precarious and precious balance between subjective will and the necessities of the objective world. In periods of artistic transcendence, architecture as idea succeeds in establishing a temporary truce between the opaque exterior of the world and the lucid interior of man-made form revealed as the spirit of the age. In that sense only architecture as idea is eternal, and the constructivists were incorrect in not striving for a fusion between the subjective imperative of creativity and the objective imperative of technique.

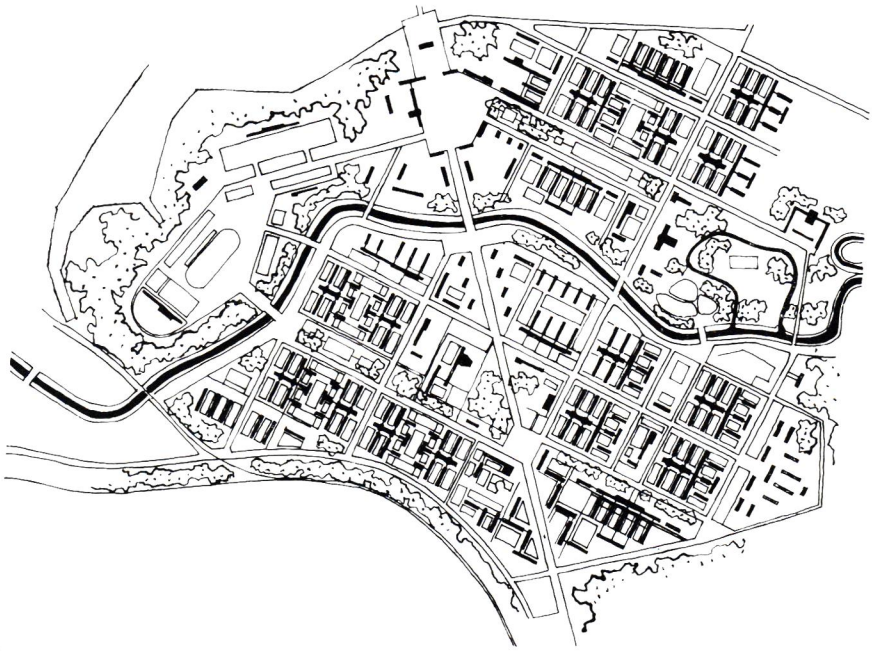
While very few contemporary "great" Western architects are willing to proceed from an explicit critique of the social and economic base of architecture in their countries, the Soviet avant-garde by and large agreed on one point, namely, that the achievement of Socialism was a basic and necessary prerequisite for the development of any new conception of architecture. In this they assumed that the class antagonism so typical of capitalist culture would soon disappear, thus leaving the path open to universal cooperation in which the architect would play a voluntary and integrated role, either as a constructivist cultural worker or as cooperative creative (rationalist) artist. In the West, the avant-garde never ceased to regard itself as a separate

25 Project for a new socialist settlement at Kuznetsk. A. and L. Vesnin, architects, 1930. This plan shows the distribution of kombinats *designed after the super-collectivist sociological principles of Leonid Sabsovich. Mass-regimented, collectivized projects such as these were promptly rejected by the workers' Soviets.*

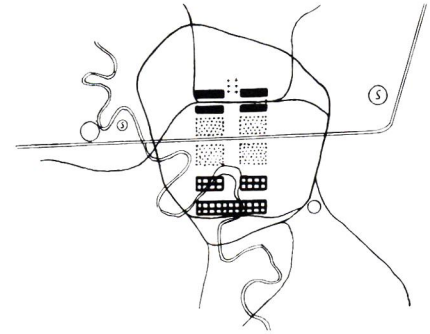
26 Project for a new socialist settlement at Kuznetsk. A. and L. Vesnin, architects, 1930. Axonometric of kombinat *(residential complex).*

27 Plan for Moscow. Le Corbusier, architect, 1933. Variation on the Ville Radieuse scheme.

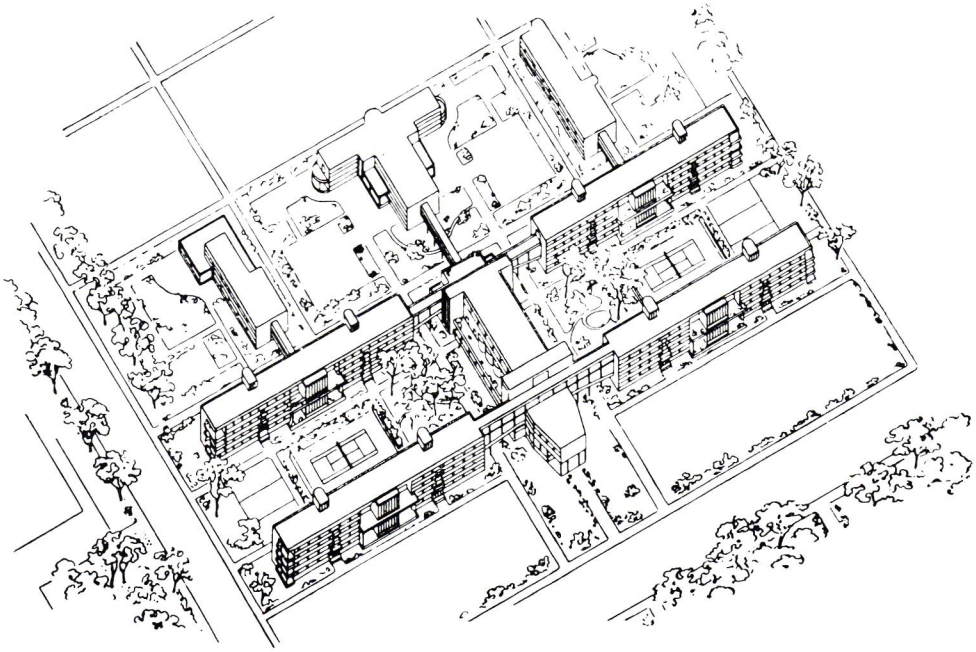
28 Plan for Moscow. VOPRA group, architects, 1933. This finger plan exercised a strong influence on Arthur Korn's MARS plan for London of 1942 and on Hilberseimer's hypothetical planning studies for the American mid-West of about the same date.



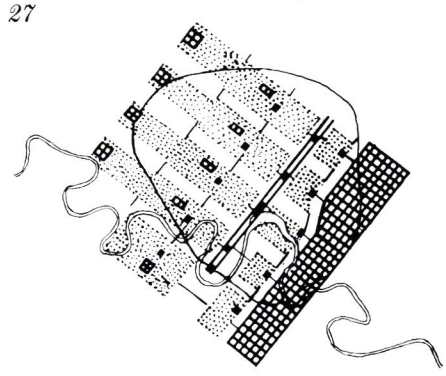
25



27



26



28

and antagonistic element within mainstream culture; forever alienated and forever in danger of being co-opted. Yet once societal goals are accepted by the creative artist as either historically inevitable or politically correct, the term "avant-garde" takes on an entirely different meaning. With this antagonism vanishes, and the avant-garde can openly proceed with its task of absorbing the objective signals and products of the socio-economic environment without fear of contradiction. It is then able to devote its creative energy to the distillation and the transmutation of the essence of the environment by giving it a spatially constructive content and expression as the man-made container for all life processes. At the same time it creates the conditions for a trajectory of progressive development to higher forms of classless existence. This picture leaves out the contradictions created by emotional and psychological factors, which complicated matters considerably and which—to some extent—contributed to the failure of the Soviet avant-garde.

While such a program is adequate for the creation of the new, it does not solve the problem of how to deal with the old, which is equally important for the maintenance of national continuity and historical legitimacy. Events have shown that both factions failed to achieve this synthesis. While the constructivists tended toward the *tabula rasa* jettisoning of all historical baggage, the rationalists believed that a dialectical reinterpretation of history in socialist terms was possible within the general framework of a transcendent and more or less abstract conception of "architecture as idea," without dealing with the question of re-using the real historical heritage. The constructivists saw themselves as active comrades and "workers of culture" who had joined the masses in the construction of the material base of Socialism, while the rationalists saw themselves not as technicians, but as artists capable of translating the dynamic of the new society into symbolic and architectural terms. Both accepted the necessity of rapid and massive industrialization. Their only difference was in the interpretation of the role which architecture should play in the society.

Earlier, the constructivist concept was criticized for its blindness to transcendent values in architecture. Kroha points out that this may be true, but that another interpretation is also possible, i.e., it could be said that the constructivists rejected the idea of superimposing extraneous "meaning" on architecture precisely for the reason that socialist society had preempted antagonistic class relations, thus cleansing society of all its former antagonisms and thereby leading to a situation in which life as a whole would be transformed into a work of art. In the face of this, only one problem remains, namely, the urge of any newly found political or social order to establish its legitimacy with regard to other societies and other moments in history.

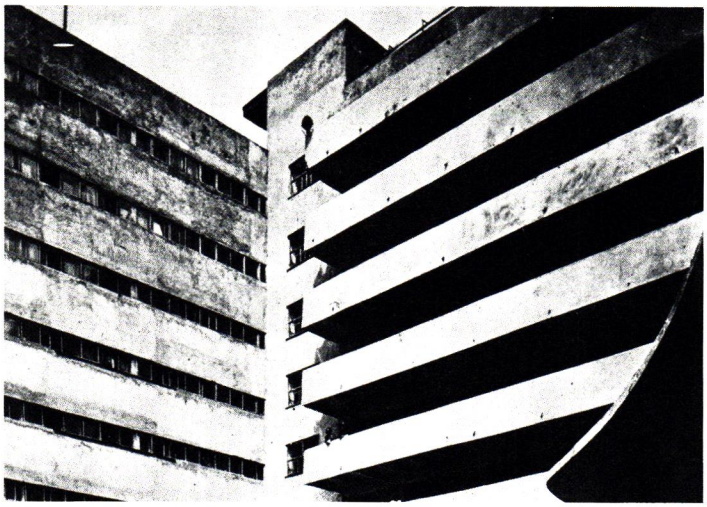
The constructivist position was evidently a violent and natural reaction against the ponderous, aristocratic court academicism which had dominated official Russian architecture up to the Revolution. The constructivists proposed to replace the past with an architecture of uncompromising social content, embodying a clear vision of a classless society. This could not be achieved through appropriating the old academic system, but only by participating in the creation of the material conditions of the new society. The new needs of society were to lead to the invention of new building types for which no precedent existed, and which, free from history, would find their expression in real life experiments rather than in academic rules and theories. Their mistake however was a corresponding lack of commitment to advanced technology and construction. Thus, while standardization and modular coordination were enthusiastically described as essential prerequisites for the industrialization of housing and other building types, there is little evidence that the avant-garde carried out serious research in this area or began to understand the implications of modular coordination and standardization in respect of repetition, etc. Instead, the avant-garde embraced functionalism without having either absorbed or understood the full implications of the utilitarian position. Rather than mastering the technical and organizational complexities of the emerging building types, the Soviet architectural left decided instead to broaden the area of their concerns by focusing on large scale projects of urbanistic character. The much publicized debate revolving around the future of the socialist city between the urbanists and the dis-urbanists

in the late twenties and the early thirties is the result of this decision. Many of the schemes were even more utopian than some of the earlier projects for single buildings, and more often than not they were characterized by a tendency toward abstract schematization. By trying to invent ready-made images of socialist urban utopias, the avant-garde lost touch with the objective Russian reality, and for all that they sought to legitimize their schemes by claiming that they were the result of "scientific" precepts based on Marxist principles, they tended to ignore the details of their technical and social reality. These avant-garde architects declared their work to be scientific without developing an adequate methodology as a basis for their work.

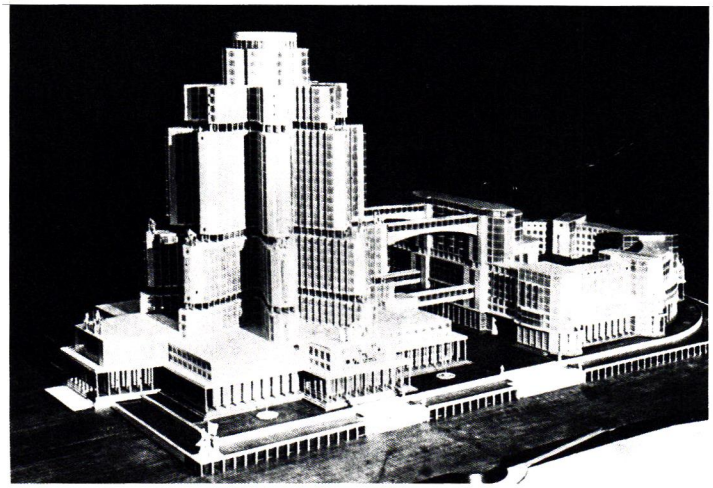
To conceive whole cities on the basis of a spurious "science" was nothing short of blatant utopianism, which stood in glaring contrast to the level of the technology available in Russia at the time. Furthermore, the Soviet architectural left failed to take into account the full complexity of the behavioral and psychological factors which would have to be solved in order to achieve such radical changes in life-style. Simply stated, the avant-garde failed because their so-called scientific-rational methods were irrelevant to the actual goals pursued by Soviet society at the time; aims which were accessible to the scientific and technical potential of the moment and which produced tangible results for all to see. The outcome was inevitable; Soviet society rejected utopia and decided to fall back on the familiar, which was well-known and powerfully represented by the historical architecture of the past.

This return to traditionalism and eclecticism was neither sudden nor totally imposed from above. On the contrary, traditionalism flourished alongside the projects of the avant-garde throughout the early years of the Revolution, and the party decree of 1932, which formally sealed the fate of the architectural left in the Soviet Union, was actually not much more than an act of official recognition of a growing reaction in the population against the experiments of the avant-garde. Kroha believes that the "constructivists" and the "rationalists" not only failed to occupy a conceptually correct position vis-à-vis socialist policy in the area of habitation, but failed even more categorically at the most crucial moment of the movement's short existence, i.e., when it was essential to take account of specific political, social, and cultural indicators which signaled that the time had come to evolve a richer formal vocabulary which would be able to symbolize the deep-seated *emotional* needs of the masses. "They also failed to imbue their unquestionably progressive theories with a *dialectically correct* and an *economically and psychologically effective* creative method which would be in close harmony with the actual production capabilities and the real needs of society at that time."

Thus, the avant-garde failed not only because it never managed to work out a creative synthesis between the anthropometric and anthropomorphic view of architecture, but also because there was insufficient practical experience on the part of either faction. The position of the traditionalists was equally complex. Many of the architects educated before the Revolution did not entirely reject the direction taken by the avant-garde. In fact, a substantial number of them (including Shchusev, who designed Lenin's tomb) tried to incorporate selected (usually formal) avant-garde ideas into their work, particularly in the early years of the Revolution. Some even joined the ranks of one or the other avant-garde architectural associations. This is described in detail in the section by Hrůza. However, almost all of them eventually abandoned the radical left in favor of practicing in the old way. Having been educated in the classical tradition, they found it difficult, if not impossible, to develop a genuine intellectual tolerance for the new theories of the avant-garde, especially insofar as the rejection of their own historical heritage was concerned. Instead, it was easier to accept the functional and utilitarian criteria established by the moderns, while retaining traditional compositional approaches to design, with an occasional attempt to mimic some of the "modern" stylistic elements developed by the young. All in all, a synthesis between the traditionalist point of view and the ideas of the avant-garde never occurred. This was unfortunate because the traditionalists were capable of imbuing their works with the emotional, plastic, and decorative content that the avant-garde so significantly lacked. The philosophical and professional rift between the traditionalists and the radicals led to endless



29



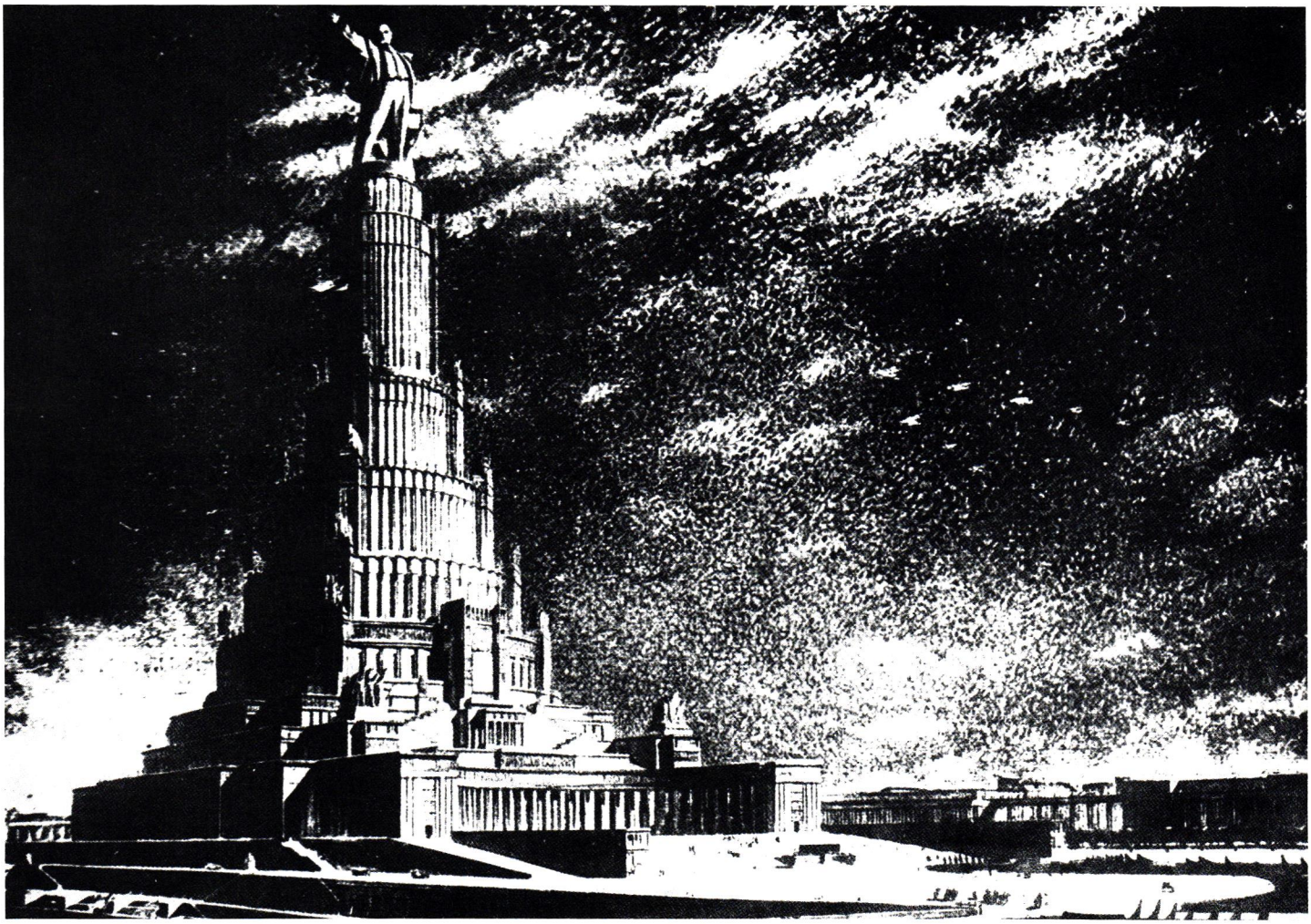
30

discussion, argument, recrimination, and, ultimately, open hostility. The victory of Zholtovsky in the first stage of the 1932 competition for the Palace of the Soviets was only the last link in a long chain of events which ended with the defeat of the Soviet avant-garde in the 1930's.[4] The decision of the jury opened the door officially to Russian academic eclecticism in architecture and, at the same time, made clear the will of the Party by publicly rejecting the ideas of the architectural left. By supporting the verdict of the traditionalist jury, the Party decided to join forces with public opinion and put a stop to the endless intellectualizing of the many factions of the left, thus hoping to settle the dispute once and for all in order to proceed without interference with the real task of the Revolution, namely, the rapid industrial and agricultural development of all sectors of the economy.

The bleak and often poorly finished examples of the built projects of the avant-garde did not help its cause either, especially in the eyes of the public, who could not help but compare the severe and laconic lines of the new buildings with the sculptural and decorative richness of the pre-revolutionary past. The intellectuals of the avant-garde failed to understand that even the neglected and run-down edifices of the aristocracy could be preferred by the people to the functional, efficient, healthy, light, and honest structures of the new socialist order. Notwithstanding all this, they missed the essential point which consisted in the curious psychological fact that the previously oppressed inheritors chose to see the architectural accomplishments of the overthrown class not so much as symbols of their former bondage, but as concrete examples of a higher living standard than that offered by the avant-garde. Viewed from such a vantage point, the architecture of the aristocratic past quite unexpectedly took on the function of a reverse utopia, where familiar forms evoked in the imagination of the population visions of what life must have been for some and how far reality still was from coming even close to such dreams. Thus, it is quite natural that failing to provide a palace for everyone, society asked architecture to match the performance of the past at least on formal and pictorial terms, i.e., by drawing on the rich plastic and decorative elements of the past for *emotional and psychological* effect,

29 Dom-kommuna *(housing project) for the international student textile institute, Moscow. I. Nikolaev, architect, 1929–1933.*

30 Narkomtiazhprom building. A. and V. Vesnin, architects, 1936. This is the third stage of the competition entry for a large ministerial complex. This particular version shows a certain compromise between the language of constructivism and the representative program of the Social Realist style.

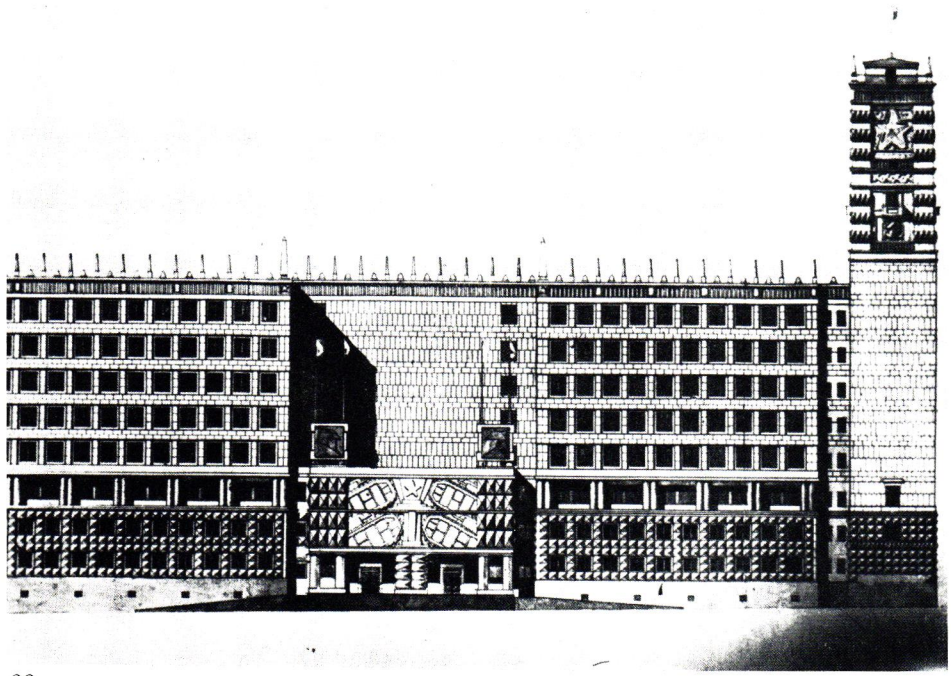


31 The first re-design of M. Yofan's entry for the 1932 Palace of the Soviets Competition, reworked in collaboration with the academicians A. Shchuko and G. Gelfreikh. Such rhetorical monumentality effectively consolidated the Social Realist style which the Party had established as its cultural line, through the Ukase (Decree) of April 1932.

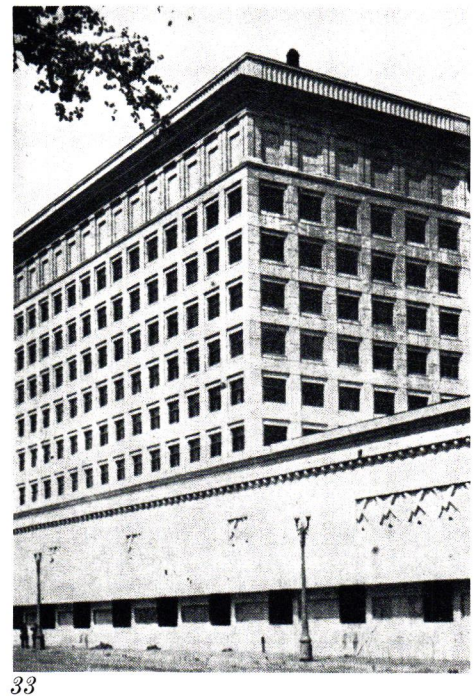
32, 33 People's Commissariat for Defense in Moscow. V. Rudnev, architect, 1933. Project. The initial years of Social Realism still left room for iconographic manipulation. Here classical rustication is associated with mechanized armor. The central entry is emphasized by tanks depicted in relief on either side of the Red Army star.

34 Apartment building, Mokhovaya Street, Moscow. I. Zholtovsky, architect, 1934. This structure helped to establish the formula for re-interpreting modern programs in classical form.

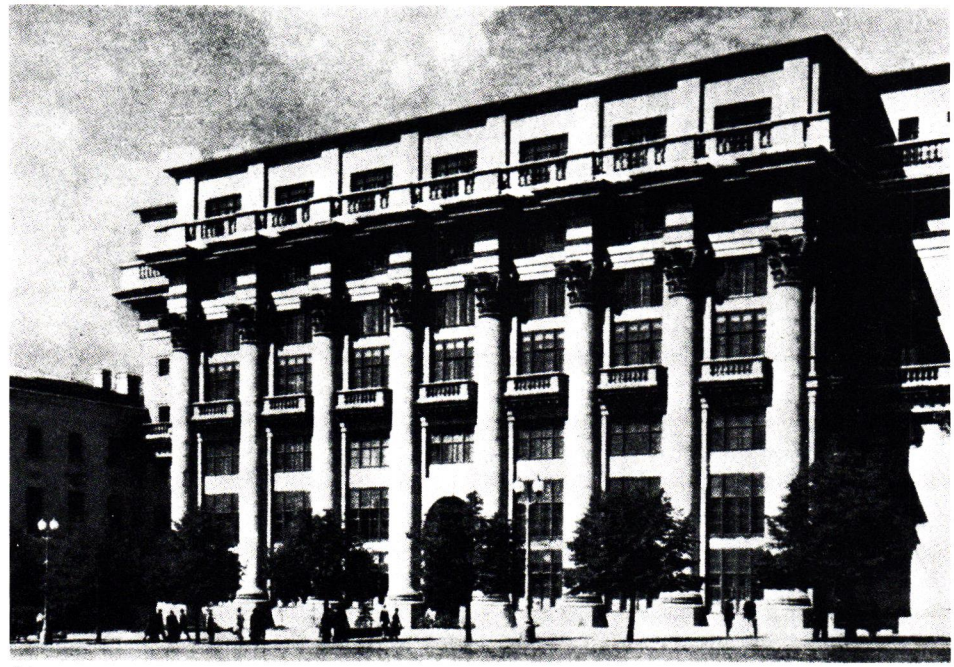
35 Soviet Pavilion at the Paris Exhibition of 1937. M. Yofan and V. Mukhina, architects, 1937.



32



33



34

rather than for the *intellectual reification of utilitarian and functional space-time notions.*

Finally, it must be pointed out that aside from these psychological and emotional factors, the avant-garde failed to acknowledge the socio-political and cultural crosscurrents of the time, which were the result of the Party's demands for extreme self-sacrifice and discipline for the sake of building a gigantic industrial base in a country that had been almost exclusively agricultural before the Revolution. This demand called for an iron enforcement of social discipline in all areas of economic life except, that is, in architecture, where extreme sacrifice on the individual level was to be compensated for by the utmost splendor and magnificence at the civic level. The ornate opulence of the Moscow subway is perhaps the best example of this policy.

Thus, by rejecting the past, and by occupying an unyielding and exclusive position vis-à-vis the future and history, the Soviet avant-garde created doubt about its own position on the crucial question as to how to deal with architecture as an integral part of art, especially since painting, sculpture, and the other decorative arts had historically enriched Russian building with their highly emotional and decorative content. This was well understood by the political leadership, whose legitimacy was at that time by no means self-evident or even secure, and who was well aware of the public's feelings and reactions toward avant-garde architecture. Given the not unreasonable hypothesis that the formal evolution of the Soviet avant-garde would have eventually led to some sort of accommodation with eclectic formalism as a matter of historical necessity, it can now be seen why the unresolved conflict between the rationalists, the constructivists, and the traditionalists could have had no other outcome than the collapse of avant-garde architecture in the USSR, simply because the traditionalists had a more dependable technical and psychological position to fall back to.

The question remains whether the subsequent rebirth of historical traditionalism should be regarded as a matter of *historical necessity*, or whether the whole episode is merely the result of special circumstances existing in a special

35

country at a unique moment in history, with no bearing on architectural developments elsewhere. Kroha tries to deal with this question by looking at the events of this period from a more general historical perspective and also in terms of their architectural significance in both local and global terms. He believes that culturally the projects of the Soviet avant-garde were characterized by an insufficient understanding of the complex spatial relationships which—in turn—were the result of the new forms of collective interpersonal relationships. There was a general failure to reassess these novel sociological phenomena in the light of Russia's cultural and historical heritage. This meant that an explicit critique of architecture by the means of architecture was never attempted by the Soviet avant-garde. In other words, historicism was never dealt with on its own terms, and its claim to unchanging value simply provided the architectural left with the argument that adherence to such values was *ipso facto* contrary to the explicit goals of a Socialism. In rejecting this argument, it can now be argued that every architectural style is also the active expression of prevalent authority and power and indicates in itself the confidence of the ruling class. While the avant-garde understood this, they did not draw the correct conclusion, i.e., they never managed to translate their critique into a positively evocative and emotionally effective formal and symbolic language. They failed to understand that a society which was desperately struggling for survival, while at the same time seeking to establish its legitimacy in the eyes of the world, could not afford to jettison the past simply because a small group of dedicated revolutionary visionaries thought it should do so.

It is interesting to note that in choosing eclecticism, the Empire, and certain periods of the Renaissance as their preferred styles, the new rulers carefully avoided the styles of the immediate past, which were too closely associated with the emergence of the Russian bourgeoisie. In rejecting constructivism and functionalism, the Party eventually accused both of being nothing other than further expressions of West European cosmopolitanism: in other words they were "styles" which served only to legitimize the mature, capitalistic, ruling elites of the West.

To what extent these considerations were the result of conscious deliberations on the part of the Bolshevik Party leadership is an interesting question, which so far nobody has been able to answer, including the authors of the book. Nevertheless, whether by design, default, or by political instinct, the Party decided to avoid identification with capitalistic culture, while at the same time establishing cultural equivalency in terms of universally accepted examples of eternal value and beauty. Thus, Socialist Realism was not only a psychological phenomenon but also a political act which, apart from providing the new state with a "timeless and transcendent" architecture, also furnished the regime with a historical and political legitimacy in the eyes of both the world and its own population. With regard to this Kroha notes: "By accepting the cultural heritage of the nineteenth century, the capitalistic bourgeoisie represented itself in its technical, economic, productive, and cultural achievement at a higher level of development than the feudal aristocratic order it had come to supersede. In contrast, the Russian working class did not have the benefit of even partial participation in national life in any of these areas prior to the Revolution and thus was highly backward in this respect. In order to allow the masses to come to terms with their national heritage an intervening period of 'catching up' was necessary. This required a complex and difficult effort on the part of the Party to raise the general level of education in all areas of national life, while at the same time having to keep abreast in the competition with the capitalist West."

In spite of its return to historical eclecticism, Soviet architecture participated in the gigantic task of reconstruction in quantitative terms. Looking back on this period, one is amazed at the range and number of new projects, housing, industrial centers, transport facilities, etc., which were built in the thirties and later. The same can be observed in urbanism. Even though there was a return to classical notions of urban design in the formal sense, an amazing number of new settlements were realized at a scale unheard of in the West. The function of Socialist Realism was to sustain the self-confidence of the hitherto dispossessed masses. It was to provide the society with a reliable means by which to accomplish cultural self-realization, accessible

to all and explicit in emotional, plastic, and pictorial terms. Thus, the question as to the specifically local versus the universally valid lesson which one may draw from the failure of the Soviet experiment may be answered in two ways. It is local and specific as to the authoritative nature of the solution imposed by the Party in its decree establishing Socialist Realism as the only official architectural style. It is universal in the sense that any movement which claims to represent the masses, but which ignores the historical, emotional, and psychological factors which are accepted by the masses as legitimate expressions of their culture and power is doomed to failure precisely because it cuts itself off from the reason for its existence.

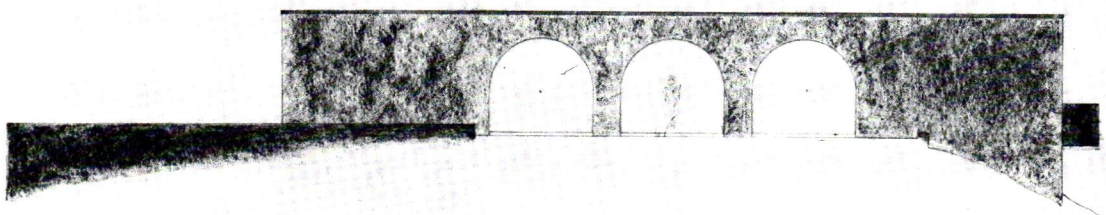
Notes

1. Jiří Kroha and Jiří Hrůza, *Sovětská Architektonická Avantgarda* (Prague: Odeon, 1973).
The text is complemented by 331 illustrations, many of which have never been published in the West.
2. This does not mean that Hrůza's part is less valuable. On the contrary, it complements the book by providing factual documentation and narrative continuity in terms of dates, events, sequences, and other documentary material related to the subject of Soviet architecture in the early decades of the Revolution.
3. The much discussed schism between engineering and architecture developing since the end of the eighteenth century made the position of architecture as idea even more insecure throughout the nineteenth century.
4. In 1933 Boris Yofan won the third and final stage of the Palace of the Soviets competition.

Figure Credits

1–35 Reprinted from Jiří Kroha and Jiří Hrůza, *Sovětská Architektonická Avantgarda* (Prague: Odeon, 1973).

1 (frontispiece) The Glass House, New Canaan, Connecticut. Philip Johnson, architect. Scheme XX ("Syrian arch," see also figs. 27–29).



1

The Evolution of Philip Johnson's Glass House, 1947–1948[1]

Robert A. M. Stern

In an article in the *Architectural Review* written in 1950 Johnson outlined his views on the relationships between the compositional principles seen in his work at New Canaan and various historical examples.[2] In that same article he acknowledged his indebtedness to Mies van der Rohe for the very idea of the Glass House: "Mies had mentioned to me as early as 1945 how easy it would be to build a house entirely of large sheets of glass. I was skeptical at the time, and it was not until I had seen the sketches of the Farnsworth House that I started the three-year work of designing my Glass House. My debt is therefore clear, in spite of obvious differences in composition and relation to the ground." [3]

Despite this assertion of skepticism by Johnson, the assumption generally held has been that the final design was chiefly an outgrowth of Johnson's unquestioning admiration for Mies. It supposedly followed a logical progression from Johnson's own earlier Ash Street House in Cambridge of 1942 by way of his first house built for a client, the Eugene Farney House of 1947, and was crystallized by his viewing of Mies's early drawings for the Farnsworth House. Now, with the publication of these early studies, the story of the Glass House can be seen to be much more complex if less romantic. For these early studies shatter the image of Johnson as a confirmed Miesian who mined the master's best ideas only to turn away from his example in mid-career in search of a more personal style. They suggest a very different Johnson, from the very beginning of his career, different from both the early polemicist for the International Style and the admirer and disciple of Mies, and one already strongly involved in a renascent form of German Romantic Classicism.

Though most of the drawings for the Glass House are Miesian in vocabulary, there are important exceptions, most notably the "Syrian arch" scheme (figs. 1 [frontispiece], 27–29), which appears late in the chronological sequence. It not only seems as well developed as any other of the studies but it is also as literal in its historical eclecticism as any work of Johnson's in his so-called ballet school phase of the late 1950's and early 1960's. The scheme—really an essay in German Romantic Classicism inspired by Schinkel and Persius—encourages one to speculate on what might have been built in New Canaan had Johnson not been working closely with Mies in 1946–1947 on the preparation of the exhibition of Mies's work at The Museum of Modern Art and thus having seen the early drawings for the Farnsworth House. It also raises the issue of historical eclecticism in Johnson's work almost a decade before it emerged in the work of other architects of the Modern Movement. Is this issue to be interpreted as a precursor of a more general condition or is it merely an eccentric manifestation of a personal style? Do the drawings for the Glass House establish any distinction between Johnson's role in the breakdown of the International Style and that of the "advanced" American architects of the period, in particular Paul Rudolph, Minoru Yamasaki, and Eero Saarinen, each of whom were hampered in their work by a far less comprehensive knowledge of history and a far more developed conviction of the moral rectitude of International Style modernism? The Glass House drawings do confirm one important point about Johnson the polemicist: that despite his polemical role in fostering Modern Movement architecture in America, he never saw this architecture or for that matter the Modern Movement as a moral or social issue; he was always interested in style but not in ideology.

The drawings for the Glass House reveal, in contrast to project sketches for many of Le Corbusier's early houses, Johnson's eclectic bias. While it seems obvious in the sketches for, say, the Villa Savoye, that Le Corbusier was not following a systematic or so-called rational line of thought leading to the final product, and that early schemes are quite unrelated to what was built, nevertheless, the differences in method reveal a fundamental difference in attitude. Le Corbusier's work is consistent from scheme to scheme; only the composition varies. Johnson's, on the other hand, is inconsistent. He experiments with a variety of forms while tending to compose in the same manner. Chiefly interested in stylistic experimentation, he undertakes no fundamental transformations of the initial spatial organization proposed: the grouping of the principal house and the guest house remains fairly constant throughout the process. Thus, each project of Le Corbusier's is ideologically charged while each of Johnson's seems an attack on

the very idea of ideology, an essay in style.

There are exceptions to this rule. Scheme III, (figs. 5, 6) for example, can be seen as a comment on Frank Lloyd Wright's Usonian houses of the 1940's: house and guest house are one, leading to a composition that seems distinctly related to the Lloyd Lewis House, a relationship that is substantiated by the evidence of the elevation. At the same time, the plan of the principal pavilion is different in composition from the earlier schemes; it is distinctly un-Wrightian in its organization and appears to be based on Mies's Resor House project of 1938—as sifted through the functionalism of Breuer's Binuclear Houses. This plan in turn seems to lead to the square pavilion scheme, which anticipates Mies's "50 × 50" House of 1950. From the point of view of spatial organization, this scheme is unique.

But uniqueness and eclecticism aside, the drawings for the Glass House present us with many problems that must be resolved. If the sketches confirm the idea that the Glass House is not wholly Miesian, then what is it? I have suggested that it is more a product of style than of ideology. Does it then reveal something about the inherent character of Johnson? It is obvious that no easy answer can be found. More research will be necessary to probe the complexity of what previously seemed to be his most open gesture.

Notes

1. The drawings for the Glass House reproduced in this selection represent thirty-nine of ninety-six drawings which Johnson has donated to The Museum of Modern Art as part of an extensive archive established to document his career. Although not all the drawings are dated, Johnson recently numbered them according to a rough chronology he established based on recollection. This initial presentation of the Glass House drawings honors that chronology, although even a cursory glance suggests that there are some rough spots: for example, the sequence proposed for the summer of 1947 seems less a sequence than an expression of contradictory ideas held simultaneously—early testimony to the eclectic approach that has come to be regarded as characteristically Johnson's.
2. The Museum of Modern Art archive also includes thorough documentation of Johnson's student work at Harvard as well as a number of executed and projected buildings that precede the Glass House. These will be presented in a subsequent issue of *Oppositions* as part of an article, now in preparation, by the author "Philip Johnson's Architecture: The First Ten Years, 1939–1949."
3. Philip Johnson, "House at New Canaan, Connecticut," *Architectural Review*, vol. CVIII, no. 645, September 1950, pp. 152–59; reprinted in *Philip Johnson: Writings* (New York: Oxford University Press, 1978).

Figure Credits

1, 3–40 Courtesy Philip Johnson. Photographed by Kate Keller and Mali Olatunji.
2 Courtesy Philip Johnson. Photographed by F. S. Lincoln.

2 The Glass House, New Canaan, Connecticut. Philip Johnson, architect. Scheme XII, January 1947. Model. (See also figs. 15–20.)

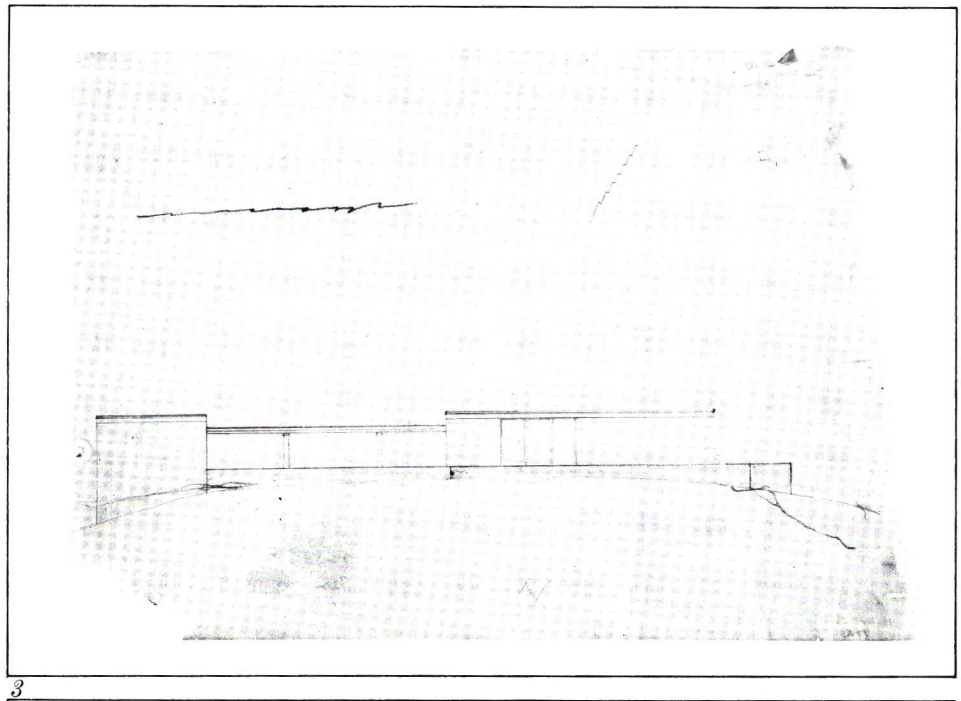
2

3, 4 The Glass House, New Canaan, Connecticut. Philip Johnson, architect. Scheme I.

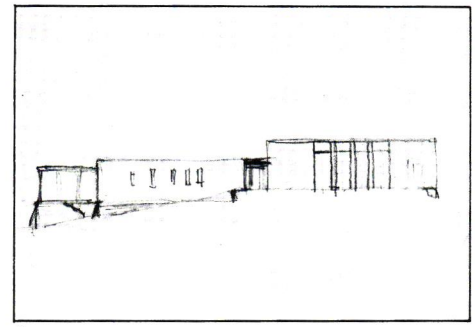
5, 6 Scheme III.

7 Scheme IV, 1946.

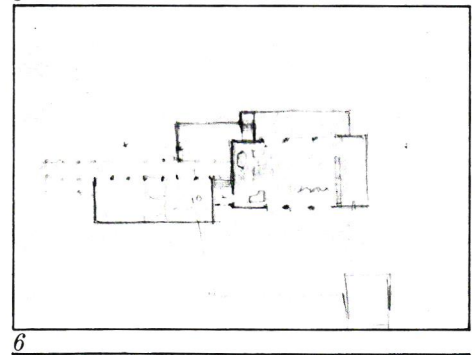
8 Scheme V, January–February 1946.



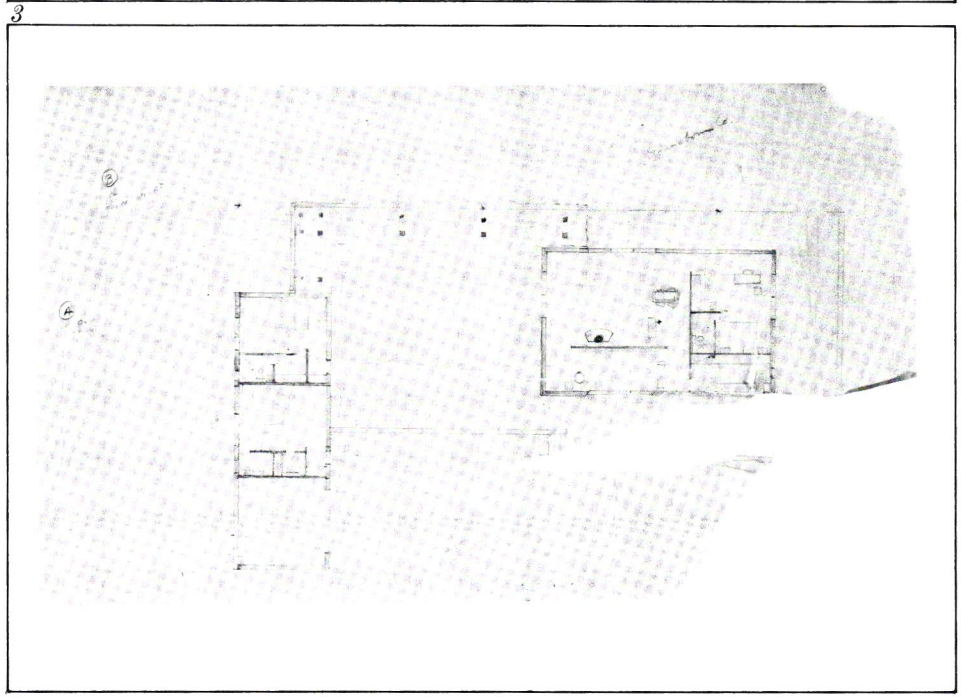
3



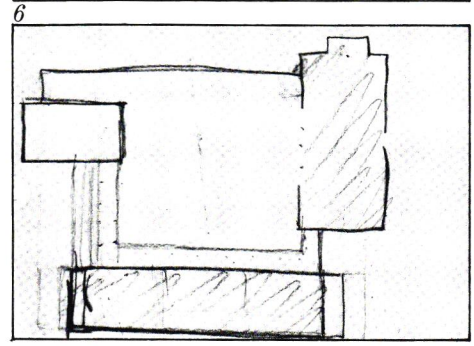
5



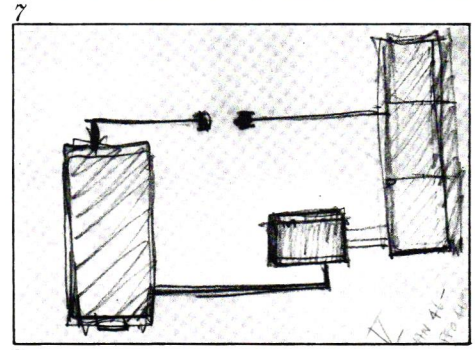
6



4



7



8

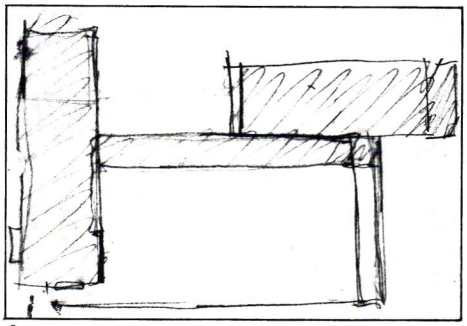
9 Scheme VI.

10 Scheme VII, February 1946.

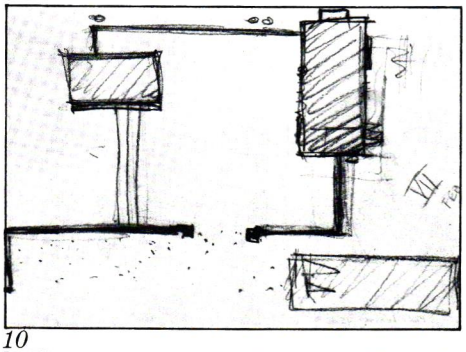
11 Scheme IX, March 1946.

12 Scheme X.

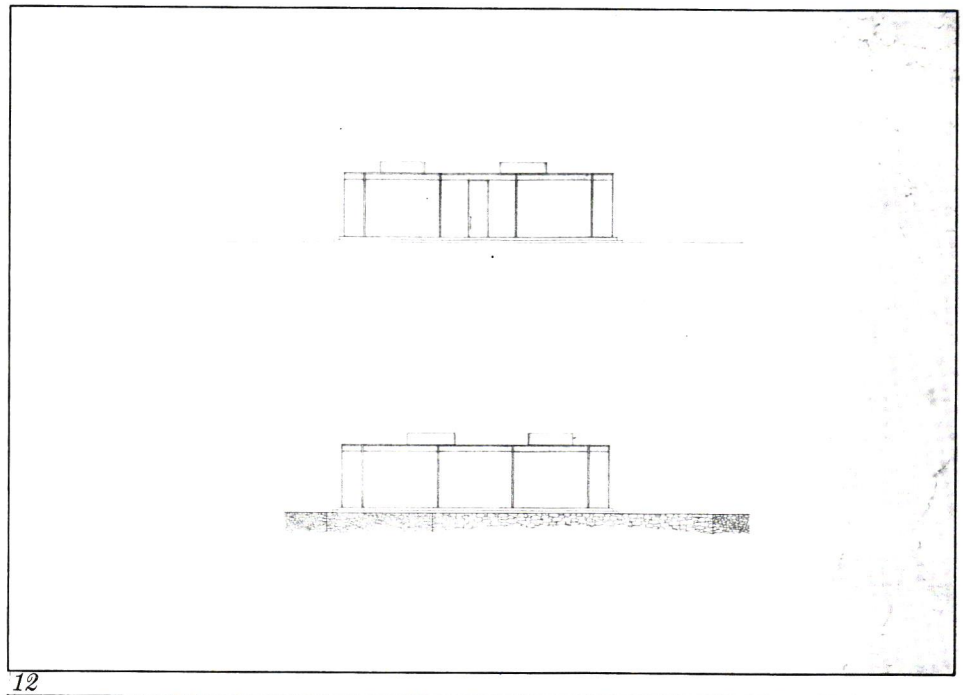
13 Scheme XA, September 1946.



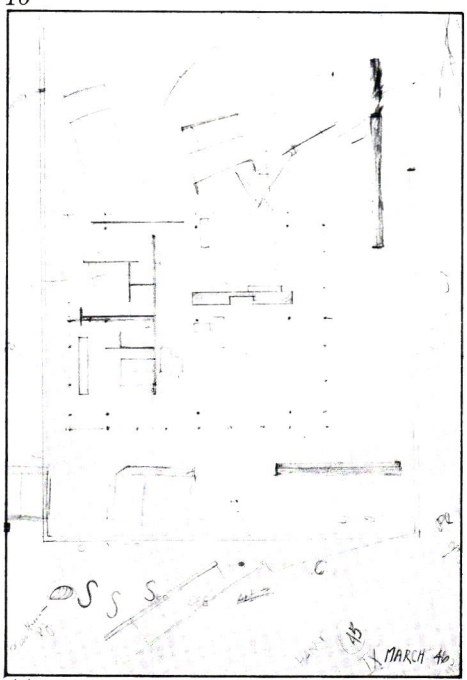
9



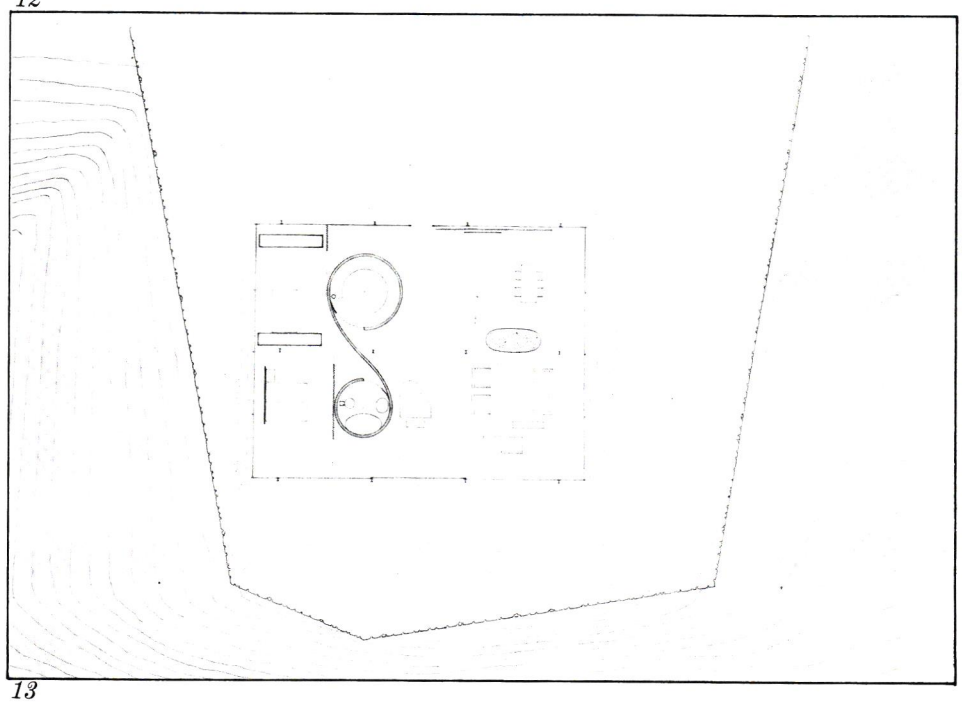
10



12

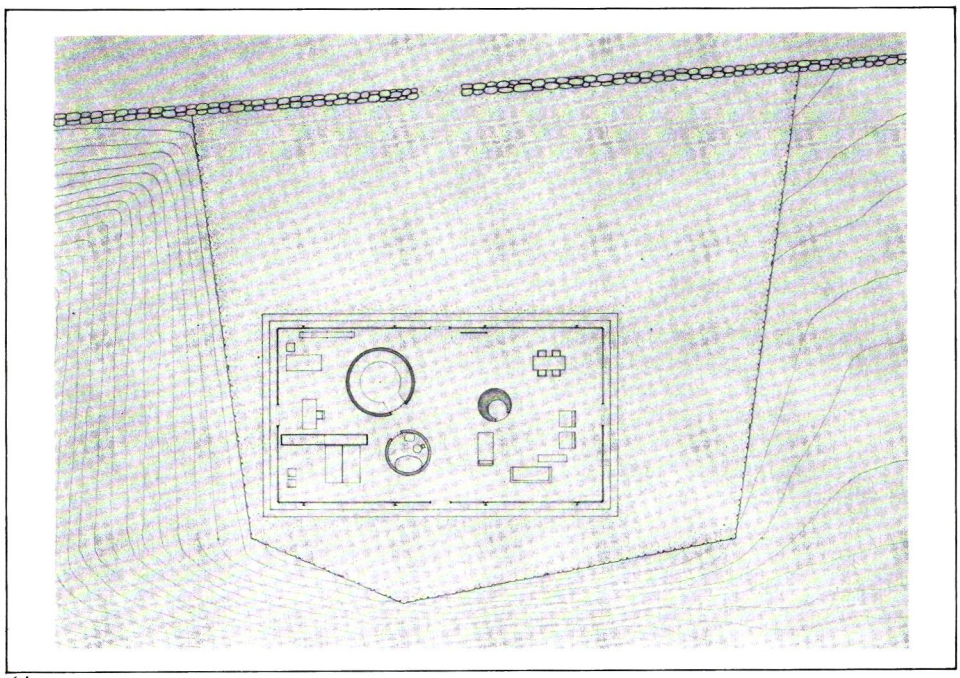


11



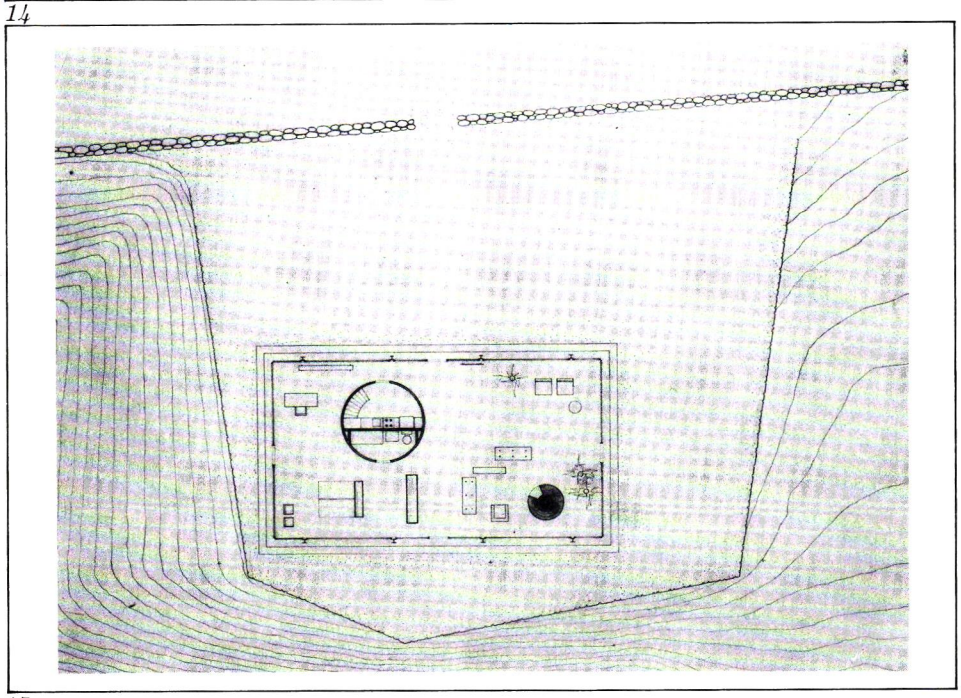
13

14 The Glass House, New Canaan, Connecticut. Philip Johnson, architect. Scheme XI, November 1946.

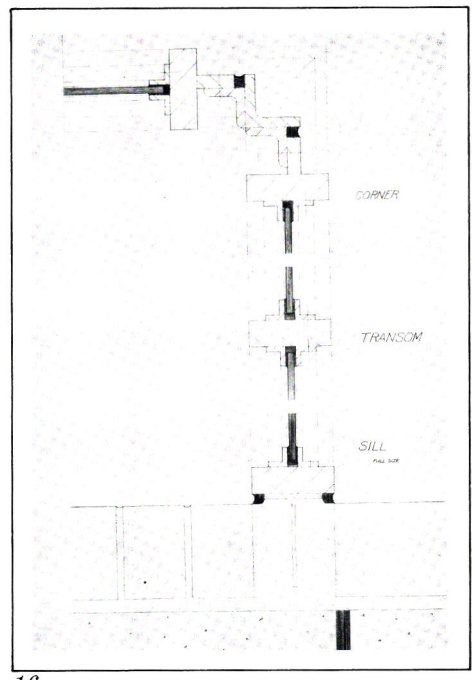


14

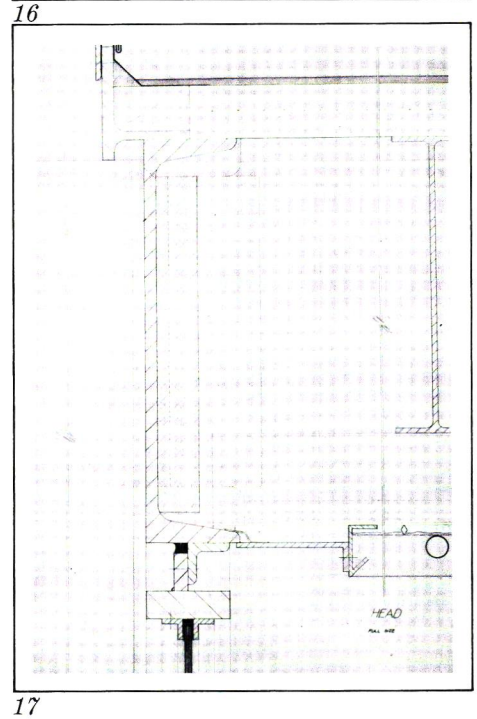
15–20 Scheme XII, January–April 1947. (See also fig. 2.)



15



16



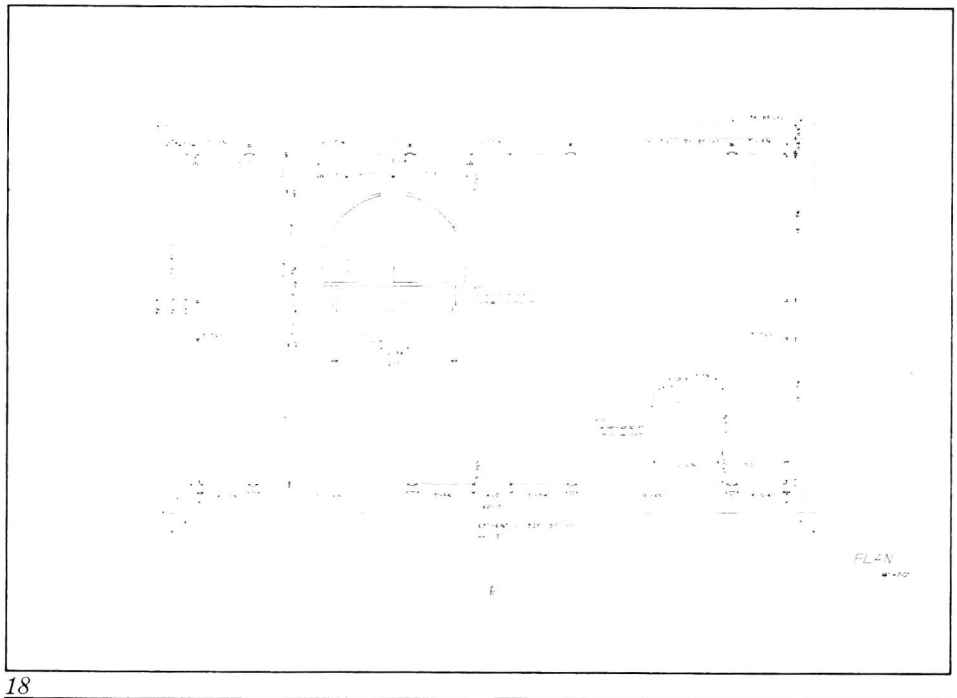
17

21 Scheme XIII, May 1947.

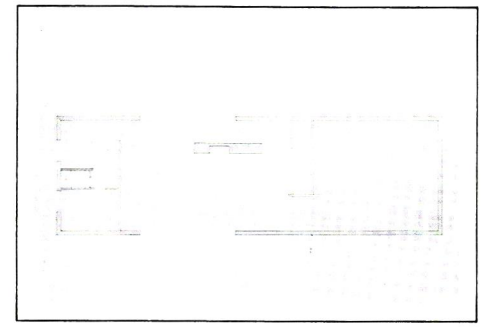
22 Scheme XIV, June 1947.

23, 24 Scheme XVI. (See also fig. 35.)

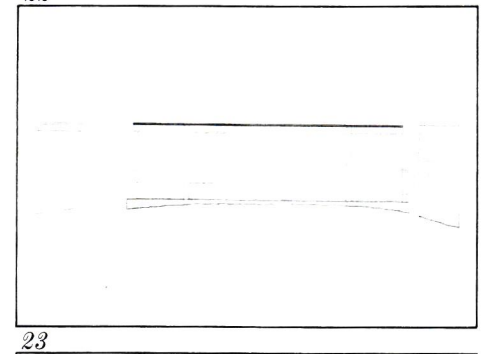
25 Scheme XVII, June 1947.



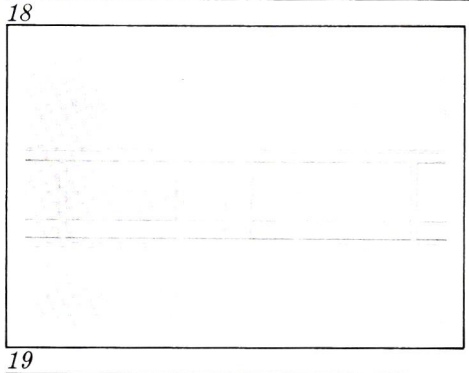
18



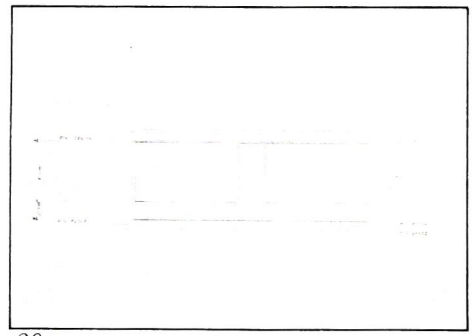
22



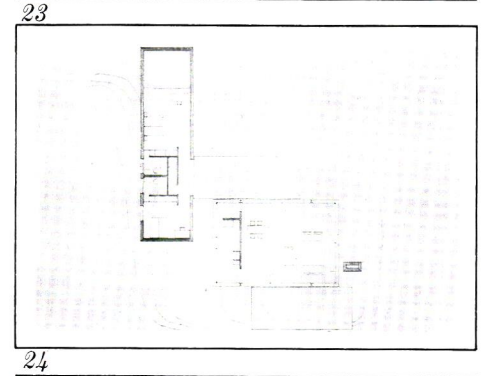
23



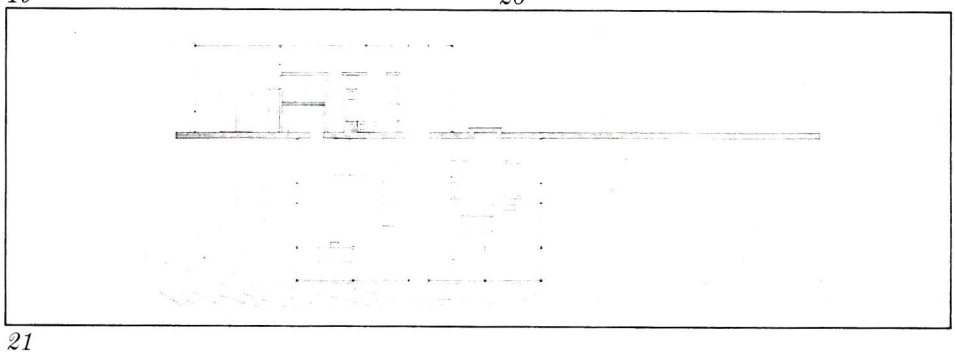
19



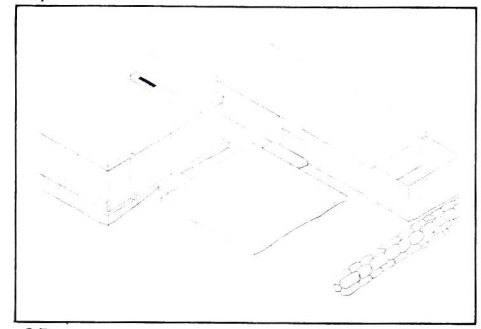
20



24



21



25

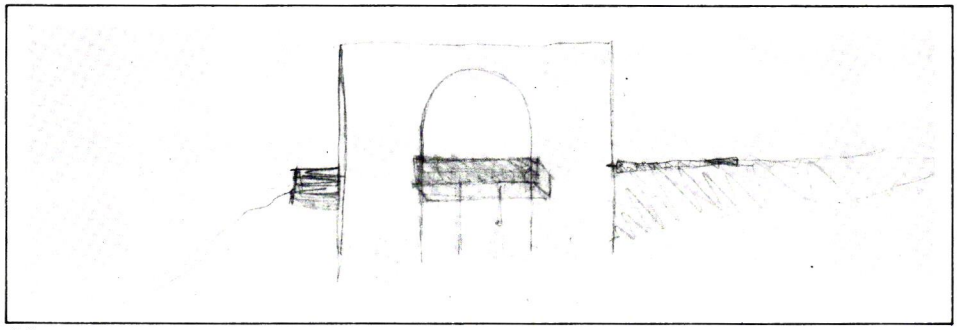
26 The Glass House, New Canaan, Connecticut. Philip Johnson, architect. Scheme XIX ("Syrian arch").

27–29 Scheme XX ("Syrian arch," see also fig. 1).

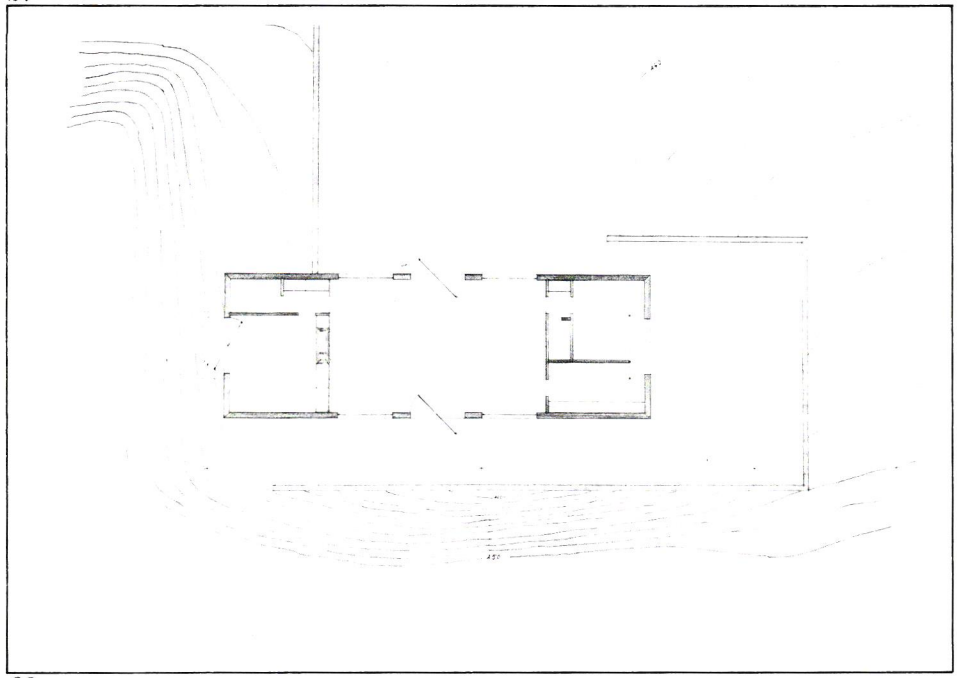
30 Scheme XXII, August 1947.

31 Scheme XXIIA.

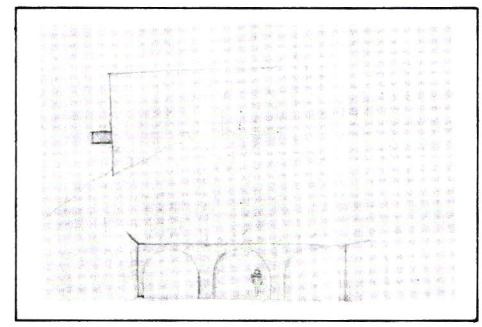
26



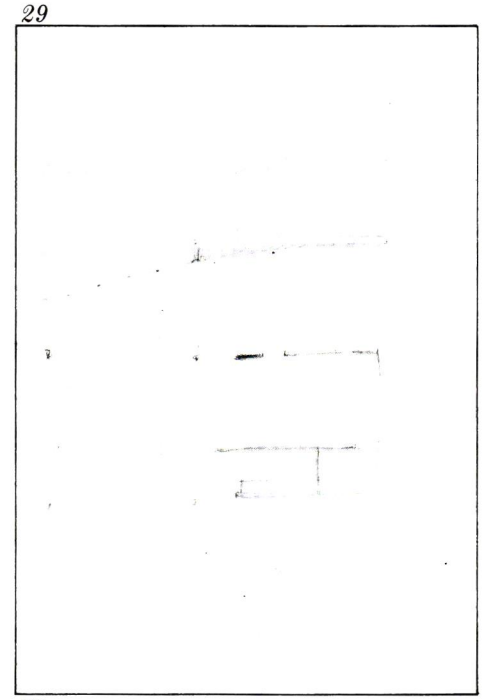
27



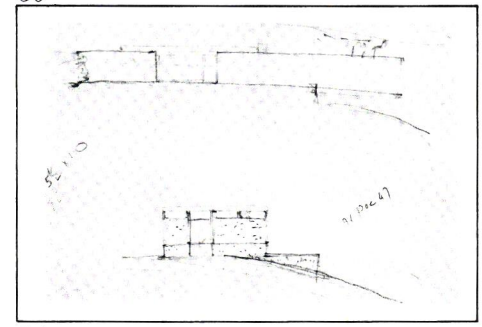
28



29



30

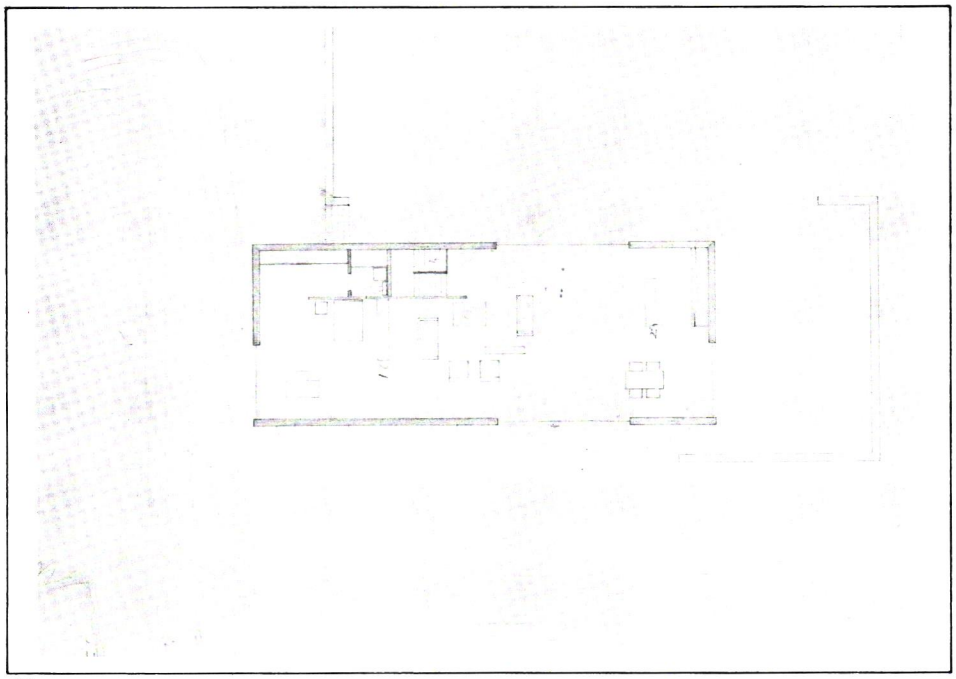


31

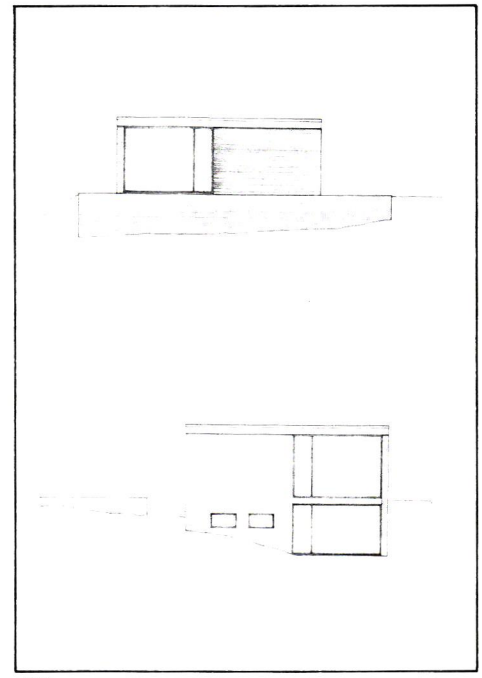
32, 33 Scheme XXIII.

34 Scheme XXIV.

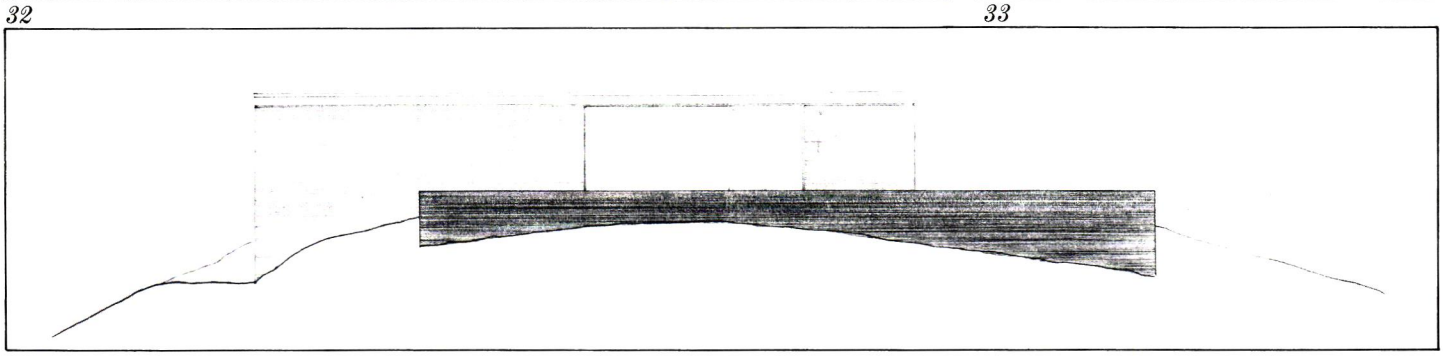
35 Scheme XVI. (See also figs. 23, 24.)



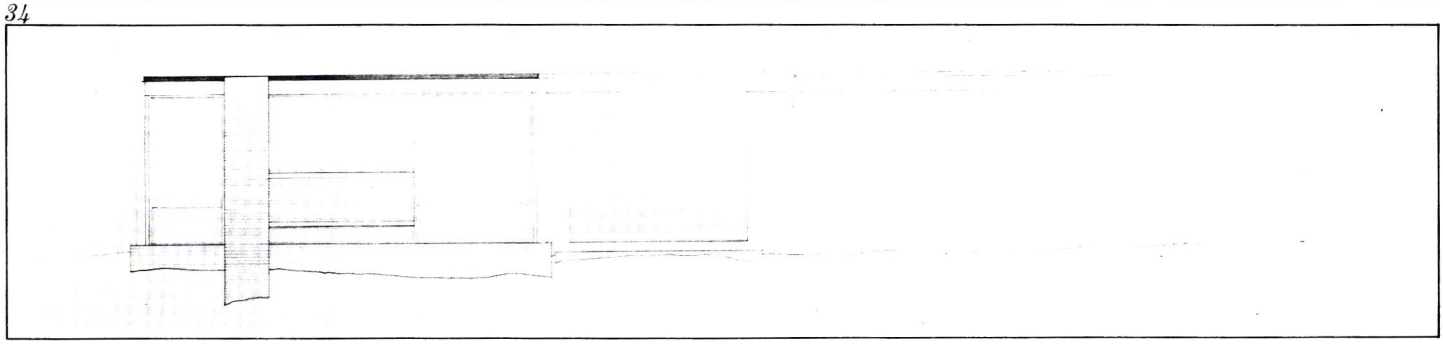
32



33



34

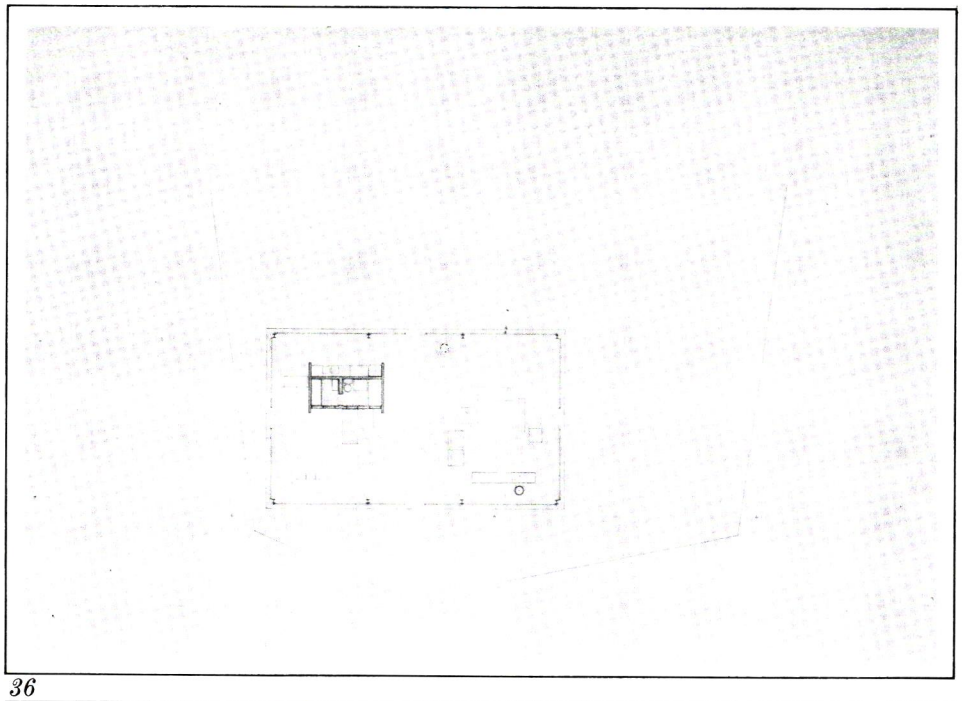


35

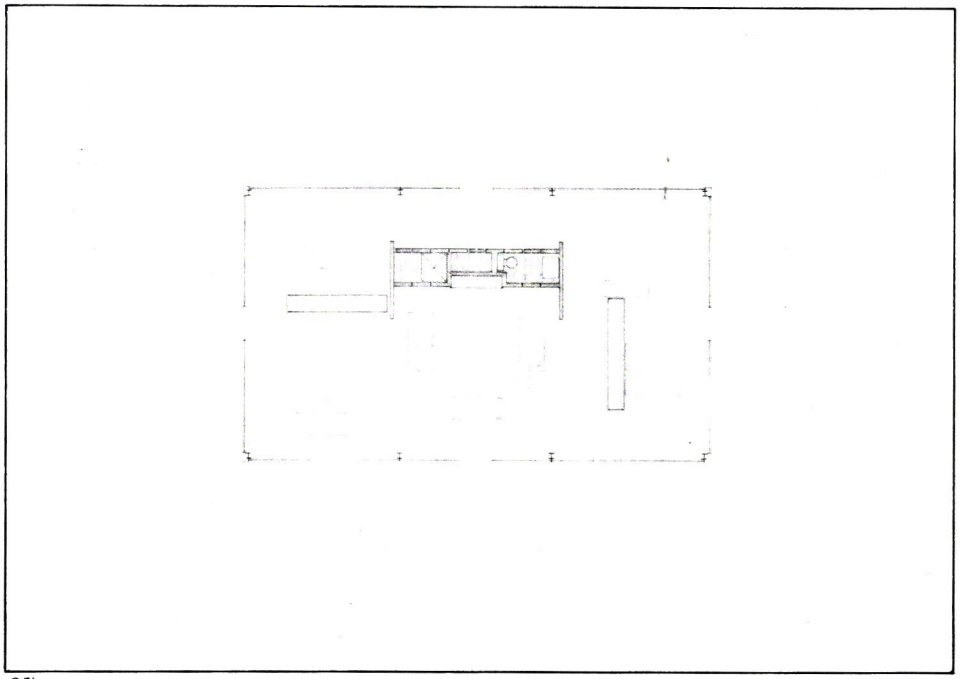
36 The Glass House, New Canaan, Connecticut. Philip Johnson, architect. Scheme XXVA, October 1947.

37 Scheme XXVI.

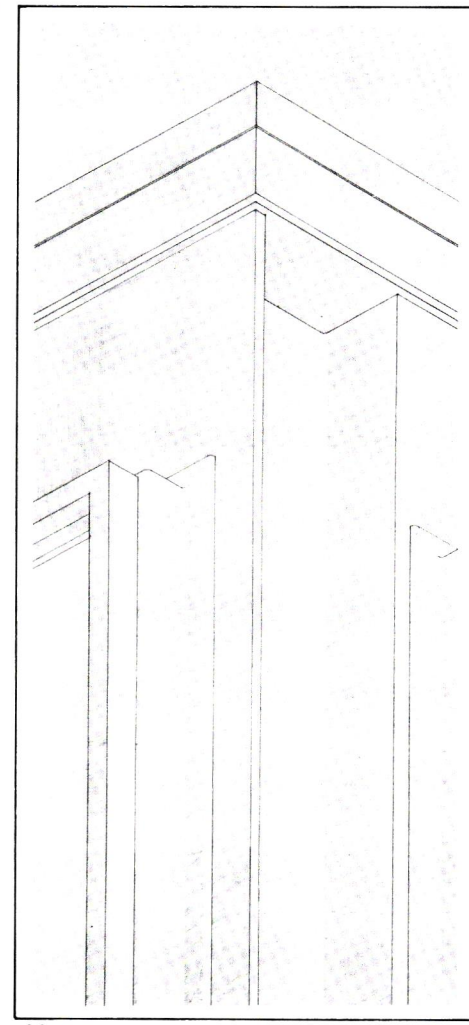
38–40 Scheme XXVII, November 1947. Final designs.



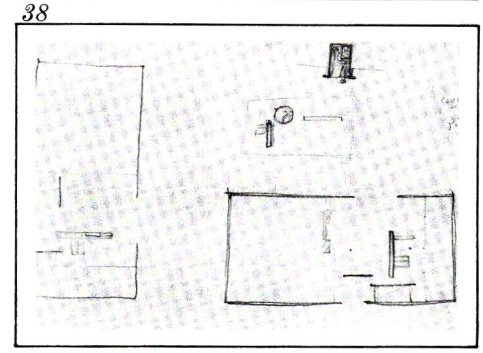
36



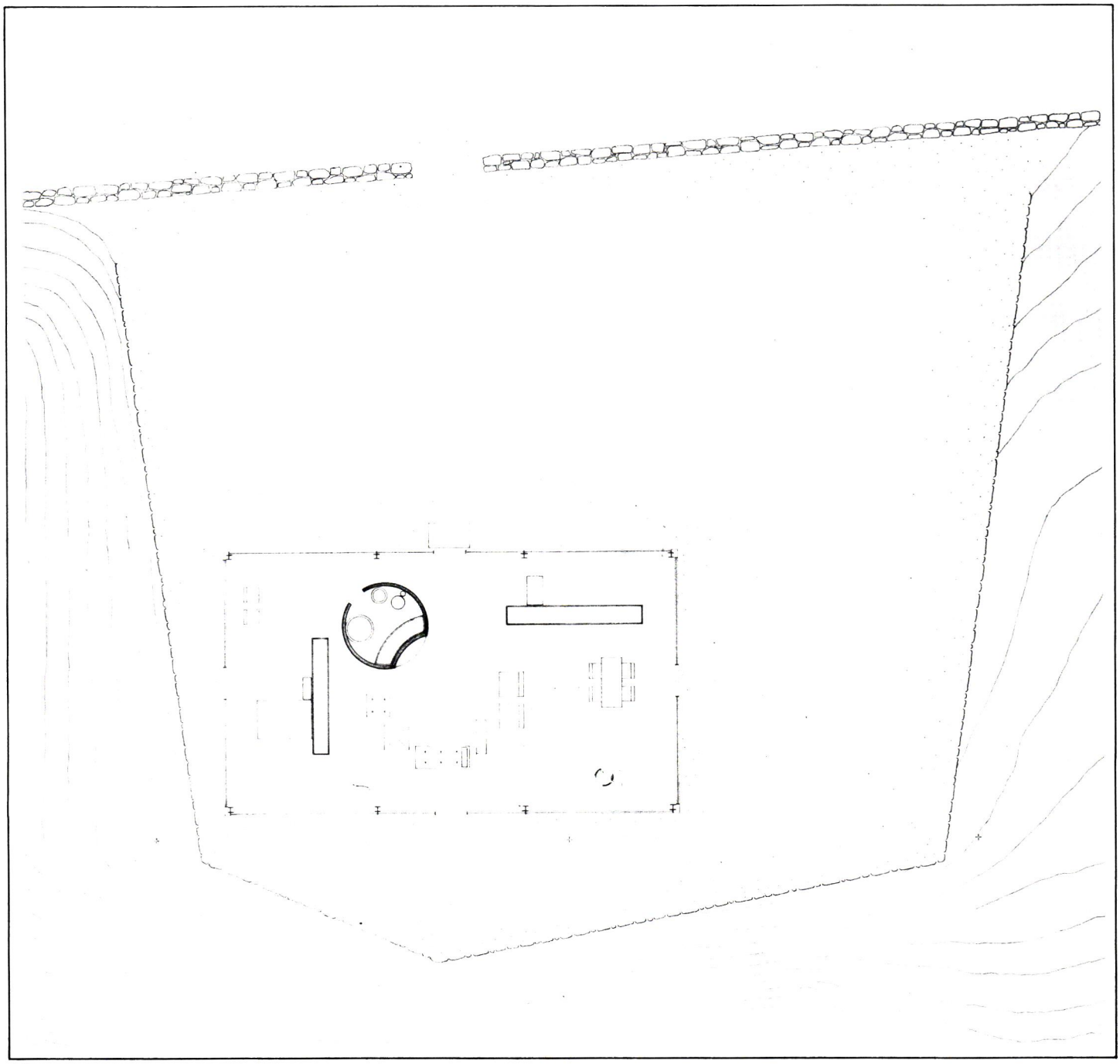
37



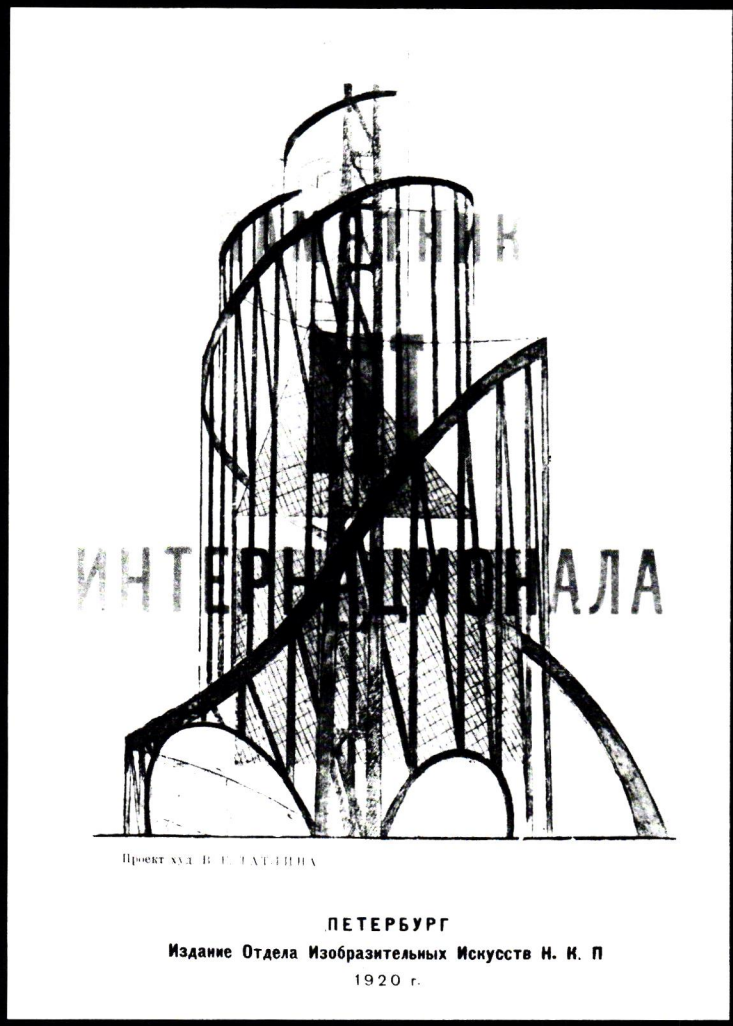
38



39



40



1 Cover of Nikolai Punin's pamphlet. "Front" elevation of Tatlin's Tower.

Punin's and Sidorov's Views of Tatlin's Tower

Kestutis Paul Zygas

For a pamphlet whose initial paragraphs have often been translated[1] and whose illustrations are rather well-known (figs. 1, 2), it is a noteworthy fact that Punin's entire, unexpurgated text on Tatlin's Monument to the Third International has not received the attention it deserves. And considering that the pamphlet describes and interprets Tatlin's Tower, a key project of Soviet modernism, the negligence is all the more remarkable.

Before addressing the pamphlet's text, we must at least note the Tower's immediate prehistory. The programmatic antecedents may be found in public discussions about "monumental propaganda" launched circa June 1918 while the Tower's physical precursor was Tatlin's cubo-futurist project for a Monument to the October Revolution dated March 1919. After transforming this project into an iron and glass megastructure, it was re-christened as the Monument to the Third International and exhibited to the public starting November 8, 1920, in festivities celebrating the October Revolution's third anniversary.[2] This final design, familiarly known as "Tatlin's Tower," is the pamphlet's ostensible concern.

Punin begins by describing Tatlin's iron megastructure. Then he abruptly switches ground and discusses "The Project's Artistic Significance." In this part, the commentary belabors the arguments about "monumental propaganda" that apparently were continuing to preoccupy Punin's mind, even though by 1920 the debate had already been going on for several years. It is as if Punin had become ensnared in a conceptual time-warp and was still engaged in the polemics raging when Tatlin's work with "monument propaganda" first began.[3]

Yet Punin was very well aware of Tatlin's activities during the intervening years. In fact, his 1919 article "Concerning Monuments of a New Type"[4] describes in detail the Monument to the October Revolution, the immediate precursor of Tatlin's Tower. This article, available in a recent translation,[5] should be compared with the text of the Punin pamphlet translated herewith. But unlike Punin's 1920 pamphlet, his 1919 article is short on interpretation and long on description.

From Punin's 1919 article we learn that the Monument to the October Revolution was to be as large as possible so that its constituent elements (cubes, cylinders, spheres, cones, spherical planes, and segments of these forms) could hold their own against the modern city's scale. The Monument's components were still disassociated—Tatlin had yet to consolidate the separate parts into one gigantic tower. Thus, we find facilities in the earlier design that were deleted from Tatlin's Tower: a gymnasium, a garage, ramps, art studios, and a cafeteria. Punin also mentions a film screen hanging from one of the Monument's "wings" and a projector for writing slogans in the cloudy northern skies. Tatlin later transformed these two features into a single screen located atop the Tower, on line b_3-a_1 (see fig. 2). The description of the Monument to the October Revolution was apparently unillustrated and we can only speculate about the Monument's overall configuration. We should, however, mention that even in this early design Tatlin was already stressing ceaseless agitation and activity.

But the difference between the earlier Monument to the October Revolution and the final configuration of Tatlin's Tower is considerable. Legitimate questions may therefore be raised about Tatlin's latitude with the project's program, if indeed Tatlin had been given a program. In the absence of Punin's explanatory remarks, we surmise Tatlin improvised as he went along, adding and deleting facilities at will, and, in effect, wrote his own program.

Punin's 1920 pamphlet also neglects mentioning that despite Tatlin's customary preoccupation with cubo-futurist warped planes, Tatlin's Tower was to be constructed from rectilinear members, elements that had been and were to remain unusual in Tatlin's work. Although the two drawings in Punin's pamphlet clearly indicate the Tower's external structure, the drawings, as well as Punin's text, ignore the internal hollow cone of inclined columns supporting the rotating volumes.[6] Likewise, though the drawings illustrate four glass volumes rotating inside the iron megastructure, Punin discusses only three volumes—reference to the topmost hemisphere is inexplicably omitted.

Although the idea of the synthesis of the arts was already time-worn by 1920, Punin conveys the impression that Tatlin's Tower was to be a unique synthesis of painting, sculpture, and architecture. In fact, other contemporary Russian artists were also working along similar lines. There was, for instance, the Zhivskulptarkh ("Paintsculptarch") group, led by Nikolai Ladovsky.[7] And, of course, Wassily Kandinsky was then proposing that INKHUK concern itself with "monumental art"—an entirely new, synthetic art form encompassing abstract painting, sculpture, and architecture.[8] In view of this, Tatlin's interest in the synthesis of the arts is hardly exceptional.

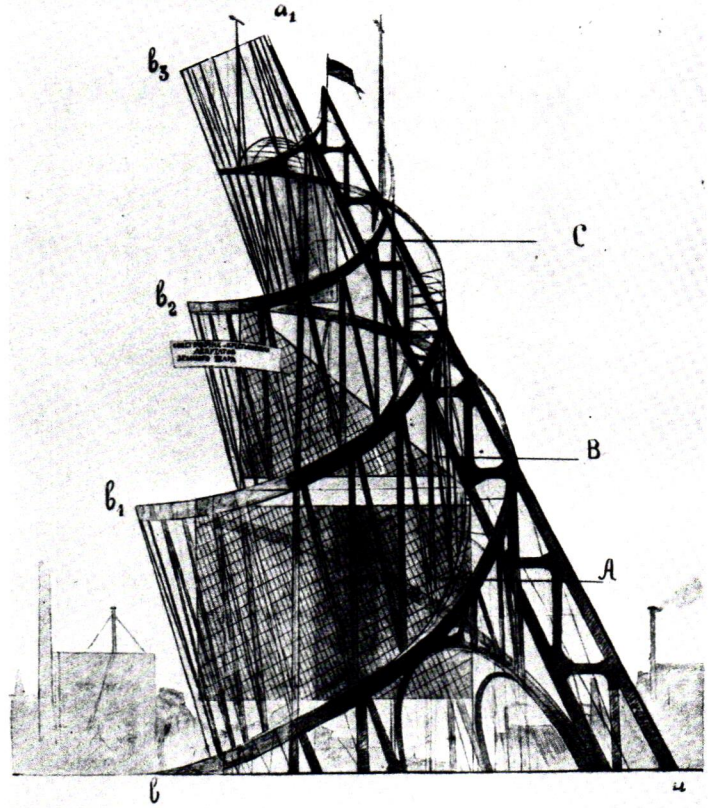
But of all the omissions, lack of reference to Tatlin as a "constructivist" or as a "productivist" is most surprising. After all, Tatlin's name has subsequently become synonymous with both of these overlapping tendencies. We infer that when Punin wrote the pamphlet, Tatlin was unaffiliated with either of these "isms," both in their infancy. However, it is better to be silent like Punin than to be misleading like Sidorov. In an otherwise clear-headed review of Punin's pamphlet,[9] Sidorov identifies Tatlin as the "leader of Russian artistic futurism." If Tatlin had wished to be identified with any movement at all, futurism, moribund by 1920, would certainly have been the least likely candidate.

Finally, a note about Punin's critical language. As Sidorov correctly observes, it can be "unintelligible." In this respect, Punin's hurried text contradicts his own precept that "modern art criticism must be, and probably will become, first and foremost a scientific criticism."[10] Punin so admired Tatlin's megastructure that he discarded all caution and hurried to record his reactions in a mixture of personal impressions and doctrinaire cant. Consequently, though the pamphlet was not an example of "scientific criticism," Punin's enthusiastic endorsement did defend Tatlin's Tower with an ideologically argued interpretation.

Notes

1. The following are several incomplete or bowdlerized translations:
N. Punin, "Tatlin Uvegtornya," *MA*, Vol. VII, No. 5–6 (May 1, 1922), p. 31.

René Fülop-Miller, *Geist und Gesicht des Bolshewismus* (Zurich, Leipzig, Vienna: Amalthea, 1926), pp. 137–142.
René Fülop-Miller, *The Mind and Face of Bolshevism*, translated from the German by F. S. Flint and D. F. Tait (London, New York: G. P. Putnam's Sons, Ltd., 1927), pp. 98–102.
N. Punin, "Das Projekt eines Monumentes für die III. Internationale von V. E. Tatlin," in Richard Lorenz, *Proletarische Kulturrevolution in Sowjetrussland (1917–1921): Dokumente des "Prolekult"* (Munich: Deutscher Taschenbuch Verlag, 1969), pp. 176–178.
N. Punin, "Tatlinova bashnia—Tour de Tatline," (Russian text) in *Veshch/Gegenstand/Objet*, No. 1–2 (March–April 1922), p. 22, translated by John Bowlt as "Nikolai Punin: Tatlin's Tower (1920)," in Stephen Bann ed., *The Tradition of Constructivism* (London: Thames and Hudson, 1974), pp. 14–17.
Troels Andersen's Danish translation of N. Punin's abridged text in *Veshch* magazine, together with Keith Bradfield's English translation from the Danish version appear in the exhibition catalog *Vladimir Tatlin* (Stockholm: Moderna Museet, 1968), p. 57.
2. A. Strigalev, "O proekte 'Pamiatnika III Internatsionala' khudozhnika V. Tatlina," in *Voprosy sovetskogo izobrazitelnogo iskusstva i arkhitektury* (Moscow: Izdatelstvo Sovetskii Khudozhnik, 1973), pp. 414–418.
3. Punin's scorn for figural monuments focuses on V. Sinaiskii's bust of Ferdinand Lasalle erected in Petrograd in 1918. The pedestaled bust of this German socialist is illustrated in V. E. Khazanova, *Sovetskaia arkhitektura pervykh let Oktiabria 1917–1925* (Moscow: Nauka, 1970), p. 154.
4. N. Punin, "O pamiatnikakh novogo tipa," *Iskusstvo kommuny*, No. 14 (March 9, 1919), pp. 2–3. For an abridged Russian text consult: M. G. Barkhin ed., et al., *Mastera sovetskoi arkhitektury ob arkhitekture* (Moscow: Iskusstvo, 1975), Vol. 2, pp. 75–76.
5. Keith Bradfield's translation of the article's Danish version by Troels Andersen appears in *Vladimir Tatlin*. Exhibition catalog. (Stockholm: Moderna Museet, 1968), pp. 56–57.
6. For a clearer view of the internal structure, consult illustrations of the Tower's model under construction in *Vladimir Tatlin*, exhibition catalog, pp. 54–55. The structural prototypes for Tatlin's Tower are discussed by K. P. Zygas, "Tatlin's Tower Reconsidered," *Architectural Association Quarterly*, Vol. 8, No. 2 (1976), pp. 15–27.
7. Paintsculptarch's membership included two painters—A. Rodchenko, A. Shevchenko; a sculptor—B. Korolev; and five architects—N. A. Ladovsky, N. V. Dokuchaev, V. I. Fidman, A. M. Rukhliadev, V. Krinskii. For additional information consult: V. Krinskii, "Voznikovenie i zhizn assotsiatsii novykh arkhitektorov—ASNOVA," in *Sovetskaia arkhitektura*, No. 18 (1969), p. 20.
8. W. Kandinsky, "Plan raboty po teorii vzaimootnosheniia otdelnykh vidov iskusstva," in I. Matsa, et.al. eds., *Sovetskoe iskusstvo za 15 let: materialy i dokumentatsiia* (Moscow, Leningrad: Ogiz-Izogiz, 1933), pp. 129–131.
9. Refer to the following translation of Sidorov's review.
10. Nikolai Punin, "Cycle of Lecture (Extracts), 1919," in John E. Bowlt, ed. and trans., *Russian Art of the Avant-Garde: Theory and Criticism 1902–1934* (New York: The Viking Press, 1976), p. 174.



2 "Side" elevation of Tatlin's Tower showing the various enumerated parts referred to in Punin's text.

Pamiatnik III Internatsionala (Monument to the Third International): A project by the artist V. E. Tatlin (Petersburg: Publication of the Visual Arts Department N.K.P., 1920)

Nikolai Punin

Translation by Kestutis Paul Zygas

The Visual Arts Department of the National Commisseriat of Enlightenment commissioned the artist V. E. Tatlin in 1919 to design a project for a Monument to the Third International. The artist Tatlin immediately set to work and completed the design. Then the artists V. E. Tatlin, I. A. Meerzon, M. P. Vinogradov, and T. M. Shapiro, having formed a "Creative Collective," worked out the design in detail and constructed a model.

The underlying concept of the monument is based on an organic synthesis of the principles of architecture, sculpture, and painting, and proposes a new type of monumental construction uniting pure creative form with utilitarian form. In accordance with this concept, the project for the Monument consists of three large glass volumes supported by a complex system of vertical pivots and spirals. These volumes are positioned one above the other and are enclosed in various harmoniously related forms. A special mechanism enables the volumes to rotate at different speeds. The lowest volume (A), cubical in form and intended for legislative use, completes one rotation per year. In it, conferences of the International, sessions of international conventions, and other large legislative meetings may be conducted. The next higher volume (B), pyramidal in form, completes one rotation per month; it is intended for executive use (by the Executive of the International, the Secretariat, and other administrative-executive bodies). Finally, the highest cyclinder (C), completing one rotation per day, contains an information center: a news bureau, a newspaper, and the publishing offices issuing proclamations, brochures, and manifestos—in a word, all the various facilities needed to inform the international proletariat; in particular a telegraph, a projector for a large screen, located on the axis of the spherical section (a_1-b_3), and a radio station whose antennae rise above the Monument. There is no need to indicate the many possible ways of equipping and organizing all the volumes; details of the project were not submitted, but they can be determined and worked out in the subsequent internal elaboration of the Monument. It must be pointed out that according to artist Tatlin's conception, the glass volumes are meant to be enveloped in a double skin of glass containing a vacuum space (thermos), which would facilitate internal temperature control. The Monument's separate parts, as well as all the volumes, will be connected to the ground and with each other exclusively by electric elevators of intricate construction and adapted to the various speeds of the rotating volumes. Such are the project's technical bases.

The Project's Artistic Significance

The social revolution by itself does not change artistic forms, but it does provide the context, which gradually alters the forms of art. The concept of monumental propaganda did not change sculpture and sculptors, but it negated the very principle of a plastic image that was dominant in the bourgeois world. The Renaissance sculptural traditions could appear contemporary only while the feudal-bourgeois roots of the capitalistic states had not yet been destroyed. The Renaissance is in ashes, and the charred ruins of Europe are only now being cleared.

True, for a certain time communist governments will use the figural monuments of Greco-Italian classicism as a means of monumental propaganda, but only because these governments must use them, just as they must use the specialists of the pre-Revolutionary school. Figural (Greco-Italian) monuments embody a double contradiction of contemporaneity. They foster individual heroism and negate history; torsos and busts of heroes (and gods) do not correspond to the contemporary comprehension of history. Torsos and busts ignore the ten-verst deep ranks of the proletariat; at best these forms express the character, emotions, and thoughts of the heroes. But what expresses the emotional tensions and thoughts of the collective thousands? A type? But a type only limits, confines, and degrades the multitude. It is indeed richer; it is vital, more complex, more organic.

To continue, even if the type is figural monuments, its static quality further contradicts the contemporaneity of the organic means of expression. In the midst of noise, movement, and the dimensions of the streets, the agit-effectiveness of such monuments is particularly meager. Perhaps thinkers on granite pedestals observe much, but no one sees them. They are bound by a form that was composed when loggias were plentiful, when mules were

used for transport, when stones served as cannonballs. Now wartime telephone poles twit the hero's nose; the tramway pole ridicules the obelisk. City residents remember Lasalle many times more from book covers and newspaper headlines in libraries than from passing under his majestic bust. Lasalle stands unseen and unwanted from the moment that his unveiling ends.

The monument must live the socio-political life of the city and the city must live in the monument. The monument must be needed and dynamic; then it will be contemporary. From this manner of depicting man come the forms for contemporary agit-sculpture. They spring from artists—not from those crippled by the feudal-bourgeois traditions of the Renaissance, but from those who labor like workers on the three elements of contemporary plastic consciousness: material, construction, and volume. Working on material, construction, and volume Tatlin made a form new to the field of monumental creative work. Such is the form of the Monument to the Third International.

The best artist of worker-peasant Russia, who by his life has proved his knowledge of the laboring masses, was commissioned last year to work out the project for the Monument to the Third International. The elaborated project is remarkable in its full worth not only as a manifestation of contemporary artistic life, but also as a profound break from the lifelessness of the overripe and decadent art of our times. Artistic matters transcend the twentieth century and indicate sectors of development in all phases of creativity. Considering myself competent to some degree in questions of art, I would rank this project as an international event in the world of art.

Under our very eyes the most complex cultural problem is being resolved: utilitarian form manifested as pure creative form. Classicism is possible once again, not as a revival, but as invention. Ideologists of the international workers' movement have long sought the classical content of socialist culture. Here it arrives. We affirm that the said project is the first revolutionary artistic work that we can and will send to Europe.

The project's form is positioned on two axes (a-a_1 and b-b_3), related by the continuous intersection of the one by the other. In the direction from a to a_1, an upward thrust develops, which is interrupted at each of its points by movement along the spirals from b, b_1, b_2, and b_3 to the line a-a_1. The collision of these two by nature mutually contradictory movements must rupture (rather than cause delay as is so characteristic in "cubism") and annihilate the utilitarian idea. But the counter movement of the spirals, accommodating the movement on a-a_1 (and b-b_3), carries them through the movement of the main stanchion (girder a-a_1) and upward from that point, conveying a dynamic image that is loaded with the powerful tensions of the ever vital and colliding axes. The entire form vibrates like a steel coil. Restraining and organizing all the components, in one overall movement it rises above the earth. The form seeks to overcome matter and the pull of gravity; the resistance is great and unyielding. Straining its sinews, the form seeks an outlet for its own elastic and dynamic lines, which recognize the world only through spirals. These spirals are full of movement, of aspiration and speed. They move tautly, as a creative will, as muscles tensed for a hammer blow.

The use and manipulation of spirals in contemporary form is by itself an enrichment of composition. Just as the equilibrium of parts is expressed by the triangle—the best expression of the Renaissance—so the best expression of our psyche is the spiral. The interaction of load and support is the purest [classical] form of statics; the spiral is the classical form of dynamism. Societies of class contradictions struggle for the possession of the earth; their line of movement is horizontal. The spiral is the line of movement of a liberated mankind. It is the ideal expression of emancipation; it rears from the ground, escapes from the world, and rises as if a beacon dispelling all bestial, mundane, and toady interests.

Petty bourgeois societies were fond of developing a lively existence on earth by cultivating the earth's surface—they erected stores, arcades, and banks upon it. Bourgeois life was public, it performed for public view and for show. But through its life force, creative humanity now permeates the

earth: it is not apparent where the co-operatives work. The public square is now for demonstrations, for play, and for festivals. Emancipated life rises above the earth, above the raw matters of the world. The house, the dwelling and social place, is transferred into the stratum above the earth; it is an expression of contemporaneity and of the content of contemporary life. At the same time, this is the subject of great artistic form.

Any content of a form may be customary and involve utility, because utility of form is none other than the organization of its content. The majority of forms, deprived of practical significance, have up to now been essentially artistic forms and not, simply speaking, organized forms. And, perhaps, the principle of organized activity is first realized in art. The Monument is designed to concentrate the legislative (volume A), adminstrative (volume B), and informative (volume C) enterprises; furthermore, these volumes, raised to the upper strata of space, tersely state the principles expressing contemporaneity. They, like the material (glass), designate pure initiative; freed from material bonds, they are an ideal. Art, deprived of creative idealism, namely that which appears as the subject of intuition, is the art of profane rhythms. Up to now the rhythms did not need to be disintegrated into the elements of material culture. They determine growth and conditions of existence, for life itself is rhythm. Intuition flows with them. The purity and fullness of the rhythms define the artist's degree of talent, and I do not know of purer and fuller rhythms than those of Tatlin's work. His eyes appraise most sensitively the nature of materials, and it is precisely this relation of materials that determines the boundaries of rhythmical waves. We accept as a basic unit of rhythm the wavelength, which is defined by the qualities of glass and of iron. Similarly, the product of the number of oscillations by the wavelength is the spatial measure of sound. The relationship of glass to iron is likewise a measure of physical rhythm. Some sort of severe and incandescent simplicity is enveloped in the confrontation of these two elementary materials, for which fire was the indispensable instrument granting their existence. These materials are the elements of contemporary art. The form defining their confrontation conveys oscillating rhythms as great as the ocean's origin. To realize this form means to embody dynamism with greatness as immeasurable as that embodied in the statics of a pyramid. We assert that only by strengthening the consciousness of the multi-million proletariat will the idea of this Monument be thrust into the world—the idea is its form. It must be effected by the muscles of that might, for we have the ideal, viable, and classical expression of pure and creative form in the international union of workers of the world.

July 1920

Review of N. Punin's Pamiatnik III Internatsionala, Pechat i Revoliutsiia, Vol. 1, May–July 1921, pp. 217–218

A. A. Sidorov

Translation by Kestutis Paul Zygas

The brochure advertises the project for a building-monument designed by V. E. Tatlin, leader of Russian artistic futurism. The first level of this monument would be for the legislative meetings of the Soviet deputized by the workers of the world, and it would revolve about its axis once a year. The second level, triangular in form and revolving about its axis once a month, is intended for executive meetings. The third level, rotating once a day, would be for an information center. All of this would be built of iron and glass, enclosed in a spiral, and inclined at an angle of forty-five degrees.

The project was shown in Moscow (at the exhibition of the VIIIth Congress) and, despite the most detailed explanatory notes hanging alongside, the situation is unchanged nonetheless: it may be extremely interesting and clever, but no more so than cubo-futurist still-lifes, which are unwarranted and, perish the thought, useless.

N. N. Punin characterizes Tatlin as the most illustrious artist of worker-peasant Russia and his project as an international event in the world of art. Considering myself equally as "competent on questions of art" as comrade Punin, I would like to note that the *new* in art does not always signify the *valuable*. The author is hopelessly biased; rejecting all figural art, he casts it back to the "feudal-bourgeois" traditions of the Renaissance. He forgets the extremely legitimate demand of the most revolutionary contemporaneity—to see as organized this world of organic humanistic life, which is ever before our eyes.

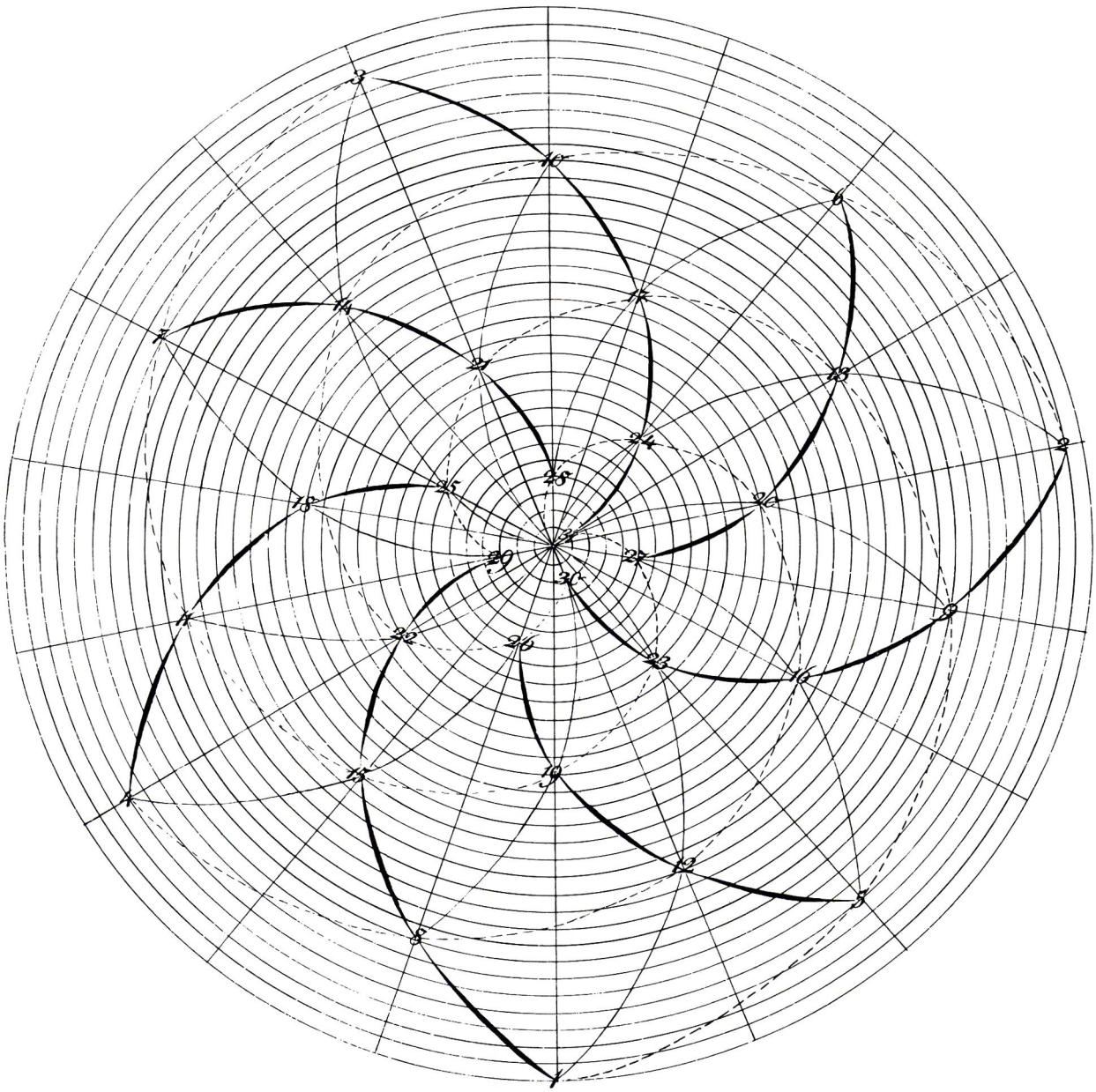
We are not saying that Tatlin's monument was successfully interpreted. We categorically disagree that it is based on an "*organic* synthesis of architectural, sculptural, and painting principles." We do not see any "*harmoniously* related forms" whatsoever in Tatlin's project. And concerning the unification of artistic and utilitarian form in art, *inventiveness* attempts to replace artistic creativity. It should be permissible to note that the *aesthetization* of the machine does not make it better. The technical beauty of the machine, of wheels, of factories, of any machine already *exists* and does not require any artist-repairman.

Tatlin's project errs in the name of that unnecessary aesthetization of machine forms, and whatever comrade Punin might say with great inspiration about the spiral expressing contemporaneity and its dynamism, all the same we feel that the project's evaluation does not convey the desired idea successfully. The entire construction is inclined, and instead of a struggle toward the sky, it gives an impression of *collapse*. Why was it necessary for the building to rotate? We fear that Tatlin's project will end unrealized.

The brochure's language is unintelligible and unbefitting comrade Punin. Do you understand how "artistic matters transcend the twentieth century and indicate sectors of development in all phases of creativity"?

Figure Credits
1, 2 Reprinted from Nikolai Punin, *Pamiatnik III Internatsionala* (Petersburg: Publication of the Visual Arts Department N.K.P., 1920). Courtesy of Ex Libris.

This facsimile reproduction has been taken from Symmetry 5 *(1971). The graphic design is by Tomás Gonda.*

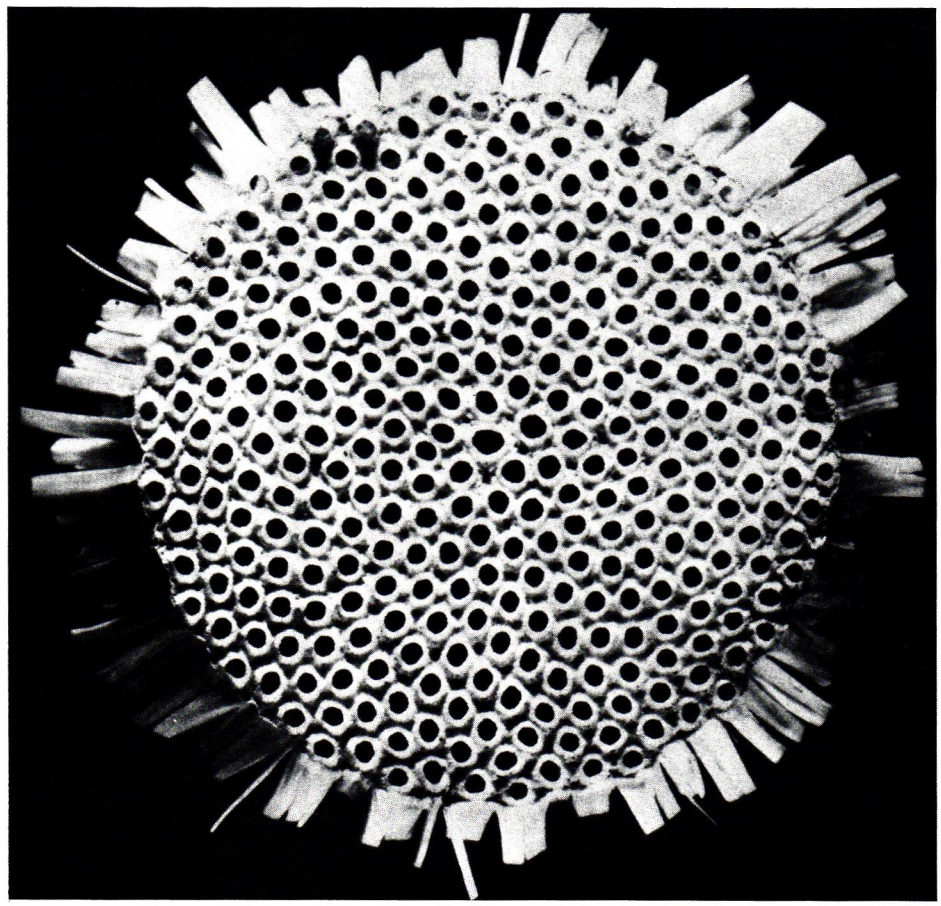


5.2

Symmetry: Man's Observation of the Natural Environment

William S. Huff

Man has sought and found
indications of the universal pattern
in inorganic and organic morphological
phenomena,
as they occur on our globe.

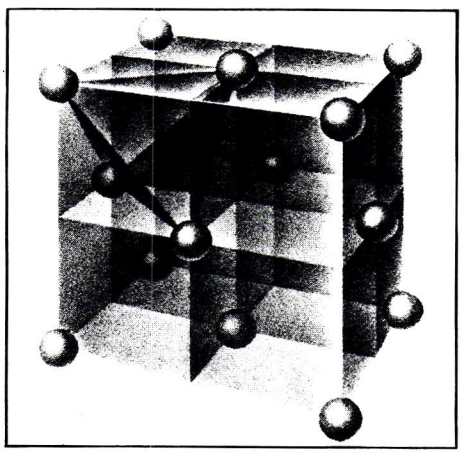


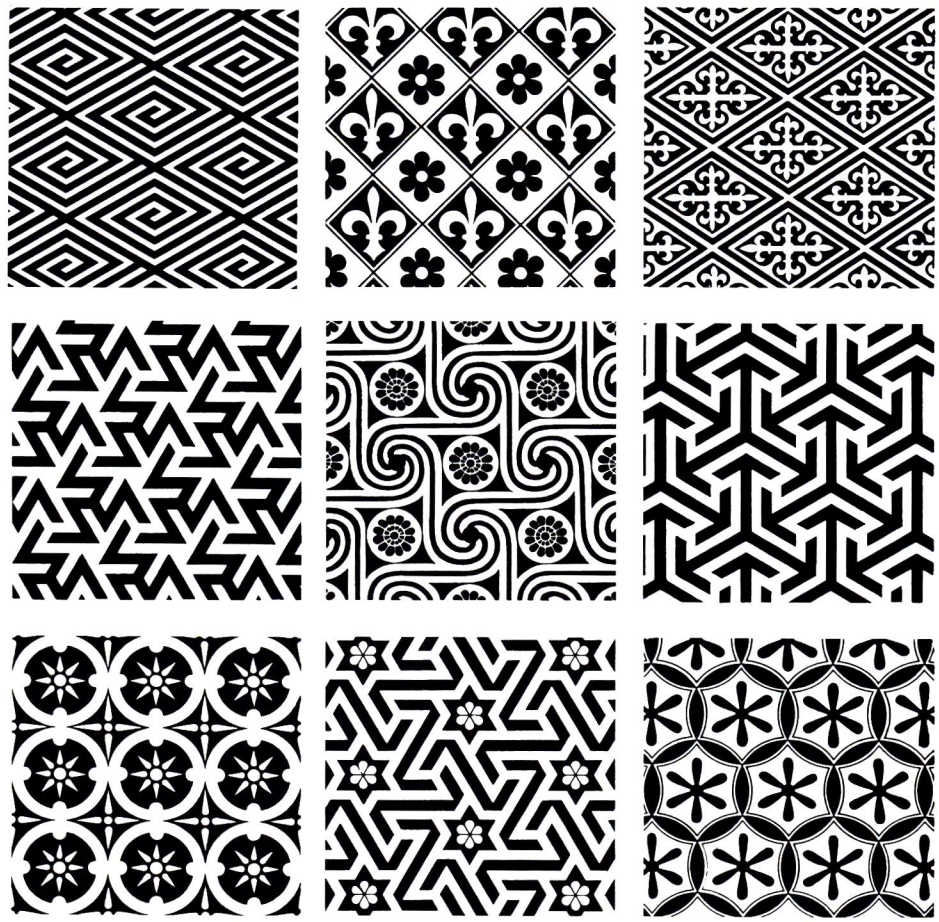
5.3

Crystals comprise a group of forms that
must have fascinated man from earliest times;
they constitute elegant natural models
of Pythagorean point (or integer) geometry.

It was not until the end of the 19th century
that it was concluded that there were exactly
230 crystal configuration possibilities
—no more, no less.
And as a two dimensional analogue,
there existed
only 17 types of repeating wallpaper patterns.

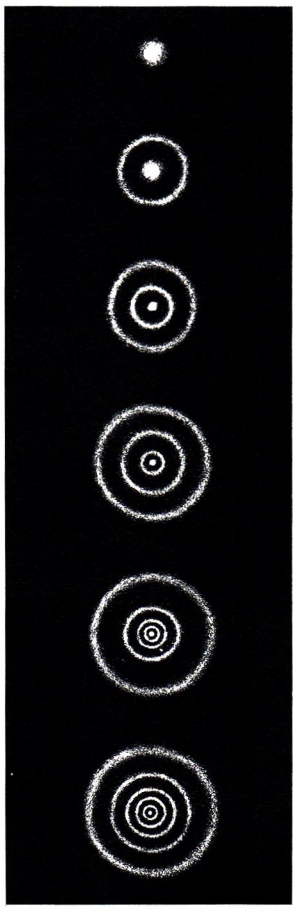
Of a similar situation,
D'Arcy Wentworth Thompson remarked:
So here and elsewhere
an apparent infinite variety of form
is defined by mathematical laws and theorems
and limited by the properties of space
and number.
And the whole matter is a running commentary
on the cardinal fact
that there are things
which are possible
and things which are impossible,
even to Nature herself.

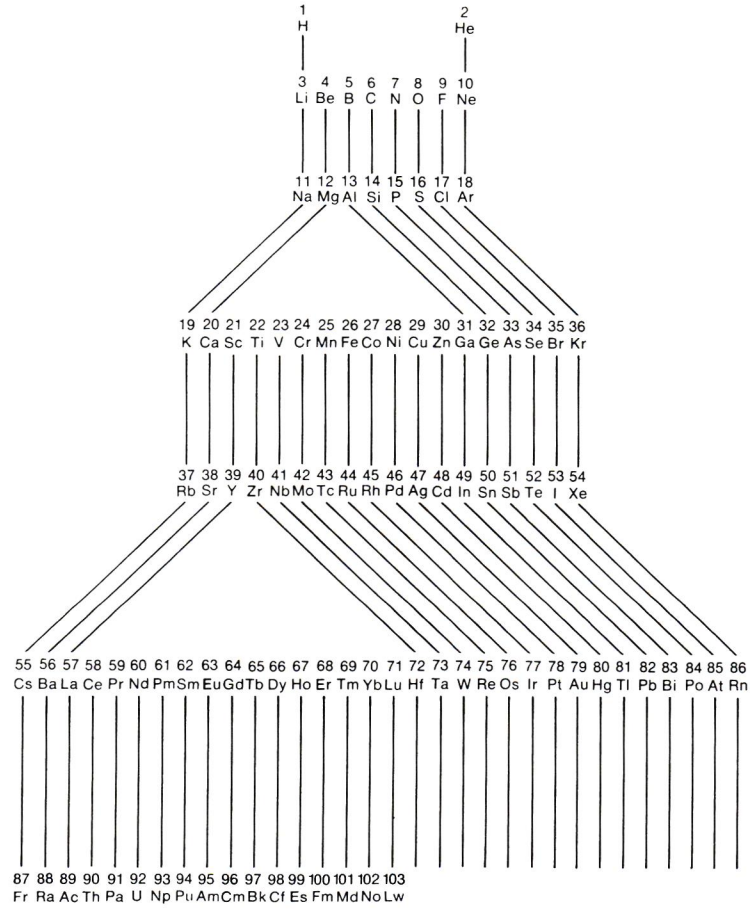




5.4

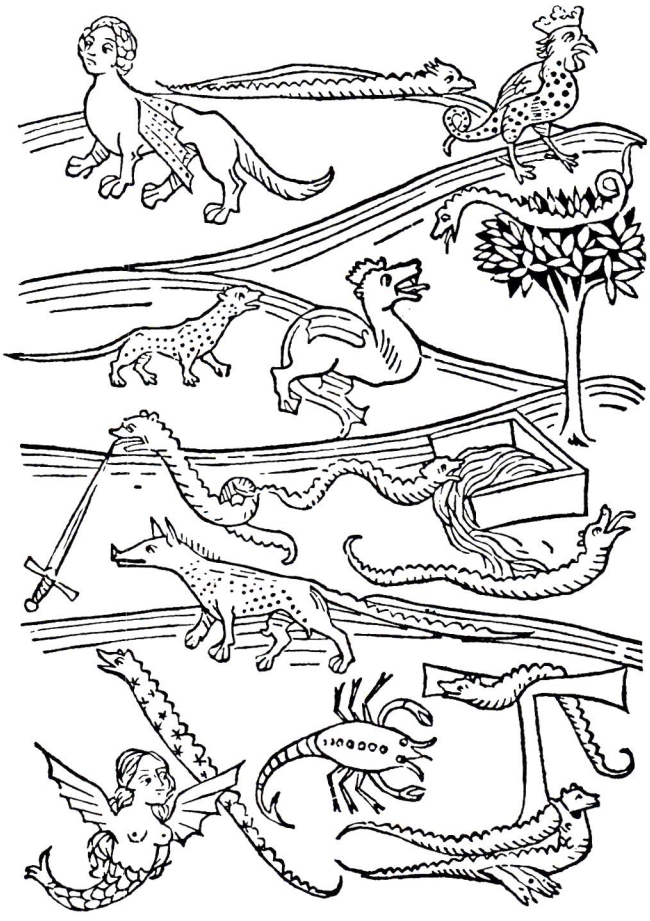
The *periodic table* of Elements,
a series of combinations in increasing numbers
of positive protons and negative electrons,
was a discovery that astounds
through its complete, though intricate,
consistency.

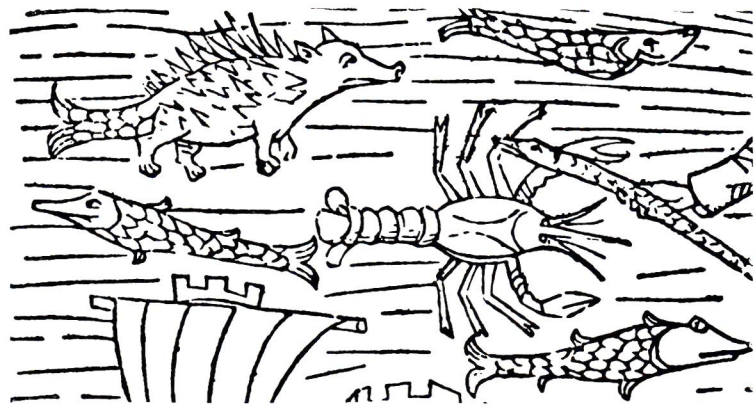




The organic world
of which man is himself a member,
contains greater fascination, greater mystery:
namely, that of life
and its essential consequence, growth.

Plato outlined a sort of reverse evolution:
In our discourse about the universe
down to the generation of man and a brief
mention
of the generation of other animals,
these are the laws
by which animals pass into one another,
changing as they lose or gain wisdom and folly.
The race of birds, which was remodelled and
grew feathers instead of hair,
was created out of innocent light-minded men
who imagined
that the clearest demonstration of reflection
on heaven was obtained by ocular view.
The race of wild pedestrian animals came
from those who had no philosophy at all;
in consequence they had their front-legs drawn
to the earth by natural affinity;
and the crowns of their heads, into which
the courses of the soul were crushed
from disuse,
were elongated into all sorts of shapes.
God gave the more senseless of them
more support
that they might be more attracted to the earth.
And the most foolish of them he made
without feet to crawl upon the earth.
The inhabitants of the water were given,
instead of the pure medium of air,
the deep and muddy sea
to be their element of respiration;
hence arose the race of fishes and oysters
which have received the most remote habitation
as a punishment of their outlandish ignorance.

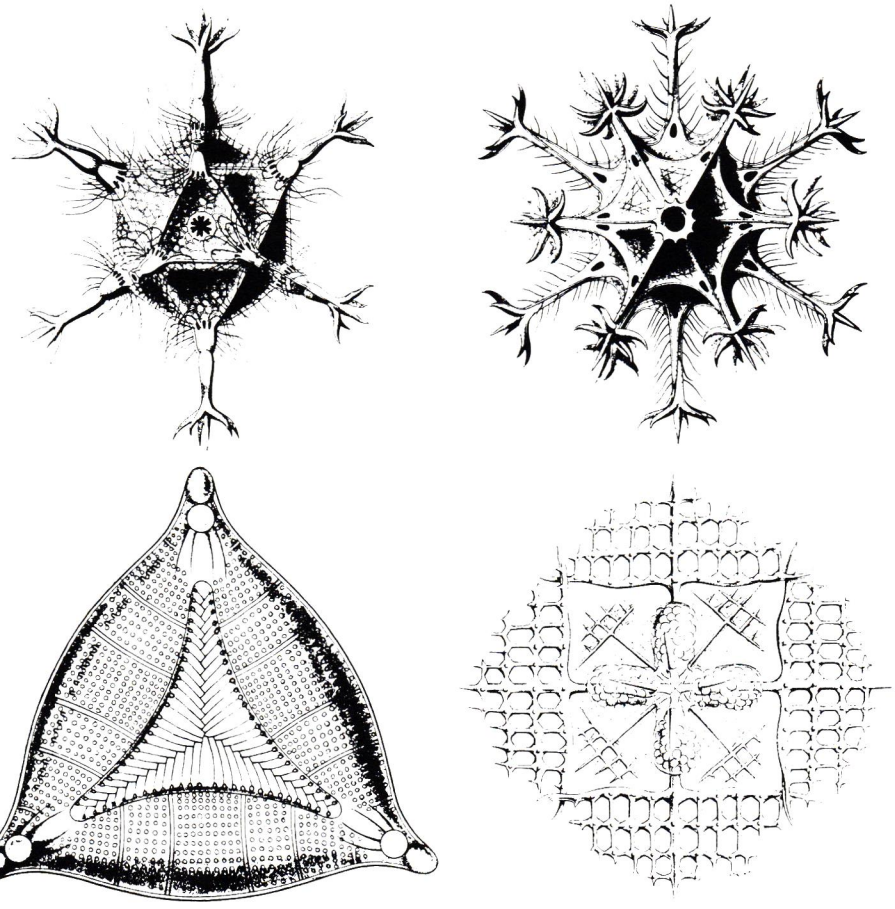




5.6

In this scheme in which beauty and perfection
are bound to intelligence,
and *we are to regard an unintelligent soul*
as deformed and devoid of symmetry
Plato overlooked the contradiction
that the more complex forms of biological life
have lower degrees of symmetry:
All creatures from crustacea to man,
possess only bilateral symmetry of order 2,
while the starfish possesses it of order 10,
the sea anemone, of perhaps order 1000,
and the spherical single celled blob,
of order infinity.

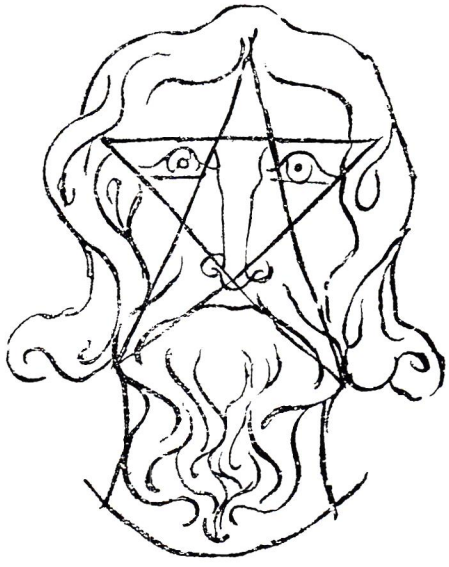
And how he might have wondered
to have found his precious solids
replicated in the microscopic Radiolaria
and in some of the viruses,
creatures at the very threshold of life,
which may more accurately be considered
senseless things.

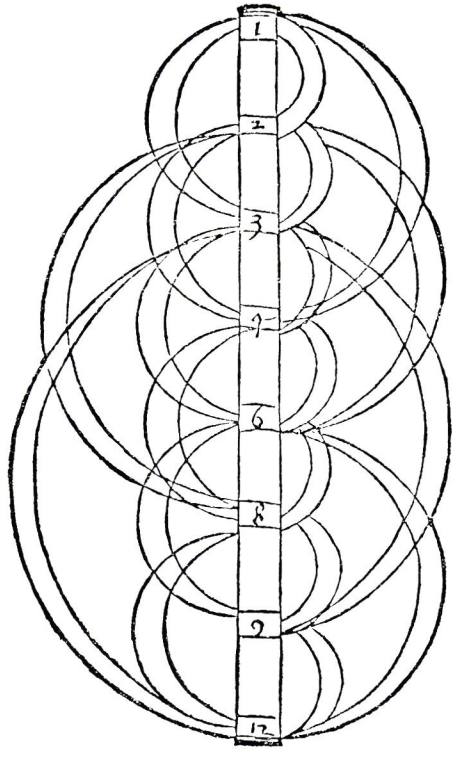


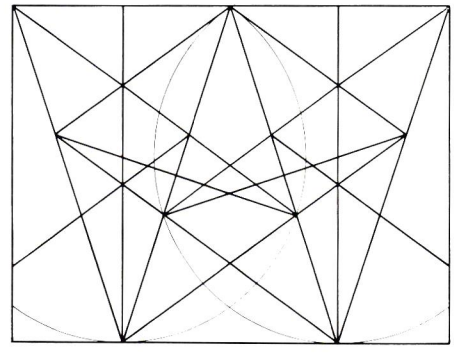
5.7

D'Arcy Thompson's countertheme
to his great life's work
is an admonition against
inexcusable Pythagoreanism.

Perhaps ungratefully, yet not without reason,
the name of Pythagoras has been given
to the unreasonable insistence
on perfection and completeness,
a mystification of orderly phenomena.





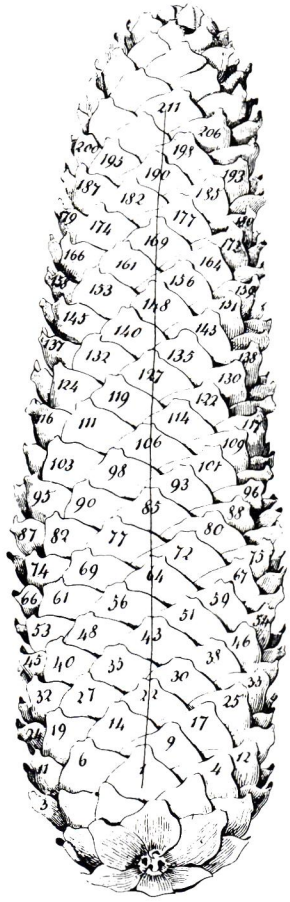


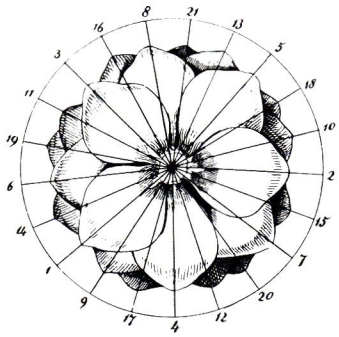
5.8

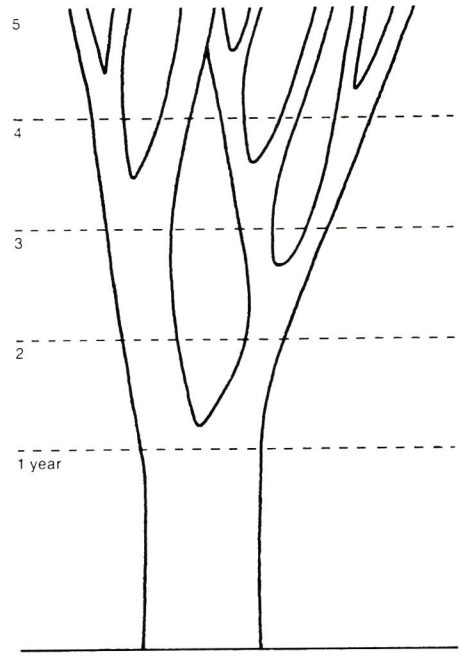
It has been noted
that leaves spiral around the stems of plants,
as well as do the scales of pine cones
and that florets spiral
upon the discs of composite flowers.

It was further noted
that the number of left handed spirals
and the number of right handed spirals
(rather than being equal)
usually grouped into couplet members
of the Fibonacci series
—a numerical series which the Renaissance
knew
to possess the quality of
approximating the Golden Section.

D'Arcy Thompson properly challenged
the long beloved assumption that the plant is
aiming at the ideal angle
of the equiangular spiral
and therefore at *beauty* itself—
the image of which was conceived
by the Classic and Renaissance worlds.
He clearly demonstrated that this is a
mathematical coincidence,
devoid of biological significance.



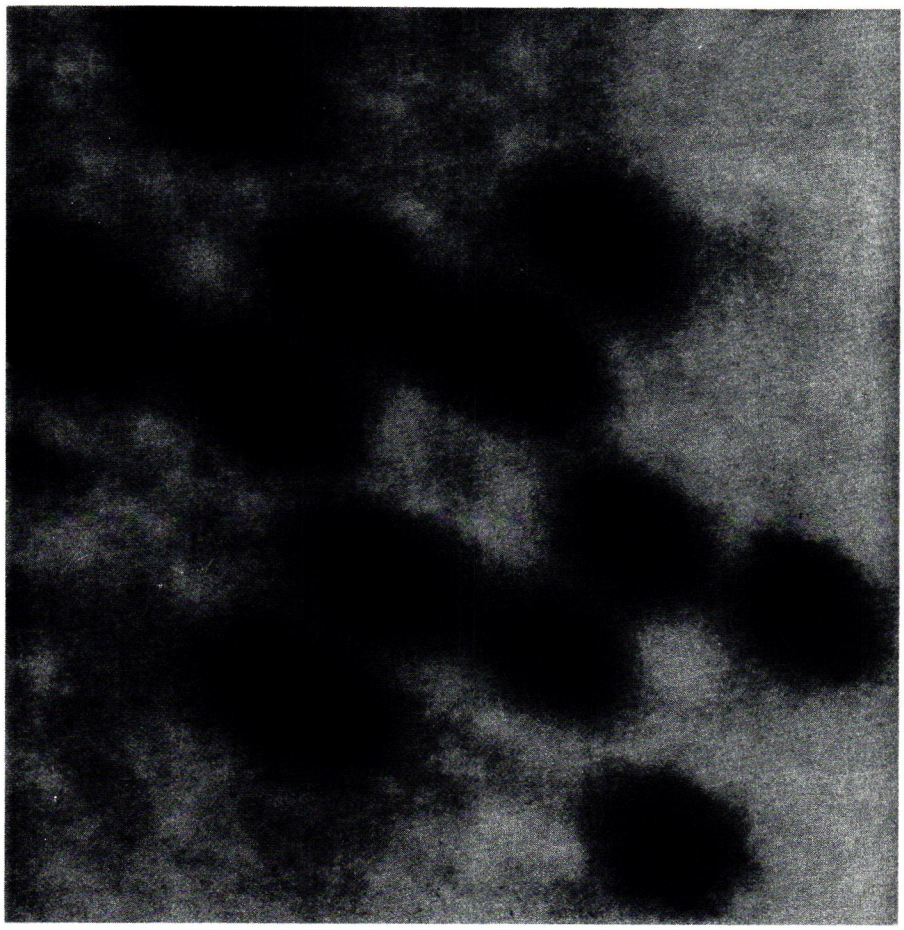


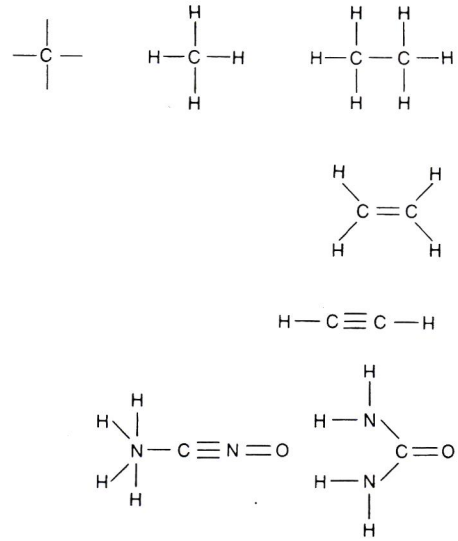


1+1=2, 1+2=3, 2+3=5, 3+5=8, 5+8=13, ...

Propounding the theory of valence,
Kekulé deduced that the carbon atom,
core of every organic compound, was *tetravalent*
and could be imagined as having four arms
reaching out to four other atoms or molecules.
Methane, or marsh gas, was the basic model.

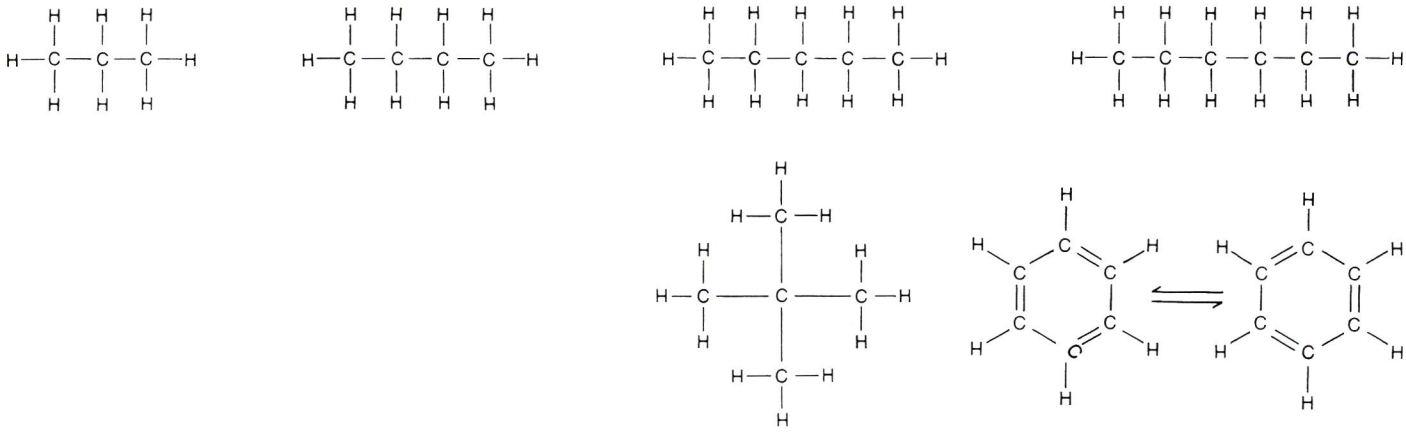
His subsequent speculation on the benzene ring
was an even greater stroke:
I was sitting, writing at my textbook;
but the work did not progress.
I turned my chair to the fire and dozed.
Again the atoms were gambolling before me.
My mental eye could now distinguish
larger structures of manifold conformation:
long rows, sometimes more closely
fitted together,
all twining and twisting in snake-like motion.
But look! What was that?
One of the snakes had seized hold of its own tail,
and the form whirled mockingly before my eyes.
As if by a flash of lightning I awoke;
and this time also I spent the rest of the night
in working out the consequences of the
hypothesis.
Let us learn to dream, gentlemen,
then perhaps we shall find the truth;
but let us beware of publishing our dreams
before they have been put to the proof
by the waking understanding.

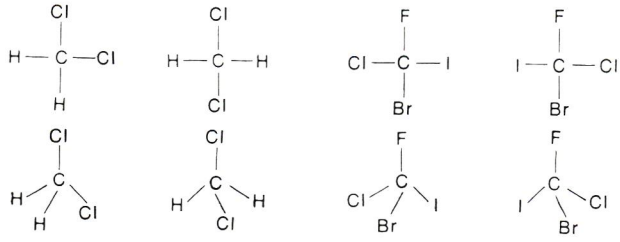




5.10

Even before Kekule, chemists were astounded
to find two compounds
with identical molecular weights
and with the same elements
in identical proportions.
Both possess formulae
that are expressed the same way,
yet one might belong to the organic world
and the other to the inorganic.
These were the *isomers* of which it
was concluded
that the molecules had different architectures.

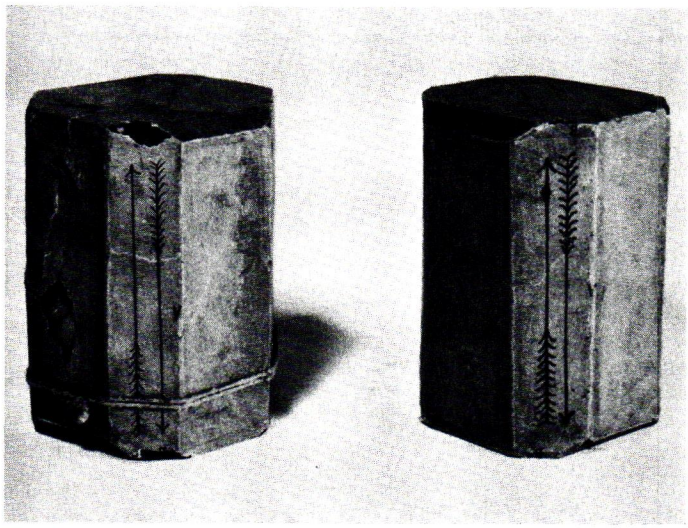


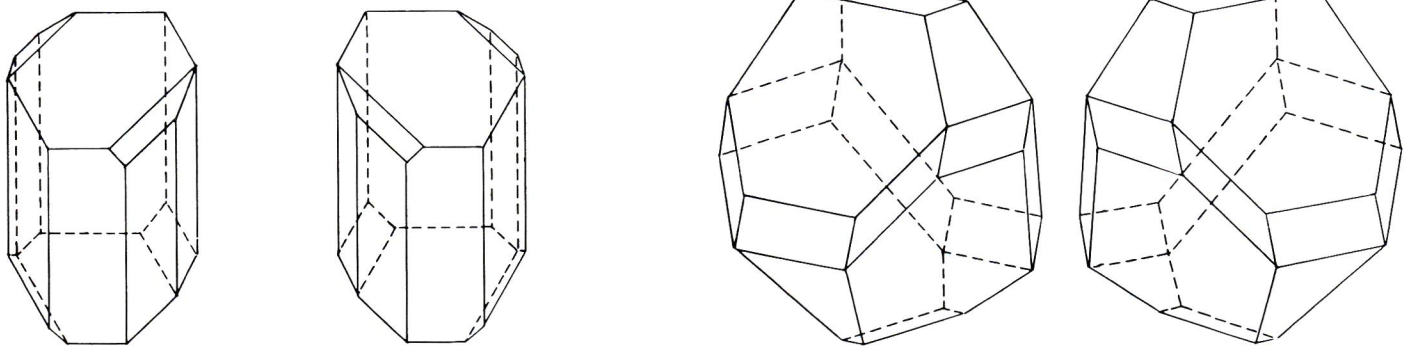


Pasteur's discovery of the *stereoisomers*,
compounds whose elements and molecular
weights were not only identical, as with the
isomers, but whose structures differed in only
one respect—*handedness*,
revealed one of the most curious of conditions
of nature's living world.
Any particular *stereoisomer*
that is produced by the biological process
invariably appears
in but one of its two possible forms
(either the left or the right—never the both).
In fact, it was discovered that the contraform
was often hostile or outrightly destructive
to other forms of living things.

Pasteur imagined that he had found the key
that would unlock the very secret of life itself:
perhaps the only
well-marked line of demarcation
that can be drawn
between the chemistry of dead
and the chemistry of living matter.

He consequently labored in vain for many years
to uncover the real significance
of this phenomenon
with such experiments
as raising grass with mirrored sunlight
in hope to reverse
the handedness of its chemistry.





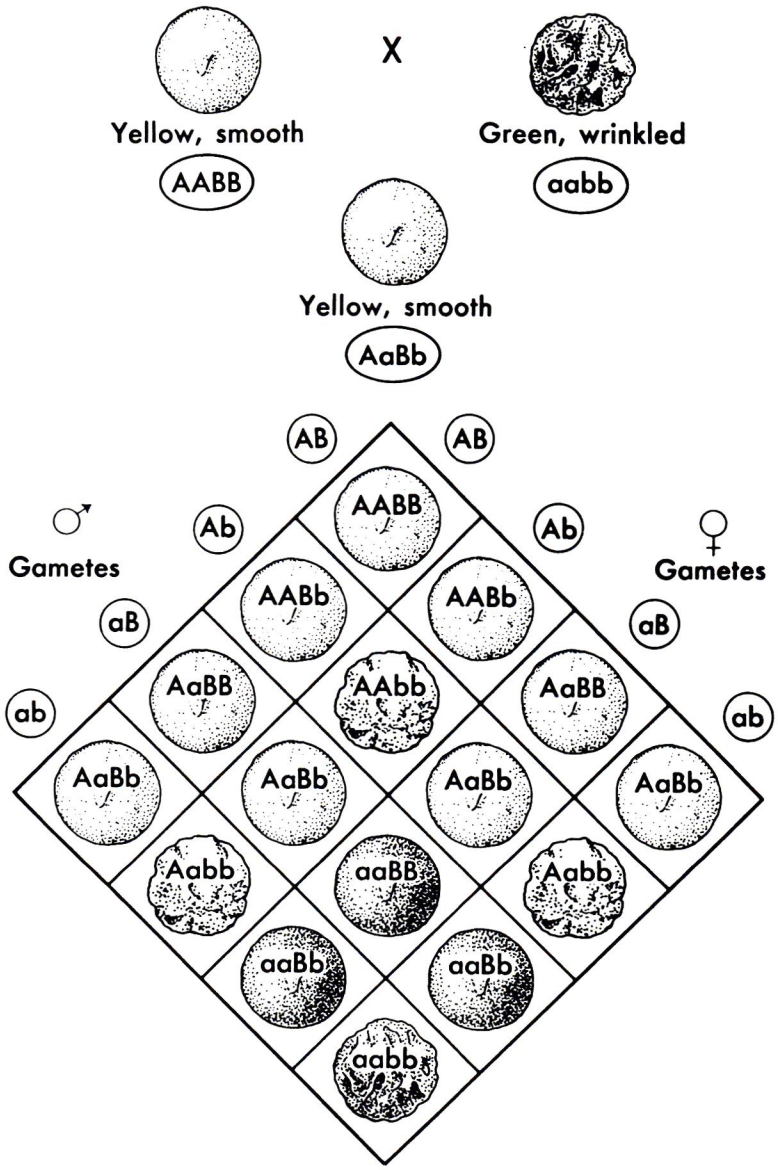
5.12

The Laws of Heredity, like the Periodic Law,
are possessed of a subtler symmetry,
the programming of determinable possibilities
and predictable probabilities.
It provided operative conditions that
validated the Darwinian Theory of Evolution.

AA
Aa aA
aa

AABB
AABb AAbB
AAbb
AaBB aABB
AaBb AabB aABb aAbB
Aabb aAbb
aaBB
aaBb aabB
aabb

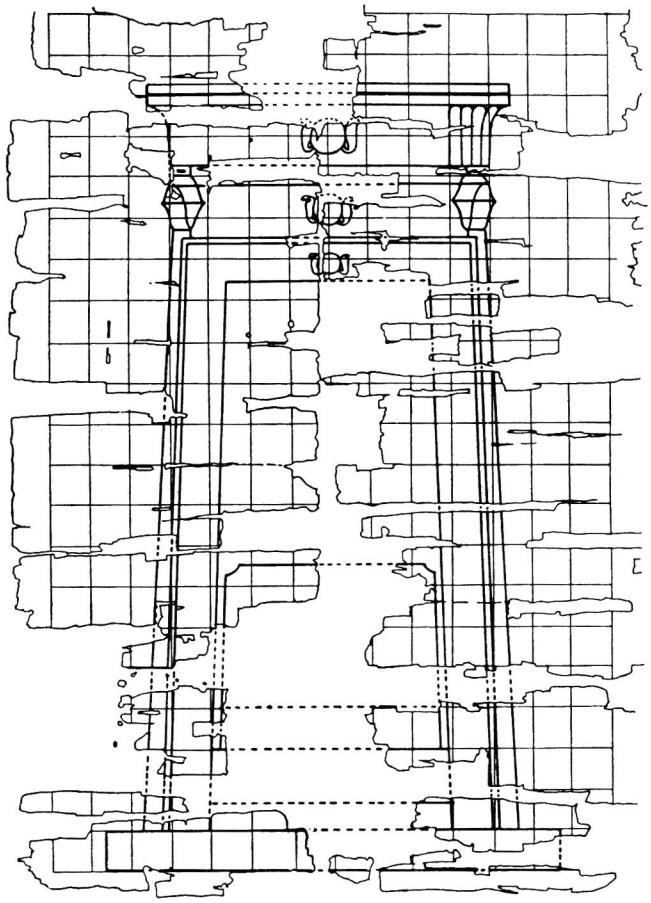
AABBCC
AABBCc AABBcC
AABBcc
AABbCC AAbBCC
AABbCc AABbcC AAbBCc
AABBCc AABbcC AAbBCc AAbBcC
AABbcc AAbBcc
AAbbCC
AAbbCc AAbbcC
AAbbcc
AaBBCC aABBCC
AaBBCc AaBBcC aABBCc aABBcC
AaBBcc aABBcc
AaBbCC AabBCC aABbCC aAbBCC
AaBbCc AabBCc aABbCc aABbcC aAbBCc aAbBcC
AaBbcc AabBcc aABbcc aAbBcc
AabbCC aAbbCC
AabbCc AabbcC aAbbCc aAbbcC
Aabbcc aAbbcc
aaBBCC
aaBBCc aaBBcC
aaBBcc
aaBbCC aabBCC
aaBbCc aaBbcC aabBCc aabBcC
aaBbcc aabBcc
aabbCC
aabbCc aabbcC
aabbcc

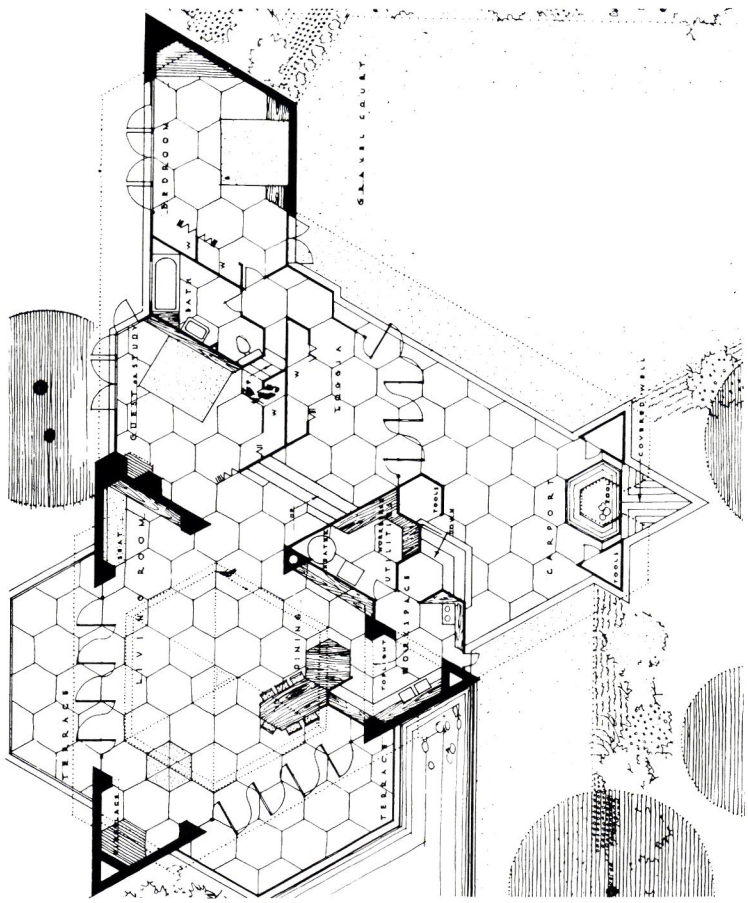


5.13

Amongst the most intriguing structures in nature,
there are those built by animals themselves;
and probably none has been given
more attention
than the hexagonal celled combs
of the paper wasp and the honeybee.
Kepler and Darwin were amongst those of many
who busied themselves with
the geometry of these constructions.
Darwin thought of them as:
the most wonderful of known instincts;
beyond this stage of perfection in architecture
natural selection could not lead;
for the comb of the hive bee is absolutely
perfect in economizing labor and wax.

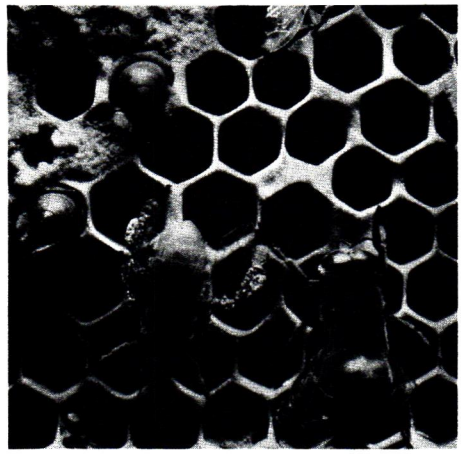
Frank Lloyd Wright, who called
his architecture *organic,*
also admired the bee's construction and decided
that the construction of the right angle,
despite the Egyptians and Pythagoras,
wasn't so remarkable an achievement
of man after all:
I am convinced that the pattern
made by the honeybee
has more fertility and flexibility
than the square
where human movement is concerned.
The obtuse angle is more suited to human
'to and fro' than the right angle.

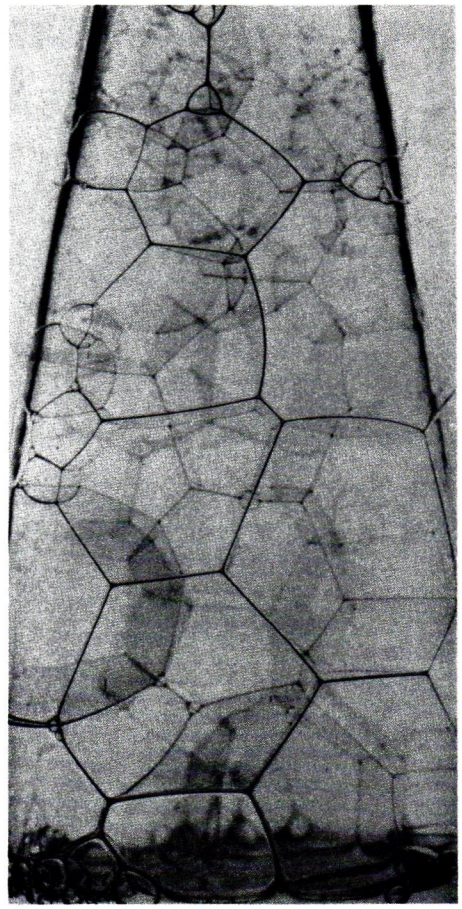




5.14

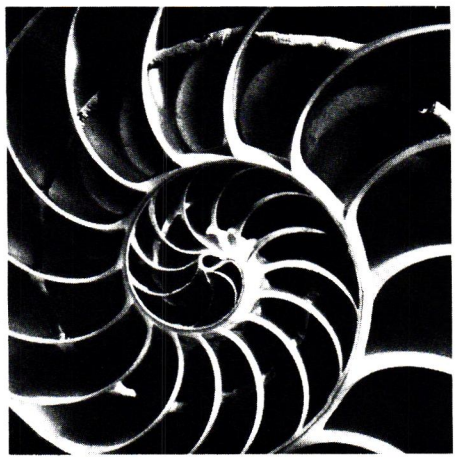
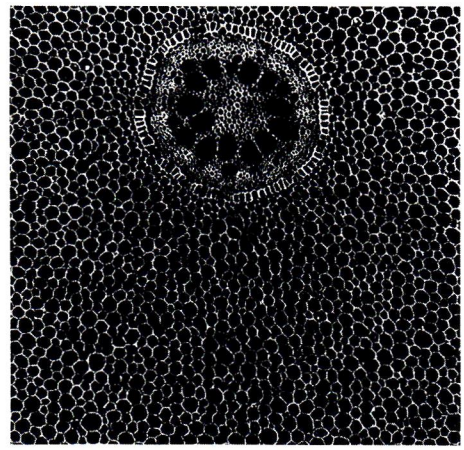
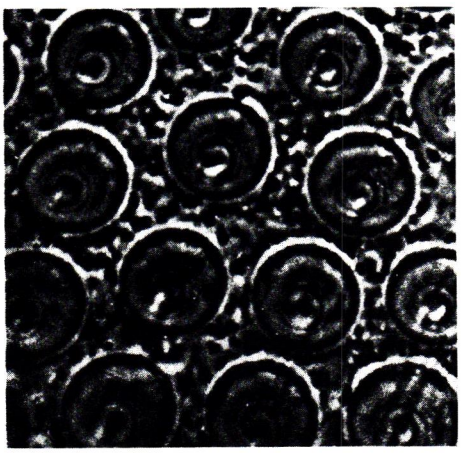
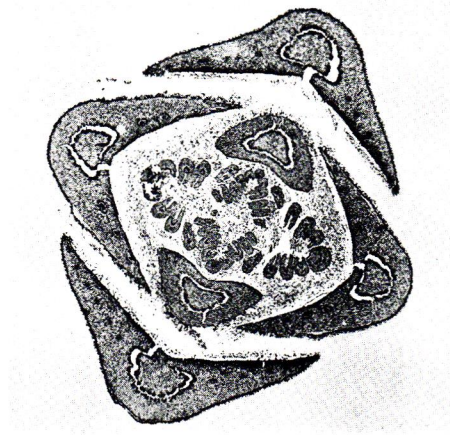
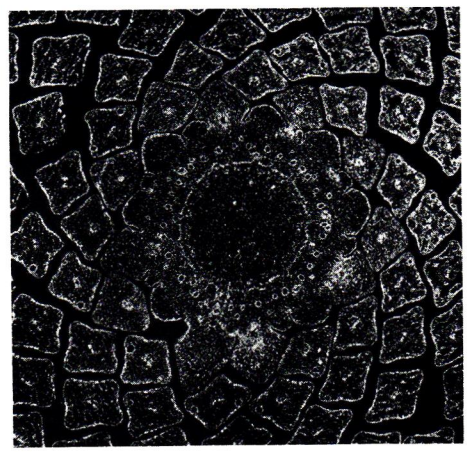
D'Arcy Thompson disclaimed
the bee's instinctive intelligence to solve
complex geometric problems and proposed
that both the hexagonal cross-section
and the remarkable rhombic dodecahedral
pattern,
formed where the cells of two combs
meet back to back, are simply the consequence
of the semi-fluid consistency of wax,
achieving an equilibrium
through minimal surface tensions
—akin to the configuration
of suds in a bottle of beer.





5.15

Thompson summarized his argument
about all natural forms:
Cell and tissue,
shell and bone,
leaf and flower,
all are so many portions of matter,
and it is in obedience to the laws of physics
that their particles have been moved,
molded, and conformed.
There are no exceptions to the rule
that God always geometrizes.

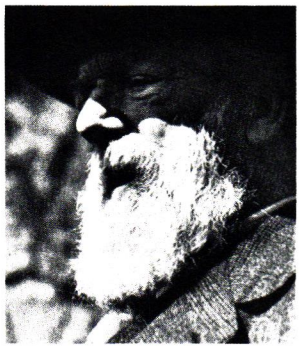
5.16

The page numbers in these notes refer to the page numbers of the facsimile.

Ist col., last para.
"FiBonacci" *should read* "Fi Bonacci"

Page 5.3 illustration
"*photograph* by Roland Furst" *should read* "*photograph* by Roland Fürst"

Page 5.4 illustrations
Between "top row right" para. and "middle row center" para. add "middle row left: 3-fold rotors, *from* ibid., plate 20, fig. 2."



Pythagoras, c. 584-c. 495 B.C.,
b. Island of Samos, Ionia,
d. Metapontum, Magna Graecia.
from Culver Pictures, Inc., N.Y.

Leonardo Pisano (Leonardo of Pisa), Fibonacci or FiBonacci (filius bonassi), c. 1175-c. 1240,
b. Pisa, d. Pisa?
educated by Moorish schoolmaster in North Africa (Bougie, Algeria); *Liber A(b) baci,* 1202, introduced Hindu-Arabic decimal notation to Europe.
from an engraving by Pelle, D. E. Smith Collection, Butler Library, Columbia University.

D'Arcy Wentworth Thompson,
1860-1948,
b. Edinburgh,
d. St. Andrews, Dundee.
photograph by Bjorn Soldan (1944) *at the kind permission of* Miss Ruth D'Arcy Thompson.

acknowledgement of valued aid given by John E. Gragg, Paul J. Karol, William H. Robinson, Philip L. Southwick, Jerome J. Wolken, Carnegie-Mellon University

Page 5.2 *illustration*
Phyllotactic diagram of a fir cone with a $5/18$ divergence—a variation of possible arrangements. As evidenced here, not all spiraling combinations are of the usually encountered *Fibonacci* series; it is only that the pure *Fibonacci* arrangements are the simplest possibilities after an alternating $1/2$ arrangement. This cone displays a "generalized *Fibonacci*" additive sequence, called a *Lucas* sequence (named for a 19th cent. French mathematician who gave the *Fibonacci* sequence its name). (*see* D'Arcy Wentworth Thompson, *On Growth and Form,* pp. 924-927; *and* Verner E. Hoggatt, jr., *Fibonacci and Lucas Numbers,* Houghton Mifflin Co., 1969, p. 7.)
from Alexander Braun, "Vergleichende Untersuchung über die ordnung der Schuppen an Tannenzapfen . . .," *Nova Acta* (Breslau and Bonn: 1831) Vol. 15, P. 1, plate XLII.

Page 5.3 *illustration*
The base of the disc of a thistle with 21 spirals turning to the left and 34 turning to the right, displaying the $21/34$ *Fibonacci* fraction.
photograph by Roland Furst.

Page 5.4 *illustrations*
Galena (or lead glance) crystals of the cubic system; a lustrous metallic sulphide of lead, PbS.
photograph by James Papariello

Diagram of a cubic unit cell, showing octahedral and tetrahedral holes.
from Donald H. Andrews and Richard J. Kokes, *Fundamental Chemistry* (New York: Wiley & Sons, 1962) p. 270, fig. 10.

9 of the 17 "wallpaper" pattern possibilities and their symmetric properties:
top row left: the primitive pattern, with *only* translations in two directions.
from W. & G. Audsley, *Designs and Patterns from Historic Ornament,* (New York: Dover Publications, 1968)—(orig. ed. *Outlines of Ornament in the Leading Styles,* New York, Scribner and Welford, 1882) plate 5, fig. 4.

top row center: vertical mirrors.
from ibid., plate 29, fig. 1.

top row right: 2-fold rotors, vertical mirrors, horizontal mirrors, vertical glides, horizontal glides.
from ibid., plate 44, fig. 1.

middle row center: 4-fold rotors, 2-fold rotors. (The eight-petal flower possesses extra local mirror symmetries that do not effect the *proper rotational* properties of the whole pattern.)
from ibid., plate 19, fig. 4.

middle row right: 3-fold rotors, 3 mirrors (at 120° intervals), 3 glides (at 120° intervals). (The mirrors pass through half of the rotors while none pass through the other half. A distinctly different pattern has 3-fold rotors, through all of which mirrors pass.)
from ibid., plate 20, fig. 1.

bottom row left: 4-fold rotors, 2-fold rotors, 4 mirrors (vertical, horizontal, 2 diagonals), 2 glides (diagonally located).
from ibid., plate 30, fig. 4.

bottom row center: 6-fold rotors, 3-fold rotors, 2-fold rotors. (Again the extra local symmetries of the star and flower do not effect the *proper rotational* properties of the pattern.)
from ibid., plate 20, fig. 4.

bottom row right: 6-fold rotors, 3-fold rotors, 2-fold rotors, 3 mirrors (at 120° intervals), 3 glides (at 120° intervals).
from ibid., plate 25, fig. 1.

Page 5.4 *notes*
Structural properties of crystals:
A *space-lattice* is a three dimensional network which has indefinite periodic repetitiveness; it is an infinite isometric system conforming to one of 6 prismatic types of the parallelepipedon genus. Lattices are sometimes said to be *space-filling.*
The 230 *space-groups* are arrays of elemental particles (atoms or molecules, but all the same in any crystal) arranged around the periodic points of one of the *space-lattices.* Each particle commands a *domain* or *region.* The *domain* is surrounded by an identical configuration of *domains,* as is every other *domain* (with the exception that the one quality of handedness may produce reversed neighborhoods).

Lattices; classes; space-groups:
In their observations, scientists firstly recognized 32 *classes* of crystals, belonging to one of 7 *space-lattice* systems, by the nature of surface characteristics; later, 230 crystal *space-groups* were mathematically predicted and eventually evidenced by X-ray probings of the internal structures. The 32 classes can be defined by the mathematics of Number Theory, affine to the geometry of Pythagoras, a geometry of arrays of points. The 230 *space-groups* conform to the geometry of the limit-

Page 5.5 illustrations
add "(not shown)" *after* "7. francium."

ed number of symmetric operations that can occur in *a space-lattice* cell. The extension of the typology of crystals from 32 *classes* to 230 *space-groups* came from the finding that molecules were not merely points, suspended in a *space-lattice*, but that they possessed unique shapes (both symmetrical and asymmetrical) and could, consequently, be arranged in three-dimensional space in only 230 different, repetitive configurations. (Euclidean geometry, a geometry of continuous lines, virtually eradicated Pythagorean point geometry and was instrumental in the evolution of the mathematics of Descarte and Newton, amongst others, which dealt with growth and movement. Pythagorean geometry was resurrected at the end of the 19th century when it was realized that many aspects of matter, which had seemed continuous, were, in fact, composed of a variety of particles: atoms, molecules, quanta, protons, genes, cells, etc., all of which conform to the mathematics of integers, i.e., Number Theory. (*see* James R. Newman, *The World of Mathematics,* pp. 876-879.)

Crystals of the 230 *space-groups:* Though the 230 *space-group* possibilities are geometrically predictable, crystal examples of each and every one have not as yet been discovered, and some conjecture they may never be, due to constrictions of tightness that certain domains would demand of an appropriate molecular structure, i.e., the motif. This author has not found a reference which records a complete list of those example that have been found.

Discoveries of n-d *space-groups:* In the 1890's three scientists working independently (Federov of Russia, Schoenflies of Germany, Barlow of England) concluded that there were exactly 230 different ways of distributing identical configurations regularly in space. These are the 230 *space-groups.* (*see* ibid. pp. 877-878.)

Federov's list of 230 *space-groups* has been further refined by Shubnikov (and Belov) who developed the 1651 *dichromatic three-dimensional point groups,* recognizing that atoms possessed spin, negative and positive polarity, and thus assigning color coding to their possible combinatorial directionalities. (*see* A. V. Shubnikov, N. V. Belov and other, *Colored Symmetry.)*

Analogous to the 230 3-d *space-groups* is the 17 2-d "ornamental wallpapers" or *planar-groups* of repeating patterns with *double infinite rapport,* based on five *planar-lattice* types, reducible to two—the square and the special rhombic. All 17 had been hit upon empirically by the Egyptians and later fully developed by the Arabians. Federov proposed them in 1891, following his discovery of the 3-d *groups;* but they had to be rediscovered by several others, including Pólya who offered his proof in 1924. (*see* Hermann Weyl, *Symmetry,* p. 104.)

If "wallpapers" are considered in relief, i.e., three-dimensionality in two-dimensional coverage or the 2½-d (as of many of the Moorish ornaments), there are found to be 80 diperiodic groups. (*see* Elizabeth A. Wood, "The 80 Diperiodic Groups in Three Dimensions," *Bell System Technical Journal,* Jan. 1964.) In 1-d there are 2 patterns and in 1½-d there are 7. (*see* H. S. M. Coxeter, "Crystal Symmetry and Its Generalizations," Transactions of the Royal Society of Canada, June 1957, p. 3.)

So here and elsewhere . . . :
D'Arcy Wentworth Thompson, *On Growth and Form* (Cambridge: University Press, 1959) Vol. II, p. 740.

Page 5.5 *illustrations*
Diagrammatic cross sections of atoms having a single electron in their outermost shells: 1. hydrogen, 2. lithium, 3. sodium, 4. potassium, 5. rubidium, 6. cesium, 7. francium.
from Donald H. Andrews and Richard J. Kokes, *Fundamental Chemistry* (New York: Wiley and Sons, 1962) p. 517, fig. 2.

A modern arrangement of the *periodic* chart of elements: Atoms having a single electron in their outermost shells are to the left, and atoms having the full complement of electrons are to the right. The vertical and oblique lines connect elements of similar chemical properties that repeat with *periodicity.* (Chart made before synthesis of 104 and 105.)
The structure is obviously not that of an isometric (regular) grid but that of a quasi *homoeometric* (expanding) grid. More correctly, the elements display morphic change, through their successive electronic arrangements, of a *katametric* (low symmetric) manner: i.e., according to a combination of rules which become particularly complex, yet consistent, at the occurrence of the *transitional* elements. From what is now known, one can propose an endless series of *transuranic* elements, i.e., without regarding their feasibility for reasons of a nature other than the already noted behaviors of electrons.
redrawn after: Louis Vaczek, *The Enjoyment of Chemistry* (New York: Viking Press, 1964) p. 97.

Page 5.5 *notes*
Dmitri Ivonovitch Mendeléeff, 1834-1907.
b. Tobolsk, Siberia,
d. St. Petersburg.

The Periodic Law: (Julius) Lothar Mayer of Germany is credited with the independent discovery of the *Periodic Law;* but Mendeléeff's version of 1869 was the first public pronouncement of it. Arrangement by atomic weight had been tried by others without success; but both, working again with this approach, discovered that certain properties of various elements were repetitive with *periodicity,* forming families with (predictably) similar characteristics. (While the atomic number, established eventually in the completed *periodic table,* is set by the number of protons, the atomic weights do not have a 1 for 1 correspondence due to additional uncharged neutrons in the nuclei, as well as variations in the numbers of electrons and other particles; there are isotopes of successive, atomic-numbered elements that have reverse magnitudes of atomic weights, i.e., lower weights and higher numbers (or, obviously, vice versa), due to their varying eccentricities from the normal atomic form—a complication which apparently did not manifest itself in the early formalization of the *periodic theory* since the extreme forms tend to be unstable.)
Mendeléeff worked with 63 different elements from hydrogen, the lightest (1), to uranium, the heaviest (238). While arrangement by atomic weights produced a horizontal linear arrangement the repeating properties of families of elements produced a vertical relationship, implying a two dimensional grid. In his grid arrangement, Mendeléeff found spaces and foretold of elements as yet undiscovered. It was not until 1875 that the first element, predicted as to weight and properties, was found: his "eka-aluminum," named *gallium.* Some twenty-five years after his prophesies, *the Zero Group* was isolated: the odorless, inert gases, helium, neon, argon, krypton, xenon, radon. A year after his death, 86 of the natural elements had been discovered, with only 6 lacking.

Transitional elements: While the atom's outermost electronic shell (after the first) can accept only 8 electrons, there are groups of transitional elements that accept additional electrons into one or another of their inner shells, beginning with the third shell out. (Of course, for each additional electron intro-

Page 5.7 notes, last col.
"H.M.S. Coxeter" *should read*
"H.S.M. Coxeter"

duced into a shell, so another proton into the nucleus—each pairing constituting a different element.) The third shell can take up to an additional 10; the 4th, up to another 14; and presumably the 5th, up to 18 more, since there is an apparent progression of 4. The valence of these elements, unaffected by the fuller inner shells, are determined as usual by the number of electrons in the outer shell which are usually 2, sometimes 1. Following each *transitional* group are *periodic* elements which have their outer shells progressively filled while the fuller inner shells are unchanged. (Each *transitional* becomes the primary member of a new *periodic* family.) The *quantum* or *wave theory* leads to further refinements in recognizing directional electromagnetic spins of electrons wherein all but the first shell may be broken down into subshells, reflecting the above progressions: the 2nd shell containing subshells of 2, 6; the 3rd, 2, 6, 10; the 4th, 2, 6, 10, 14.

The newer transuranic elements: It was reported on 27 April 1970 by the Lawrence Radiation Laboratory, University of California, that the 105th element had been synthesized. The name of hahnium (for German chemist Otto Hahn) has been proposed. The U.S.S.R. had made an earlier claim to this achievement but curiously left 105 unnamed. In 1969, the U.S.S.R. had claimed the synthesis of 104, proposed as kurchatovium (for the Russian physicist), while Berkeley proclaimed 104 in the name of rutherfordium (for the British physicist). Neither claims nor names have to date been established for 104 and 105. Number 103 had been identified in 1961.

The history of synthetic elements began with the search for the last of the 92 primordial elements when technetium (no. 43) was produced in 1939. But even before the list was completed in 1945 with the synthesized promethium (no. 61), the first transuranic elements were produced in 1940. Plutonium (no. 94), the second of the synthetic transuranic series, has also been detected in natural uranium. With the possibly debatable exception of 95 and 96, all have been produced in chronological succession, though this is not of necessity a prerequisite to their synthesis.

On *isometric* and *katametric* systems of chemistry: While the molecular arrangements of crystals exemplify *isometry* (the highest degree of symmetry), the periodic table of elements presents an elaborate *katametry* (the lowest type of symmetry). In *isometry* there are limited structural possibilities; in *katametry,* endless combinatorial variations. (Note that the Periodic Law, incomplete that it were, predated the establishment of the 230 crystal space-groups.)

Neither atom nor universe, by virtue of its magnitude, minute and immense, has been as yet (and may never be) "visually" apprehended. Both, being governed by the fundamental motions and the elemental materials (i.e., laws), give evidence that the extremes of the natural world are constituted of a simplicity of systems*—with the intervening world constituted of complexer systems, resultant from combinatorial arrangements. Symmetry has been heavily relied upon in the prediction of certain possibilities and in the exclusion of others; as an analytical tool, it has been employed in translating the largely unseen but otherwise detected behaviors of parts and particles into proposed physical, as well as mathematical, models.

*The sub-atomic particles, neutrons, protons, mesons, etc., are theorized to be the most primary of structures, consisting of various arrays of a singular particle (the "quark") whose behavior is determined by a single basic force.

Page 5.6 *illustrations*
Creatures of folly: birds and animals.
from Catalogue of a Collection of Early German Books in the Library of C. Fairfax Murray, compiled by Hugh William Davies (London: privately printed, 1913) Vol. 1, p. 246 (orig. printed in Conrad von Megenberg's *Buch der Natur,* Augsburg, Jo. Balmer, 1478).

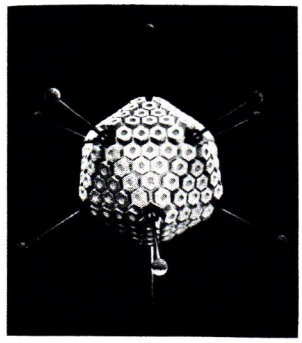
Creatures of folly: the inhabitants of the sea.
from ibid., p. 245.

Page 5.6 *note*
In our discourse about the universe . . .: "Timaeus," *The Dialogues of Plato,* trans. B. Jowett (New York: Random House, 1937) Vol. II, p. 68 (section 92).

Page 5.7 *illustrations*
top row: Radiolaria with the form of an icosahedron; Radiolaria with the form of an all triangular (not regular) faceted polyhedron.
bottom row: Diatom; Acanthometra.
from: Ernst Haeckel, *Kunstformen der Natur* (Leipzig and Vienna: Das Bibliographische Institut, 1904) plates 1, 4, 21.

Page 5.7 *notes*
we are to regard an unintelligent soul . . .: "Sophist," *The Dialogues of Plato,* trans. B. Jowett (New York: Random House, 1937) Vol. II, p. 233 (section 228).

The *order* of the *symmetry group:* "Symmetrical transformations are *equivalent* or *identical* if they lead to the same regrouping of a figure's components. Otherwise they are considered *non-equivalent* or *different.*"
"The number of *non-equivalent* operations (plus the *identical* operation) constituting a symmetry group is called *the order of the group.* Since each operation determines identically one of the equal domains of a figure which are not divisible into smaller equal domains, then the order of a symmetry group is equal to the maximum number of equal domains of the figure. This maximum number is otherwise called *the value of symmetry* of a figure."
"Any figure may be brought into self-coincidence by the operation of *identification.* If (this) is the sole symmetric transformation, then the figure is called *asymmetric.* From the formal point of view an *asymmetric* figure would be more correctly called a figure with a minimal *value* or *order of symmetry,* (i.e., equal to one). If a symmetric figure is divided into the maximal possible number of equal components, then each component taken separately is an *asymmetric* figure." A. V. Shubnikov, N. V. Belov and others, *Colored Symmetry* (New York: MacMillan Co., 1964) pp. 11 & 28.
"The simplest kind of symmetry, *bilateral* symmetry, is characteristic of the external shape of all animals more highly organized than the lobster. The *symmetry group* of the tiger is of order 2, generated by a single reflection. That of the square pyramid is of order 8."
H. M. S. Coxeter, "A Symposium on Symmetry—I. Crystal Symmetry and Its Generalizations" (Transactions of the Royal Society of Canada, June 1957) Vol. LI, Series III, Section Three, pp. 1-2.



Model of a virus with icosahedral symmetry; note pentagonal elements (*capsomeres*) at vertices.
photograph by Yale Joel, *Life*

Magazine, Time Inc.

Viruses: The smallest (10 to 200 millimicrons) biological structures, which contain all the information needed for self-reproductions, are viruses. For some time, helical symmetry had been detected in some larger viruses, as the tobacco mosaic virus. It was then discovered through X-ray diffraction and the even more refined method of "casting shadows" with streams of metal atoms that many of the smaller, "spherical" viruses actually conform to Platonic solid configurations—including, surprisingly, the dodeca- and icosahedron. These are said to have *cubic symmetry,* which is not to be confused with the *cubic system* of crystallography. Rather than developing in conformity with the endless, repetitive space-lattice periodicity of the crystal, the "spherical" virus, a finite entity, has a core, normally containing nucleic acid (the genetic material) and is surrounded by a shell (the *capsid*) built of subunits (*capsomeres*), which in most smaller viruses are probably of identical protein components. The symmetrical developments, rather than being of repetitive spatial configurations, are of polyhedral surface conformations. Though the space-lattice excludes the regular dodecahedron and icosahedron, allowing only specific irregular variations as found in iron pyrite (dodeca-) icosahedral symmetry conforms to the singular cube, as well as do the tetrahedral and (cubo-) octahedral symmetries, as peripheral systems of both external and internal "spherical" forces. Again, as with crystals and Radiolaria, the possibilities and limits of geometry indicate the probable structures of the minute viruses. *see* R. W. Horne, "The Structure of Viruses," *Scientific American,* Jan. 1963, pp. 48-56; D'Arcy Thompson, ibid., p. 732; Martin Gardener, *The 2nd Scientific American Book of Mathematical Puzzles & Diversions,* p. 92.

Dodecahedral pyrite crystals with irregular pentagonal faces: This geometry belongs to the cubic system. Regular dodecahedra are impossible in crystals, since no regular arrangements of points (atoms) can be organized into a regular pentagonal grouping. *see* James R. Newman, *The World of Mathematics,* pp. 876-877. *photograph by* James Papariello.

Page 5.7 *notes*
Radiolaria (named by Johannes Müller in the mid-19th cent. for their particular characteristic of radial spines): Radiolaria of the phylum Protozoa are mostly aquatic creatures, which, despite their minuteness (½ to several millimeters in diameter), possess highly symmetrical skeletal shells. Ernst Haeckel claims some 4000 species; but D'Arcy Thompson tends to discount this number on the proposition that the same species may display a variety of skeletons for mathematical, rather than for biological reasons. "We begin by an easy and general assumption of *specific properties,* by which each organism assumes its own specific form; we learn later that throughout the whole range of organic morphology there are innumberable phenomena of form which are not peculiar to living things, but which are more or less simple manifestations of ordinary physical law."
The central mass of protoplasm is the essential living portion of the "unicellular" organism; it is surrounded by a frothy mass of cells, conforming to bubble configurations, between which there is an adsorbed or secreted deposition, usually of silica, in walls and edges common to adjacent cells. While D'Arcy Thompson can claim to explain fully the simpler skeletons of many Protozoa, he is hard pressed to give a conclusive reason for the existence of Platonic icosahedral and dodecahedral skeletons in some of the Radiolaria. Is it not possible, however, that the mid-20th century discovery of similar structures in some of the smaller viruses explain those of the Radiolaria? Both possess a central nucleus around which is a shell—often with facets composed of subunits, generally hexagonal. The whole system must conform to the limits of polyhedra: in particular, no system (regular or irregular) of hexagons alone can enclose space. *see:* D'Arcy Wentworth Thompson, *On Growth and Form,* pp. 694-732.

Page 5.8 *illustrations*
A pentagram or pentacle inscribed upon face of bearded man: the five points determine the apex of the forehead, the breadth of the face, and the breadth of the jaw, with the nose located at the lower concave angle. *Here begins the method of drawing as taught by the art of geometry, to facilitate working* (quoted from Villard's text to the sketch). *The Sketchbook of Villard de Honnecourt,* ed. Theodore Bowie (Bloomington: Indiana University, 1959) p. 10.
from Robert Willis, *Facsimile of the Sketch-Book of Wilars de Honnecourt* (London: John Henry and James Parker, 1859) plate XXXV.

Pythagorean harmonics.
from Franchini Gafuri (Franchino Gaffurio 1451-1522) *Theorica Musicae* (Rome: Reale Accademia D'Italia, 1934) p. 67 (from *Theoricum opus,* ed. of 1492).

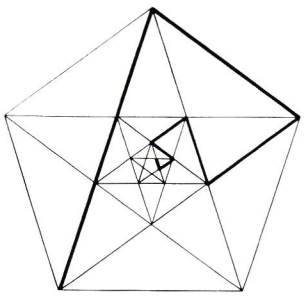
"The Triangle of the Pentagon": a design based on the "sublime" (or Golden Mean isosceles) triangle found in the pentagon.
redrawn after: Matila Ghyka, *The Geometry of Art and Life* (New York: Sheed and Ward, 1946) p. 25, plate I.

Page 5.8 *notes*
inexcusable Pythagoreanism:
D'Arcy Wentworth Thompson, *On Growth and Form* (Cambridge: University Press, 1959) Vol. II, p. 932.

Thales, c. 640-c. 550 B.C. is credited with bringing the geometry of the Egyptian priests to Greece. Of the discoveries ascribed to him is the theorem that any angle located on the arc of a semicircle and embracing the diameter is a right angle. Thales persuaded his student Pythagoras to visit Egypt. In 529 B.C. Pythagoras settled at Crotona, a Dorian colony in Southern Italy, where he expounded philosophies around which a brotherhood, the Order of Pythagoras, was founded. The Society held that the principles of mathematics, and more specifically of numbers, were the principles of all things; it transformed mathematics into a philosophy and "diverted arithmetic from the service of commerce" (Eudemus). Dietary laws and medicine were practiced; religious and moral precepts were expounded. All discoveries were committed to secrecy and at first only orally transmitted. A written treatise, however, is said to have come to Plato, who visited the Pythagorean commune; such an event would have had great significance for the development of mathematics. It is not certain which of the great discoveries were made by Pythagoras himself, since the brotherhood credited all discoveries to the master. Of the discoveries were: the icosahedron and the dodecahedron, which were apparently not known to the Egyptians as were the three other regular solids; the square *on* (of) the hypotenuse of a right triangle is equal to the sum of

the squares *on* (of) the other two sides; the constructions of regular polygons; geometric point patterns of integers; the laws of musical harmonics. Ironically, the most important discovery attributed to the man who gave mystical significance to whole numbers is that of irrational numbers. It is suggested that the proof involved the Golden Section: in attempting to show that for any given line, divided into two arbitrary parts, there could, by a series of further subdivisions, be eventually found a unit common to both, it was realized that the parts of a line divided by the Golden Section and then similarly subdivided leads to an endless geometric progression in which a common unit is never found. *see* James R. Newman, *The World of Mathematics,* pp. 81-89.

Pythagoreanism is practiced to this day, particularly in the Societies of Theosophists (USA) and Anthroposophists (Europe) the latter of whom have a settlement at Dornach in Canton, Basel, Switz.



A series of Golden Section segments traced through a configuration of pentagrams and circumscribed pentagons.
by William S. Huff.

Page 5.9 *illustrations*
Elevation and plan view of a fir cone, upon which are diagramed the arrangement of the cone scales: The parastichies (or rows of scales running along the vertical axes) have an interval of 21; the scales spiraling to the right, an interval of 8, the scales to the left, an interval of 5. These three numbers are all members of the *Fibonacci series,* and this cone is said to have a *phyllotactic* arrangement of $\frac{8}{21}$.
from Alexander Braun, "Vergleichende Untersuchung über die Ordnung der Schuppen an Tannenzapfen . . ."; *Nova Acta* (Breslau and Bonn: 1831) Vol. 15, P. 1, plate IXX (i.c. XIX).

A *Fibonacci* tree: "If a tree puts forth a new branch after one year, and always rests for a year, and if the same law applies to each branch, then in the first year we should have only the trunk, in the second, two branches, in the third, three, then 5, 8, 13, etc., as in Fibonacci's sequence."
redrawn after: H. Steinhaus, *Mathematical Snapshots* (New York: G. E. Stechert & Co., 1938) p. 28, fig. 31.

Page 5.9 *notes*
Leonardo da Vinci, 1452-1519,
b. Vinci (near Florence),
d. Cloux (near Amboise), Touraine.

"leaves spiral": *see* D'Arcy Wentworth Thompson, "On Leaf-Arrangement, or Phyllotaxis," *On Growth and Form,* Vol. II, pp. 912-933.

Recognition of the phenomenon of *phyllotaxis:* Though many plants were named and described, especially for their herbal qualities, by the ancients, Leonardo da Vinci is generally acclaimed as the first botanist for his organographic studies of plants—i.e., observation of their structures, both internal and external. His discovery of *phyllotaxis* (study of the systems of leaf arrangements) was unnoticed for three and a half centuries as his manuscripts (written in the reverse mirror image) were either displaced or merely not read. In the mid-17th century, *phyllotaxis* was re-discovered (Brown, Grew, et al) and during the 19th century, given renewed attention (Goethe, Braun, et al). The simpler arrangements (i.e., lower Fibonacci ratios) are found in the leaf arrangements along stems and are most apparent when closely packed in the leaf bud—the alternating (*or glide*) leaf arrangement (noted as 1:2) being of the simplest. More elaborate Fibonacci combinations occur in the scales of conifer cones and in the discoidal influorescence of composite flowers.

	1:1	**1.000000**
.500000	**1:2**	
	2:3	**.666666 . . .**
.600000	**3:5**	
	5:8	**.625000**
.615384 . . .	**8:13**	
	13:21	**.619047 . . .**
.617647 . . .	**21:34**	
	34:55	**.618181 . . .**
.617977 . . .	**55:89**	
	89:144	**.618055 . . .**
.618026 . . .	**144:233**	
	233:377	**.618037 . . .**
.618032 . . .	**377:610**	
	610:987	**.618034 . . .**
.6180336 . .	**987:1597**	

Sixteen successive ratios of the *Fibonacci series.*

	30:5	**6.000000**
.145714 . . .	**5:35**	
	35:40	**.875000**
.533333 . . .	**40:75**	
	75:115	**.652173 . . .**
.605263 . . .	**115:190**	
	190:305	**.622950 . . .**
.616161 . . .	**305:492**	
	495:800	**.618750**
.617750 . . .	**800:1295**	
	1295:2095	**.618138**
.617994 . . .	**2095:3390**	
	3390:5485	**.618049 . . .**
.618016 . . .	**5485:8875**	
	8875:14360	**.618036 . . .**
.6180331 . .	**14360:23235**	

Sixteen successive ratios of a *Lucas series* (beginning with a reversed pair).

The *Fibonacci series* and the Golden Section: The successive ratios of two consecutive terms of the *Fibonacci series,* or of any *additive* (*Lucas*) sequence for that matter, approach very quickly the Golden Section as their limit; the values of one set of alternating ratios, though ever closing in, remain ever somewhat greater and the other set, ever somewhat lesser than the *ideal* number: **.61803398875 . . .**

aiming at the ideal angle: D'Arcy Wentworth Thompson, *On Growth and Form* (Cambridge: University Press, 1959) Vol. II, p. 932.

mathematical coincidence . . .:
D'Arcy Wentworth Thompson, ibid., p. 931.

Page 5.10 *illustration*
Electron density map, derived from the X-ray diffraction pattern of hexamethylbenzene.
photograph by Eastman Kodak Research Laboratories, Rochester.

Pages 5.10 and 5.11 *graphic formulae and spatial models of carbon chemistry.*
top row: Straight-chain patterns of *saturated* hydrocarbons: diagram of the *tetravalent* carbon atom (C with four bonds); C_1H_4 methane; C_2H_6 ethane; C_3H_8 propane; C_4H_{10} butane; C_5H_{12} pentane; C_6H_{14} hexane.
redrawn after: Donald H. Andrews and Richard J. Kokes, *Fundamental Chemistry* (London: John Wiley & Sons, 1962) p. 183, table 2.

second row: Hybrid compounds: two chemical compounds having two carbon atoms, as does ethane, but less hydrogen atoms, ergo, *unsaturated* hydrocarbons; C_2H_4 ethylene (above), C_2H_2 acetylene (below).
redrawn after: Donald H. Andrews and Richard J. Kokes, ibid., p. 147, fig. 9.

A *branched-chain isomer* of pentane, C_5H_{12} dimethylpropane.
redrawn after: Donald H. Andrews and Richard J. Kokes, ibid., p. 186.

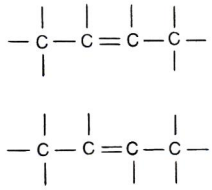
The two aspects of the *resonance*

compounds, they constitute a *racemic* mixture which is *optically inactive.* The third type of *optical isomer* (molecules with *mirror-rotational* pairings between molecular groupings) is a *meso* form, and its relationship to the *enantimorphs* is that of a *diastereomer;* i.e., its properties are different from *l* and *d* forms, even to being *optically inactive;* yet, by definition, it possesses the same structure as the other two.

Concerning contrary biological effects of certain *stereoisomers,* the two *enantimorphic* forms can be sweet and bitter, healthful and noxious, absorbed as nourishment or not acted on by bacteria; or they can even cancel out each other's potencies.

*Structure, as has been used by chemists, is not a very satisfactory term. *Stereoisomers,* in their *levo, dextro,* and *meso* forms are said to have the same *structures*; but a *structure* is absolute, and the differential qualities of *left* and *right handedness* should be sufficient to qualify two *enantimorphs* as being possessive of different *structures.* Only two things that are *exactly* the same can actually have the same *structure. Constitution* has recently been suggested as a replacement for the traditional word *structure* (ergo, *constitutional isomers* for *structural isomers). Chirality* (a term attributed to Kelvin) is also suggested to be renewed for the quality of *three-dimensional handedness, non-superposibility,* or *screw. see* "IUPAC Tentative Rules for the Nomenclature of Organic Chemistry. Section E. Fundamental Stereochemistry," *The Journal of Organic Chemistry,* Sept. 1970, pp. 2849-2867.

**Mirror-rotation* planes can occur in chains only in the idealized linear *conformation—a conformation,* defined as the actual shape a molecule has at any one moment. In actuality, the *conformations* of molecules are more often in curved conditions than in the singular straight state. Rings, which can also be found in the *stereo* forms, *levo, dextro, meso,* cannot, of course, have *mirror-rotation* planes in their ideal *conformation.*



Two *geometrical* isometric chain configurations, resulting in compounds of differing properties.
according to Paul J. Karol

Perhaps the only well-marked line . . .: Louis Pasteur, *Researches on Asymmetry of Natural Organic Products* (Edinburgh: William F. Clay, 1897) p. 45.

Page 5.13 *illustration*
Tabular diagrams with one, two, and three variables: a system that can be employed for any number of characteristics. It is easily observed that for one characteristic there are three different forms out of four combinations, with the occurrence of three *dominants* to one *recessive;* for two variables, 9 forms out of 16 combinations, with 12 *dominants* to 4 *recessives* per variable; and for three variables, 27 out of 64, with 48 *dominants* to 16 *recessives.* (Note: These diagrams are representative of the first generation from *hybrids* since two *constant parents,* each of differing characteristics, are capable of producing only the *hybrid* form. I.e., an **AABBCC** *parent* crossed with an **aabbcc** *parent must* produce **AaBbCc** offspring, but two **AaBbCc** *hybrids* can produce the 27 forms.)
by William S. Huff

The mapping of a two-dimensional matrix of all combinatorial possibilities and the ratio of occurrence of two characteristics, according to *Mendel's Law of Independent Assortment.*
(When only one characteristic is involved in a *hybrid* fertilization, a lineal model will suffice:

A A a a
A a A a

Were a third characteristic to be considered, the matrix would have to be expanded to the third dimension; and, for yet more variables, this manner of visual model would be infeasible, while the tabular diagram can be employed for any number of variables.)
from Otto T. Solbrig, *Evolution and Systematics* (New York: Macmillan, 1966) p. 16, fig. 2.3.

Page 5.13 *note*
Gregor Johann Mendel, 1822-1884, b. Heinzendorf, Austrian Silesia, d. Brünn, Austria (Brno, Czechoslovakia).

Operations and observations of Mendel: The paper, *Experiments in Plant-Hybridization,* was presented in 1865 to Brünn's provincial society of natural history, published the next year in the society's proceedings, and, following distribution to scholarly institutions in Austria and abroad, lay dormant for some 35 years before it was coincidentally uncovered several times with attendant appreciation. In it, Gregor Mendel, an Augustinian monk, described his serene labors of some seven years (1856-63) involving the hybridization of pea plants, recorded his observations, and established two fundamental laws of heredity. His carefully controlled experiments, requiring a select minimum of equipment, were conducted upon a small garden plot within monastic walls.
Mendel remarkably discovered the discrepancy between the physical appearance (*phenotypic*) and the genetic constitution (*genotypic*) of biological organisms and therein defined the phenomenon of *dominance.* The Mendelian procedure consists essentially of an initial, artificially induced cross-fertilization of two differing *parent* types and the subsequent natural self-fertilization of all generations therefrom. By definition, a *parent* possesses a particular set of characteristics that is constant in all generations issuing from its kind. Two *parents* displaying a variety of constant characteristics that differ between themselves are needed. Mendel selected two strains of the genus Pisum and identified seven character variances—amongst them, tall and dwarf stalks, violet and white blossoms, smooth and wrinkled seed surfaces, and yellow and green seed colors. The products of reciprocal crossbreeding are the same; i.e., whichever *parent* furnishes the donor male cell and whichever the recipient female cell, all offspring are of the singular *hybrid* formulation. They display one *parent's* external, *dominant* characteristics (tall stalk, violet flower, smooth surfaced and yellow colored seed, in the case of the pea) and carry the other parent's latent, *recessive* characteristics, traits which reemerge in some of the *hybrid* progeny.
In the first generation from a self-fertilization of the original *hybrid,* Mendel found that *dominant* and *recessive* characteristics appeared on the average to the proportion of three to one. Of those plants that possessed *recessive* characteristics, all passed them on unvaried to their offpring; but, of the ones that exhibited the *dominant* characteristics, it could not be visually determined which had been regenerated in the *hybrid* form and which had reverted to the *constant, dominant parent* pattern. When the reverted *parent* types were culled out, as may be done by successive breedings in order to establish the constancy of *dominant* traits, the remaining *hybrids* again displayed the three *dominant* to one *recessive* ratio; and so, for all succeeding generations. The more refined ratio, 2:1:1, in expressing the offspring from the *hybrid* form, represents the recurrence of two *hybrids* like itself to one reverted

structure, i.e., alternating bonds between the carbon atoms, of the benzene ring C_6H_6 the basic *closed chain aromatic* hydrocarbon. Before *hybrids* were understood, benzene, like ethylene and acetylene, seemed to have too few hydrogen atoms, i.e., six, in this case, in relation to the 14 of the hexane chain.
redrawn after: Sidney J. French, *The Drama of Chemistry* (New York: The University Society, 1937) p. 93, fig. 78.

third row: two *isomers,* both expressed by the same formula CH_4ON_2, one inorganic (ammonium cyanate), the other organic (urea). These compounds were discovered in 1828 by Wöhler who noted their identical molecular weights and identical elements in identical proportions, along with different chemical properties. Berzelius named them *isomers* in 1830 and concluded that the differences occurred in their structures.
redrawn after: Sidney J. French, ibid., p. 89, fig. 77.

Planar or graphic 2-d diagrams and spatial models: Planar diagrams can be deceiving. The two CH_2Cl_2 planar diagrams seem to be different; but, when represented in (tetrahedral) space, it is seen that they are the same. The two CFClBrI planar diagrams, however, are different in that their spatial models display right and left-handedness, i.e., mirror images, indicating *stereo-isomers.*
redrawn after: Donald H. Andrews and Richard J. Kokes, *Fundamental Chemistry* (London: John Wiley & Sons, 1962) p. 171.

bottom row: The tartrate acids in planar diagrams and spatial models. *First graphic and first spatial diagrams: dextrorotatory-tartaric acid* turns polarized light to the right; *second graphic and second spatial diagrams: laevorotatory-tartaric acid* turns polarized light to the left; *third graphic and third spatial diagrams: mesotartaric acid* is *optically inactive* due to the fact that the two tetrahedral sections of the molecules are rotated mirror images of one another and, therefore, cancel out right or left rotations of polarized light. *Racemic acid,* the mixture separated by Pasteur in 1848, was explained to be *optically inactive* since it consisted of equal amounts of *dextrotatory-* and *laevorotatory*-acids.
redrawn after: B. Pavlov and A. Terentyev, *Organic Chemistry* (New York: Gordon and Breach, Science Publ., 1965) pp. 248, 247. (note: The Pavlov and Terentyev spatial diagrams conform to similar diagrams depicted in Aaron J. Ihde, *The Development of Modern Chemistry,* p. 327. Both are incorrectly depicted; the two tetrahedra should be opposed in an inversion through the central point. See Part 2 on *mirror-rotation symmetry.*)

Page 5.10 *notes*
Friedrich August Kekulé von Stradonitz, 1829-1896,
b. Darmstadt, d. Bonn.

I was sitting . . .: Aaron Ihde, *The Development of Modern Chemistry* (New York: Harper & Row, 1964) p. 310.

Valence: In the mid-19th century, Italian chemists proposed the *Theory of Valence.* This gave Kekulé, shortly thereupon, the facility to speculate correctly, in 1858, that carbon was *tetravalent* (i.e., of *valence* 4), to graph the chain molecules, and eventually, in 1865, to conjecture the structure of the *benzene ring.* (Kekulé's hypotheses were not proved until 1874 by independent investigations of van't Hoff and Le Bel.) Richard Abegg refined the theory: he noted that elements vary in *valence,* from lowest to highest, by only 8 units (Newland's Law of Octaves), eight being the limit of the number of electrons an outermost shell can contain—excepting the first shell which allows only two.

An element, whose essential characteristic is determined by its number of (positive) protons (corresponding with its atomic number), is defined as an *atom* when it has an equal complement of (negative) electrons—*ions* being elements with less or more than a matching number of electrons. Only those atoms whose outer shells are full are electrochemically stable or *inert (the Zero Group).* All other *neutral* atoms, as well as ionized members of the Zero Group, tend, in a greater or lesser degree, to seek chemical stability by combining with other atoms into molecules—sometimes with their own kind. The *valence number* of an element is determined by the number of electrons to be given (*reduction*) or to be accepted (*oxidation*) in the sharing process of chemical reactions and is respectively designated as *plus* or *minus* (e.g., hydrogen is $+1$; oxygen is -2; one oxygen atom combines its two electrons with the single electrons of two hydrogen atoms in forming water sometimes noted as H-O-H). An element such as sulphur with 6 electrons, usually considered as -2 in accepting 2 electrons, can also give up six and assume a charge of $+6$. This *electrochemical bonding* is one of four recognized natural forces, the others being *nuclear binding, weak decay,* and *gravity.*

Page 5.12 *illustrations*
Models which Pasteur used to demonstrate his 1848 discovery of the dual right and left handed properties of *paratartaric acid* crystals.
photograph by Institut Pasteur, Musée Pasteur, Paris.

lower left: Drawings of right and left *tartrate* crystals, similar to those of above photograph.
redrawn after: Emile Duclaux, *Pasteur: The History of a Mind* (Philadelphia: W. B. Saunders, 1920) p. 24, fig. 5.

lower right: Drawings of other right and left handed crystals.
redrawn after: Oeuvres de Pasteur (Paris: Masson et Cie. Ed., 1922) Vol. 1, p. 109, figs. 10 & 11.

Page 5.12 *notes*
Louis Pasteur, 1822-1885,
b. Dole, Jura,
d. Villeneuve, l'Etang.

Isomers and *stereoisomers:* The area of *isomers* has many complexities. There are two distinct groups, *structural isomers** and *stereoisomers. Structural isomers* are identified as those compounds having identical *molecular formulae,* or *compositions,* (such as CH_4ON_2) but differing in *structure,** i.e., in the manner in which the atoms or molecules are attached to each other. The number of possible *structural* combinations of the *isomer* group of one of the longer linear molecules becomes astronomical; it is easily shown that, though any of these can exist (and can be produced), all forms of even one long molecule most probably do not exist in the total universe. *Stereoisomers* are compounds with the same *structures* but different *configurations* and comprise two illy determined subclasses, *optical isomers* which generally are *optically active* and *geometrical isomers* which generally are not. In certain instances (as in the case of the tartaric acids) the *optical isomers* may occur in at least three *configurations.* 1. a right-handed (screw) arrangement, 2. a left-handed (screw) arrangement, and 3. a right-left (alternating) arrangement, i.e., with *mirror-rotation* planes introduced between the carbons (or other core atoms) of chains**. The first two forms are *enantimorphs;* they differ in their properties in only one respect, *right* and *left-handedness,* and are usually *optically active* as to the rotation of polarized light in *levo-* and *dextrorotary* manners, when in solution. If mixed together in equal quantities, as normally occurs in the synthetic production of the

dominant parent type, to one reverted *recessive parent* type.
Of major importance was the observation that each pair of differing characteristics, possessed by two diverse *parent* plants, was independent of each and every other characteristic. That only three formulations *(constant dominant, constant recessive, hybrid)* for any one characteristic can emerge from successive progeny of a cross-fertilization is not to be confused with the total number of form variations that occur from the simultaneous interaction of several differing characteristics. E.g., a specific pea plant derivative from an original cross-fertilization and successive breedings of progeny may be endowed with a *constant dominant* yellow seed color, a *constant recessive* wrinkled seed surface, and a (tall) *hybrid* stalk from which both tall and dwarf plants will issue in successive generations of its kind. The *group* number of variations in all possible associations of any specific number of paired differing characteristics is easily determined by combinatorial mathematics. While *dominant,* then, refers to the appearance of physically evident characteristics, it does not infer a superiority in occurrence; here, mathematical probability rules. *Constant dominants* and *constant recessives* are regenerated in equal numbers. That there are twice the number of *hybrids* for each *constant* is easily understood: in the combinatorial set of **AaAa,** for each one **AA** and each one **aa** there occur also one **Aa** and one **aA** —these two being two distinct combinatorial possibilities, yet equivalent in their genetic natures.

Mendel's Laws of Heredity: from Mendel's observations are derived the two Laws of Heredity which bears his name. *The First Law* states that there exist elemental particles, the *genes* (or "factors," as Mendel termed them), i.e., independent entities, whose integrities are preserved at all times. During a stage in the maturation of either a male or female cell and at a stage in the sexual conjunction of a male and female cell, there is a temporary pairing of two genes for each of the resultant organism's various characteristics. After the pairing, there is a separation; and, whether *dominance* or *recessiveness* occurs, each particle (gene) emerges unchanged. There is no blending or dilution of a gene resulting from its momentary pairing with another; and the particular resultant characteristic is completely determined by only one of the pair, thus *parental* characteristics (both *dominant* and *recessive* strains) are transmitted unchanged from generation to generation.
The Second Law, The Law of Independent Assortment, states that each of the many gene pairs, the sum of which constitute the full complement in the determination of the various characteristics of the organism, shuffle and separate independently of each and every other gene pair. This then provides for the wholly new combination of characteristic determining genes passing from each parent to each offspring and allows for a great number of variations in an organism's total form, limited, of course, by the mathematical combinatorial possibilities.

Of the mechanics of *genes, chromosomes, zygots, gamates:* The *genes* are the basic information carrying bodies which determine the characteristics of an organism —cell, plant, animal. There are always two *genes* present for each characteristic, whether in the passive state or in one of the two pairing cycles. A full complement of *chromosomes* are in dual sets, each set carrying one *gene* for each characteristic. As a sexual cell, either male sperm/pollen or female egg, matures, the various characteristic determining dual sets of *genes* pair in *zygots,* temporary cells where *gene-pairs* cooperate and then separate. A full set of *genes,* encased in their respective *chromosomes,* are then collected (in one of numerable combinatorial possibilities) into a *gamate.* Every male and female cell carry two *gamates* each; on fertilization, one of the male *gamates* couples with one of the female *gamates,* after which there is a new pairing and separation, allowing new possible combinatorial variations. Of the other male and female *gamates,* both remain unmated and are consequently discarded—wherefore, their particular characteristics are not transmitted to offspring (allowing, amongst other possibilities, offspring of *hybrids* to revert to "pure" strains).

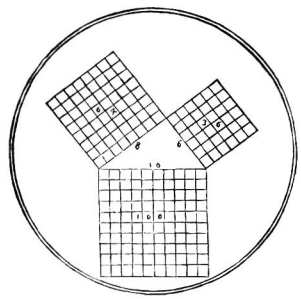
Page 5.14 *illustrations*
Side elevation (redrawn) of an 18th dynasty Egyptian shrine drawn on papyrus over a square grid: it is conjectured that the grid was not established as a drafting aid but as a modular layout, so that the stones could be prefabricated in any sequence and later assembled rather than having to be dressed in place.
from Somers Clarke and R. Engelbach, *Ancient Egyptian Masonry (The Building Craft)* (London: Oxford University Press, 1930) p. 47, fig. 48.

Plan of the Vigo Sundt house (project, Madison, Wisconsin, 1941) by F. Ll. Wright, laid out on hexagonal modules: Note the confining 60° angles as well as the open 120° ones.
from Frank Lloyd Wright, *An American Architecture,* ed. Edgar Kaufmann (New York: Horizon, 1955) p. 212.

Page 5.14 *notes*
Charles Robert Darwin, 1809-1882
b. Shrewsbury, Shropshire,
d. Down, Kent.
the most wonderful of known instincts . . .: (Darwin, quoted in) D'Arcy Wentworth Thompson, *On Growth and Form* (Cambridge: University Press, 1959) Vol. II, p. 537.

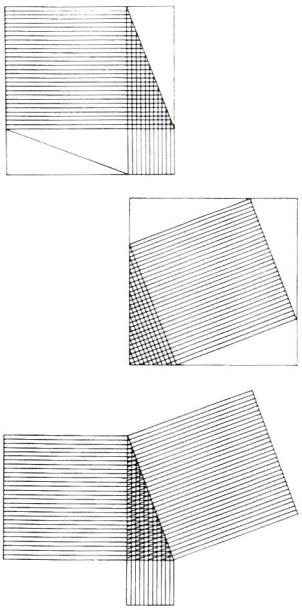
Frank Lloyd Wright, 1869-1959,
b. Richland Center, Wisconsin,
d. Phoenix, Arizona.

The right angle: The incredible trueness of the construction of the Pyramids indicates a powerful grasp of fundamental geometric principles. The Egyptians employed geometry more practically in laying out (mensurating) quadrangles of land of equal sizes, as told by Herodotus. Their surveyors (called *rope stretchers)* are known to have used ropes for swinging arcs, marking off equal spacings, and for determining right angles through forming triangles from lengths of 3, 4, and 5 units—methods employed at least as late as the great cathedral builders of the Gothic era. The precision of the Pyramids, with its perfectly square base and terminating hundreds of feet aloft in a point, would indicate that the Egyptians knew this triangle to produce no mere approximation of the right angle. (The Mayans realized no such virtuosity.) *see* James R. Newman, *The World of Mathematics,* pp. 79-80.



A 6, 8, 10 triangle.
from Ioanne Paulo Gallucio (Giovanni Paolo Gallucci, 1538-1621?). *Theatrum Mundi, et Temporis . . .* (Venice: I. B. Somascum, 1588) p. 49.

The Pythagorean Theorem: Since Pythagoras did not manipulate irrational numbers algebraically and since the above Renaissance demonstration deals with that neat triangle belonging to the 3, 4, 5, family, it is suggested that his Theorem was derived by such a geometric device as of the figures below.
redrawn from Herbert Western Turnbull, "The Great Mathematicians"; James R. Newman, *The World of Mathematics* (New York: Simon and Schuster, 1956) Vol. 1, p. 84.

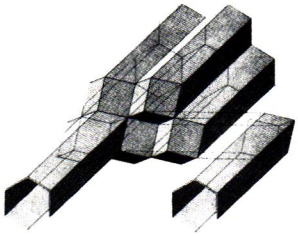


I am convinced . . .: Frank Lloyd Wright, "The Hexagon Unit," *Architectural Forum* (New York: January, 1938) p. 68.

Page 5.15 *illustrations*
Honeybees, demonstrating the *to and fro flexibility of movement* in their hexagonal cells!
photograph by James Papariello of a large scale model in Carnegie Museum, Pittsburgh.

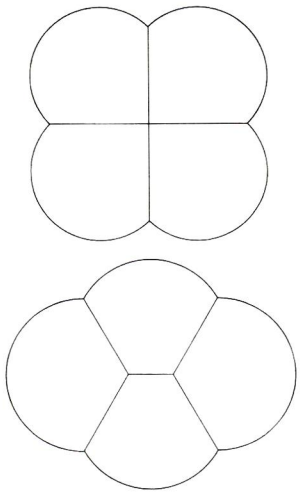
Suds in a bottle, showing that configurations of polygons transform on the glass surface from greater- and from lesser-sided figures into six-sided ones. All vertices are three-way (i.e., each is constituted of three 120° angles); four-way vertices (four 90° angles) are not stable.
photograph by James Papariello.

Page 5.15 *notes*
The geometry of the honeycomb: *see* D'Arcy Wentworth Thompson, "Of the Bee's Cell," *On Growth and Form*, Vol. II, pp. 525-544.



A diagram of the cell arrangement of the honeycomb, showing the hexagonal openings and the rhombic dodecahedral geometry where cells meet back to back.
redrawn after: Heinrich Vogt, *Geometrie und Okonomie der Bienenzelle* (New York, G. E. Stechert & Co., 1911) fig. 3.

Despite Kepler's discovery, Maraldi has the credit for ascertaining the shape of the rhombs at the base of the honeycomb cell. Furthermore, Maraldi calculated the ideal angles of the rhombic dodecahedron as 70° 32′ and 109° 28′. The latter angle, more precisely identified as 109° 28′ 16″, found also in the four-dimensional pentahedroid (a regular tetrahedron with a fifth grouping of coinciding verticles at its center), is consequently known as the "Maraldi angle." *See* D'Arcy Wentworth Thompson, "Of Tetrahedron Symmetry," *On Growth and Form*, Vol. II, pp. 497-498.



"When we have four bubbles meeting in a plane, they would seem capable of arrangement in two symmetrical ways: either (a) with four partition-walls intersecting at right angles or (b) with five partitions meeting, three and three, at angles of 120°. Now, though both of these figures might seem, from their apparent symmetry, to be figures of equilibrium, yet in point of fact the latter turns out to be stable and the former of unstable equilibrium. If we try to bring four bubbles into the form (a), that endures for an instant; the partitions glide upon one another, an intermediate wall springs into existence, and the system assumes the form (b), with its two triple instead of one quadruple, conjunction".
redrawn after and quoted from: D'Arcy Wentworth Thompson, "Of Clustered Bubbles," *On Growth and Form* (Cambridge: University Press, 1959) Vol. II, pp. 483-486.

Page 5.16 *illustrations*
top row left: Cross section of the hip joint of a horse.
photograph by Andreas Feininger.
top row center: Cross section of a chambered Nautilus.
photograph by Andreas Feininger.
top row right: Cross section of a root bud of an iris (magnified 75 times).
from C. Postma, *Plant Marvels in Miniature* (New York: John Day, 1960-61) plate 75.

bottom row left: Eye lenses of a fire fly.
photograph by Biophysical Research Laboratories, Carnegie-Mellon University, Pittsburgh.

bottom row center: Cross section of a leaf bud of an ash (magnified 30 times).
from C. Postma, *Plant Marvels in Miniature* (New York: John Day, 1960-61) plate 41.

bottom row right: Cross section of a leaf bud of a spruce (magnified 30 times).
from C. Postma, ibid., plate 43.

Page 5.16 *notes*
Cell and tissue . . .: D'Arcy Wentworth Thompson, *On Growth and Form* (Cambridge: University Press, 1959) Vol. I, p. 10.

God always geometrizes: Quoted by Plutarch as a traditional saying of Plato, but not found in Plato's work: "Shall we enquire upon what account Plato says (supposing it to be his saying) that God always plays the part of the geometer? I said that this sentence was not plainly set down in any of his books yet there are good arguments that it is his, and it is very much like his expression." *Plutarch's Lives and Writings, Essays and Miscellanies*, ed. A. H. Clough and William W. Goodwin (Boston and New York: Little, Brown & Co., 1909) Vol. III, p. 402.

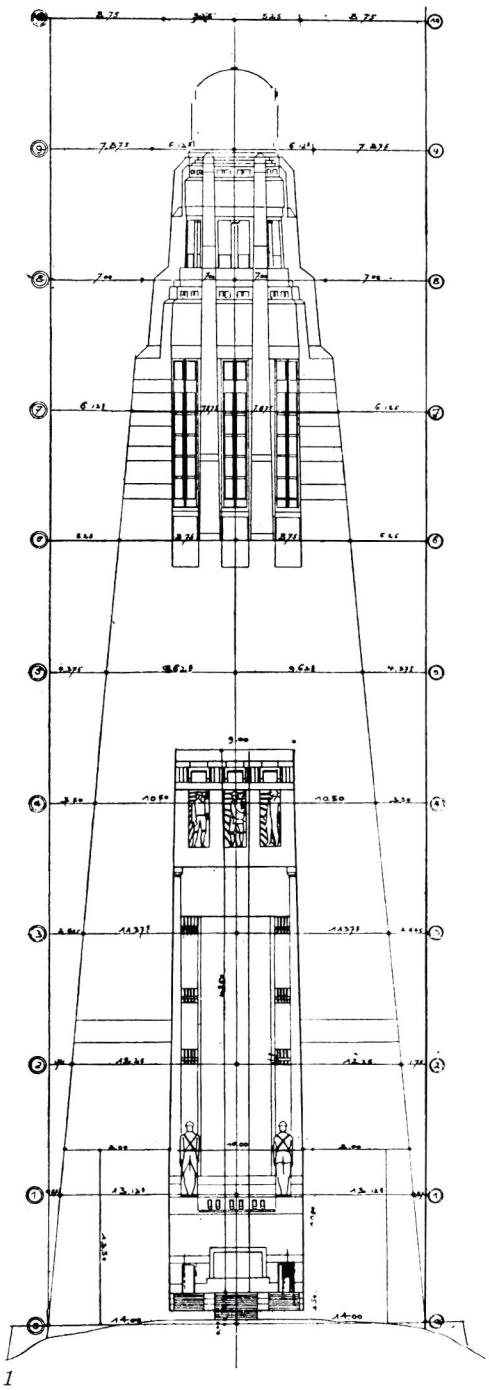
Reviews and Forum

L'Architecture Vivante Revisited

L'Architecture Vivante (1923–1933), Jean Badovici, ed. 1975, New York, N.Y., Da Capo Press, Inc. and London, England, Trewin Copplestone Publishing Ltd. 21 issues in 5 vols., 885 pp. (text), over 1,300 illustrations inc. 31 color plates, $595.00.

Kenneth Frampton

Kenneth Frampton is a Fellow of The Institute for Architecture and Urban Studies, New York, and an Associate Professor at Columbia University, New York.



1

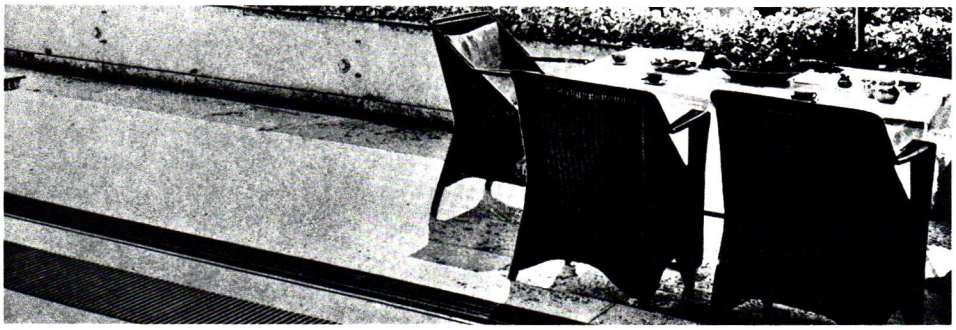
Edited by Jean Badovici and published by Albert Morance, *L'Architecture Vivante* had the virtue of existing as an avant-garde publication for exactly a decade, from the aftermath of World War I and the Belle Epoque to the advent of the Third Reich.

Created in 1923, apparently as a platform for that which Henry-Russell Hitchcock identified some six years later as the New Tradition, *L'Architecture Vivante* came into existence with the evident blessing of Auguste Perret who wrote a dedicatory text for the first issue, an aphoristic piece from which the title itself seems to have been derived. "Living architecture," he wrote, "is that which faithfully expresses its time. We shall seek it in all fields of construction. We shall select those works which, strictly determined by use and the judicious application of material, attain beauty by virtue of their organization and the harmonious proportion of the necessary elements from which they are composed."

After acknowledging the final exhaustion of the culture of the Salon, Albert Morance, in his preface of 1923, went on to recognize the implacable forces that had been released by the urban concentrations of the nineteenth century. Fully aware of the cultural hiatus that had been introduced by the advent of mass society, yet remaining opposed to the reactionary rhetoric of a *pompier* Beaux-Arts, Morance, together with Perret and the Rumanian emigré Badovici, still hoped, as a progressive publisher, to advance the frontier of culture within the rationality of Western classicism.

The contents of the first issue, Automne/Hiver, 1923, reveal in retrospect the crypto-classical point of departure from which Badovici developed his ideological front. As with Le Corbusier, whose book *Vers Une Architecture* appeared in the same year, Badovici took a line that in the beginning at least was skeptically weighted in favor of a reinterpreted classicism. If this was not explicit in his incidental celebration of Adolf Loos's arrival in Paris through his publishing of a new version of Loos's still prophetic essay *Architektur* of 1910—under the title *L'Architecture et Le Style Moderne*—then it was certainly clear from the works documented in the first issue. Herein, despite the Gothic references, a sense of classical *ordonnance* pervaded to an equal degree Perret's Notre Dame du Raincy and Henri Sauvage's setback block for the Rue Des Amiraux. And although we may now dismiss the inclusion of a ponderous interior by Ruhlman or a monument designed by André Ventre and Albert Bartholomé to commemorate the American landing in France in 1917 (fig. 1) as nothing but the confusions of a disoriented bourgeois taste, we must nonetheless still recognize as fundamentally classic Loos's house projected for the Venice Lido or Le Corbusier's much more polemical but nonetheless classic villa then nearing completion at Vaucresson. At the same time, like the authors of *Vers Une Architecture* (Le Corbusier and Ozenfant), Badovici was well aware that architecture could only maintain or even regain its authority by becoming integrated with the technical capacity of its epoch. This insight led Badovici to admire the achievements of American engineering and to celebrate in the pages of this journal the perfection of the Hennebique system, which had already distinguished the reinforced concrete work of Perret and Perret Frères for more than a decade.

Despite Badovici's admiration for the French mastery over *beton armé*—that is to say, for the rationalist works of Perret and Tony Garnier and above all for the advanced pre-cast concrete structures of the engineer Eugène Freyssinet—he seems to have sensed instinctively that an adequate architectural language, appropriate to the emotional and universal tenor of the age, could no more be found within the achievements of a single country than it could be contained within the theory and practice of *les grands constructeurs*.

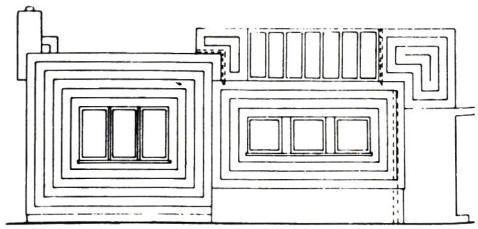


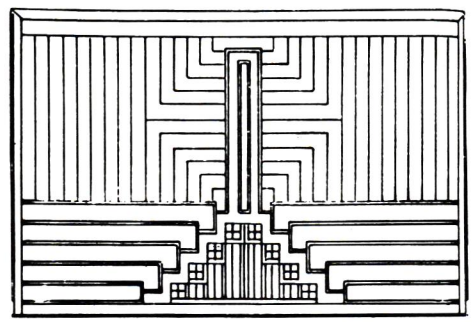
2

By the next issue in the summer of 1924 Badovici's net had already been cast outside France to publish, in the same company as the French masters, a number of obscure and even cryptic works from Holland: the early, slightly theosophical work of J. J. P. Oud (fig. 3) and a relatively unknown piece by Cor Van Eesteren and Theo Van Doesburg—an early Neo-Plastic project for a small house in Alblasserdam. Obviously the De Stijl exhibition of 1923, staged at Léonce Rosenberg's Parisian gallery L'Effort Moderne, had drawn Badovici's attention to the possibilities latent therein for the development of a universal formal language capable of transcending not only the limited vocabulary of rational classicism but also the self-indulgent legacy of Art Nouveau. It was this no doubt that led him to feature the work of Rob Mallet-Stevens and Fernand Léger at this juncture, for no other artists in France could even come close to achieving a cultural language as comprehensive as De Stijl.

The winter issue of 1924 was to reflect again Badovici's growing interest in Holland, and this number stands today as a witness to his position on the eve of the influential and nationalistic Exposition des Arts Decoratifs. For, besides carrying the first version of Léger's essay on the use of color in architecture, his "Architecture Polychrome," and publishing alongside further examples of French rationalism, together with interiors by Eileen Gray and the De Stijl artist Vilmos Huzar, Badovici also featured a number of buildings from Holland: a major piece by H. P. Berlage from 1904 and recent works by the young Amsterdam architects Bernard Bijvoet and Johannes Duiker. Today, the most surprising aspect of this volume is surely the omission of any reference to Loos, who was extremely active in Paris at the time. Equally inexplicable was the sudden inclusion of Bruno Taut for his expressionistic and prophetic sports hall that had been built in Magdeburg some two years before, in anticipation of the mature work of Hans Scharoun. Some notice needs also to be taken of the fact that while Frank Lloyd Wright's work now appeared in *L'Architecture Vivante* for the first time, his achievement to date was hardly adequately represented by two works drawn directly from the famous Wasmuth volumes of 1910–1911. And while Wright was the undeniable influence behind most of the Dutch work, Badovici postponed any serious presentation of Wright until the summer of 1930 when, presumably out of a need to balance his extensive coverage of Le Corbusier, he published a survey of Wright's work up to 1924. Even then only the Sugar Loaf Mountain planetarium of that year (a slightly earlier and different version from that published by Wright himself in 1955) gave any indication as to the richness of Wright's second career.

1925, the moment of Art Deco, was, for obvious reasons, a critical year and was to represent for *L'Architecture Vivante* a point of no return. For all the continuing influence not to say patronage of Perret evident in the regular coverage of his work, Badovici became increasingly interested in Holland and divided a considerable part of his editorial attention between the formal speculations of De Stijl—devoting to these the winter issue of 1925—and an extensive reportage on the housing achieved by Oud in Rotterdam. The Art Deco exhibition itself, an imaginative if indulgent triumph for such architects as Pierre Partout, André Ventre, and even such progressive figures as Henri Sauvage, was summarily dismissed by Badovici with understandable bitterness. "One is astonished," he wrote, "that this exhibition which could have been a great artistic demonstration has revealed such weaknesses; we were expecting the emergence of a powerful vitality and saw a very small number of major works drowned under a flood of repetitions and banalities; we were hoping for a spiritual unity and saw a jumble of excessively pretty and disparate works; we were expecting a renewal and we witnessed a display of mediocre survivals from the past." Given the crassly ide-



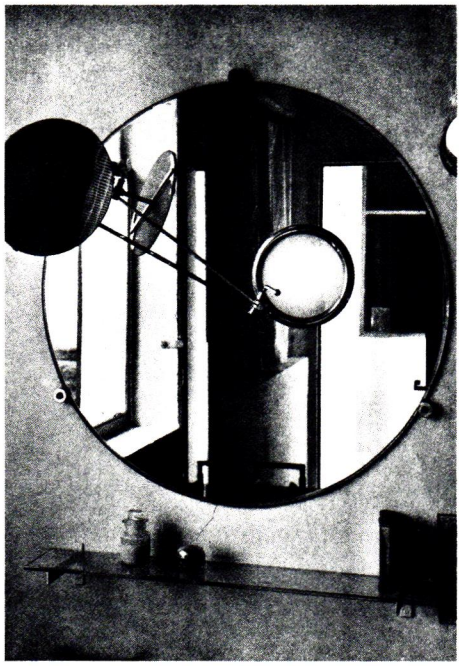


3

1 Monument de la Pointe de Grave, project. Albert Bartholomé and André Ventre, architects, 1923.

2 Erich Mendelsohn's house, Rupenhorn, near Berlin. Erich Mendelsohn, architect, 1930.

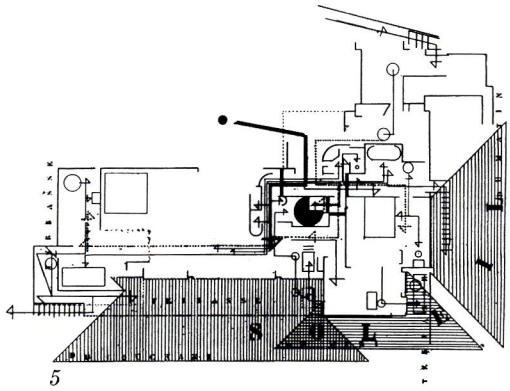
3 Temporary builder's hut, project. J. J. P. Oud, architect, 1923.



4

4, 5 House at Cap Martin, Roquebrune. Eileen Gray and Jean Badovici, architects, 1926–1929.

6 Weir at Taliesin, Wisconsin. Frank Lloyd Wright, architect, 1911.



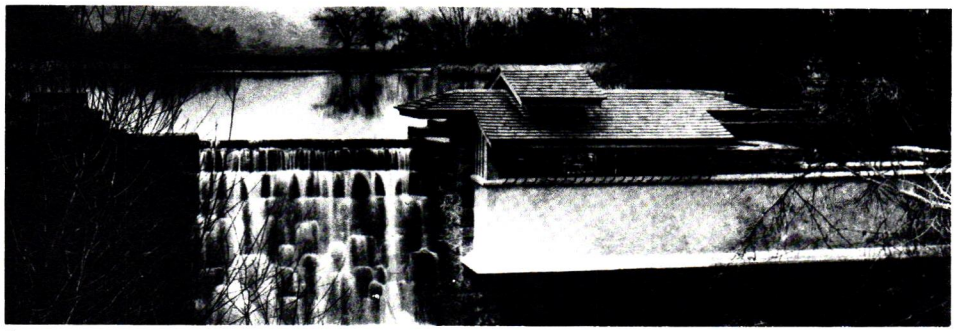
5

ological not to say nationalistic orientation of the whole exhibition (it had originally been planned for 1915 in answer to the Cologne Werkbund—Austellung—of the previous year), it seems that Badovici could not condone the treatment that both Perret and Le Corbusier had received at the hands of the authorities, from the inaccessible siting of their respective works to the manner in which they were excluded from the final awards. Badovici's implicit rejection of the exhibition is evident in his dedication of the whole of the immediate post-exhibition issue to the Dutch De Stijl movement, including a French version of Van Doesburg's "16 Points of a New Plastic Architecture" that had first appeared in 1924. Somewhat uncharacteristically, Badovici was also to publish a sampling of Henri Van de Velde's works and writings, presumably in an effort to put to shame the Belgian government for their perversely patriotic rejection of this important Belgian designer. (Van de Velde had been in Germany from 1899 up to the outbreak of World War I. Exiled to Switzerland during the war, he was more or less ostracized in his own country on his return.)

The 1925 exhibition was of course a *succès d'estime* for Kasimir Melnikov, the designer of the official Soviet pavilion, and experimental Russian work begins to appear in the pages of *L'Architecture Vivante* from this point on. Badovici indulged in his first coverage of Russian constructivist work in the summer of 1926, publishing some thirteen plates which in the main were devoted to recent student projects executed in the Vchutemas under N. A. Ladovsky. In a brief editorial, Badovici expressed a certain doubt as to the present status and future of these works. He wrote, "We see that a certain formula has been found and not a style, and although a formula can help to discover a style, it is not the style itself." And later, "despite all the profound sensuality that is here directly translated into the strictest intellectual speculations of the Russian spirit, it seems that Russian *constructeurs* today have sought and attained a sort of excessively scientific objectivity, a calculated coldness wherein the spirit of the people can neither know nor recognize itself."

Whatever Badovici's reservations, three particular lines of development were to preoccupy him after the autumn of 1927: first, the rapidly evolving work of Le Corbusier and Pierre Jeanneret, whose entry to the League of Nations competition was extensively documented in *L'Architecture Vivante* at this time; second, the remarkable housing production of the Weimar Republic; and last but not least, the constructivist work in the Soviet Union. Except for a documentation of the remarkably sensitive Gray and Badovici house built at Roquebrune (figs. 4, 5) and issues devoted to Wright and Freyssinet respectively in 1930 and 1931, the whole of the next four years was to be given over to these three themes, of which the documentation of the Russian work was probably the most important and remarkable. It is true to say that much of Russian constructivist architecture would have been lost to the West had it not been for *L'Architecture Vivante*.

In a review of limited length it is impossible to cover all the vicissitudes of Badovici's perception during a decade, for aside from the gradually changing editorial line, replete with critical texts, his written contributions alone amount to some thirty-five essays, of which a number contain arguments of considerable subtlety. Nor is it feasible to give anything more than the barest outline of a documentation of such diversity and density, where even after considerable familiarity, the whole remains something of a labyrinth whose complexity always seems to contain yet one more illuminating piece which one will have never noticed before and which, in all probability, will be available nowhere else. A random sampling of such pieces will provide the uninitiated with an indication as to the extraordinary repository of significant work that still lies buried in the pages of *L'Architecture Vivante*. Where else, for



6

example, can one find Gocar's Czechoslovakian pavilion for the 1925 exhibition or the complete drawings for Van Doesburg's house at Meudon; where else the highly revealing photographs of the villas at Garches and Poissy under construction or, say, explicit evidence as to the immediate influence of Rietveld on the Russian avant-garde? And when on those rare occasions Badovici's documentation extends outside Europe, one finds pieces which from the point of view of their general availability would otherwise be lost—works such as Wright's Los Angeles theater project of 1914 (unlisted by Russell Hitchcock in his definitive chronology of 1942), or the hitherto largely ignored weir structure (fig. 6) built at Taliesin in 1911, which clearly anticipates thematically Wright's Falling Water—one cannot conclude this appreciative list without noting that until recent date *L'Architecture Vivante* was the only comprehensive record of Russian constructivist work. Similarly, by virtue of consistently documenting the salient details of all the major works illustrated, *L'Architecture Vivante* now affords the only accessible record of technical solutions which would otherwise be lost or at best incarcerated in some unknown archive. How can one have anything but admiration for a document where one is brought to recognize that the vaulted construction of Le Corbusier's *maison de weekend* of 1935 was derived, in its specific detail, from a Perret project for Grand-Quevilly of 1922? Immune to the demoralizing confusions of our own age by his suspension in that hopeful period *entre les deux guerres*, Badovici could still subscribe to a culture of architecture in a profound sense; that is to say, to a body of collective experience, capable of being consistently developed as a continuous but changing line of evolution from one designer to the next.

It may be objected that to return to such a culture at this moment is to indulge in an act of irrelevant pedantry; or that to produce a facsimile of a journal that closed over forty years ago is a gesture that is only of academic interest; or to pay, as I have, not only homage to Badovici, but also by implication to the Modern Movement in which he played so vital a part, has all the flavor of being *retardataire* at a time when the simplistic rejection of our immediate heritage has come to be the general response to the populist pressure to which we are subject. And while the much criticized Modern Movement—a term which in itself is imprecise—should quite rightly give us pause, the fact remains that Alvar Aalto's Paimio Sanatorium in Finland (illustrated in the Autumn issue of 1933), to cite the last major work to be published by Badovici, stands today both as a reality and as a model of culture from which we have surely degenerated.

Against such an assertion, the populist critic will find it an easy matter to prove that the people have rejected modern architecture, but is it modern architecture they have rejected or its gradual degeneration at the hands of architects, builders, and bureaucrats who, abandoning both their heritage and their social roots, have opted to satisfy as directly as possible the economic imperatives of admass demand? The environmental degradations of recent years could no doubt have been inflicted without the aid of so-called modern architecture, but not, I would argue, of an architecture comparable, say, to the sensitivity of the Siedlung Neubuhl, completed outside Zurich as the penultimate issue of *L'Architecture Vivante* was going to press. Instead of a living architecture we are now urged to return to the vernacular, to that which, as Loos explained in the first issue of *L'Architecture Vivante*, we no longer have access. As he was to put it in his essay of 1910, "like almost every town dweller, the architect possesses no culture. He does not have the security of the peasant to whom this culture is innate. The town dweller is an upstart."

Badovici, like Loos, was just such an upstart, and his answer to this cultural predicament, made with Eileen Gray in their house (see figs. 4, 5) realized at Cap Martin between 1926 and 1929, remains an object lesson. For herein every changing human need and mood found itself beautifully accommodated in a delicate and articulate whole, which was inflected according to the seasons, a work whose articulated interior was both rich and lyrical. To persist, in the face of this and comparable achievements, in referring to the impoverishments of modern architecture is to reject, in my view without sufficient cause, the movement that was the mainspring of Badovici's life.

Figure Credits
1 Reprinted from *L'Architecture Vivante*, Winter 1932, pl. 26.
2 Reprinted from *L'Architecture Vivante*, Autumn 1923, pl. 15.
3 Reprinted from *L'Architecture Vivante*, Spring 1924, pl. 37.
4, 5 Reprinted from *L'Architecture Vivante*, Autumn and Winter 1929, p. 23 and pl. 45.
6 Reprinted from *L'Architecture Vivante*, Summer 1930, pl. 11.

1 Mario Gandelsonas, Rosalind Krauss, Anthony Vidler, and Michael Graves.

2 John Hejduk and Raimund Abraham.

Forum/Drawing It Out

William Ellis

William Ellis is an Associate Professor of Architecture at City College of New York, an Adjunct Professor at The Cooper Union, New York, and a Fellow of The Institute for Architecture and Urban Studies.

1

2

Drawing and architecture have virtually always lived inside each other's skins. It is not really news that from time to time drawing can replace building as the activity and product of architecture or that recently we have come into one of those periods. A number of galleries have begun hot trading in architectural drawings as art objects, whether or not those drawings are intended to lead to pieces of architecture. In the past year, four exhibitions have hung in the Cooper-Hewitt Museum, The Drawing Center, and the Leo Castelli gallery downtown; thus the subject of the latest *Oppositions*' Forum, "Drawing versus Idea: The Recent Exhibitions."

The exhibitions had suggested a number of reciprocal connections between drawing and architecture, from drawing as instrument, to drawing as ultimate icon, to drawing as the architectural object itself. The Forum expected to witness elaborations of these conflicting points of view. It was not altogether disappointed.

Anthony Vidler moderated a panel consisting of Raimund Abraham, Michael Graves, John Hejduk, Rosalind Krauss, Massimo Scolari, and Robert Slutzky. John Hejduk was able to suggest a number of not necessarily consistent, but nonetheless ineffable propositions, leaving the impression of polemical statement and providing at the same time an entertaining performance for almost everyone. It seems his *Readers' Digest Dictionary* has confronted the verb "draw." He superimposed its defininitional examples over the subject to form a series of comic, serendipitous metaphors that were suggestive rather than directly enlightening, but somehow proper as a treatment of the subject. It is, after all, quite a word.

The allusive erudition produced by this device drew a variety of responses from those assembled, from self-congratulatory snickers to uncomfortable guffaws, all of us struggling to grasp a little delight where we imagined to perceive it.

3 Diana Agrest, Leon Krier, and Rodolfo Machado.

4 Massimo Vignelli, Abigail Moseley, and Alexander Kouzmanoff.

5 Gerrit Oorthuys and Massimo Scolari.

6 Arata Isozaki and James Rossant.

7 Massimo Scolari, Robert Slutzky, and John Hejduk.

8 The Forum.

3

4

5

6

7

8

Hejduk concluded, after "drawing a thought" on the blackboard, that the acts of talking, drawing, and building are all means of representing a thought. "And that is a means of re-presenting nothing." No one seemed willing to ask if that constituted in his mind the negative form of "presenting something."

Krauss, an art critic, found the re-appearance in some of the drawings of *the Cloud* as a motif to be the most significant departure. This motif she characterized as evocative and neurotic in drawing, lacking the architectonic properties to which Western art has always given priority. It suggests an opposition to architecture as a stable code; it tends to resurrect Surrealist material, especially where it combines with central point perspective; and it emanates solipsism—not only because it attempts to ignore collective "real" problems, but because it intends to speak only to one person at a time, that person being the artist himself, just as we speak to ourselves in dreams. She stopped short of suggesting, as she might well have done, the presence in these drawings of the escapism and confusion that might be expected to follow a period of high achievement. Her contribution was game, energetic, and provocative.

The issue of drawing as architecture creates a real dilemma, the terms of which were most clearly set out in the opposed positions of Raimund Abraham and Robert Slutzky. Abraham questioned the boundaries of architecture. He sees his work simply as architecture produced through drawings and models rather than through buildings. He "constructs" in these media because to his mind they provide grounds for architecture that reality often cannot. He reminded us that he was doing it long before it became fashionable.

Slutzky set up his position on a firm modernist base. He invoked Albers' terms, differentiating between presentational art and representational art. The presentational—in painting, the thing in and of itself—he characterized as the essence of modern art. Thus the implication that architecture, if it is to be the thing itself, cannot be a representation of itself. Thus architectural drawings must be the instruments that lead to real architecture. This modernist syllogism leads Slutzky to a none too fashionable but very strong "if God had meant us to live in drawings he would have made us paper dolls" position. In addition, he thinks most of the architectural drawings in the recent shows tend too much toward the representational, with strong ties to literary traditions as well as to those of architectural representation. These remarks bring to mind Pevsner's dismissal of that strain of nineteenth century architecture which retained only associational values, and within which examples were thus required to 'tell a story'.

Some of the semantic seaweed surrounding the concepts of architectural drawing was almost as arresting as Hejduk's definitions. To Scolari the recent drawings are a result of the equally recent problem of freedom from the rules of modernism; they are good because they act as a kind of architectural musing, but problematic in the pedagogical sense; it is difficult to transmit their value to students. Graves suggested that drawings are speculative fragments that contribute to larger speculations in other areas, including that of thought. He attempted to buttress this assertion with examples from the development of a recent project.

Slutzky and Abraham managed to continue to differ while jointly dismissing various aspects of Graves' presentation. Slutzky implied that Graves' building, like the drawings in these exhibitions and the phenomenon of "post-modernism," are in effect one and the same, and that they tend to suffer from the same malaise—too much draftsmanship and too little architectural thought.

For Abraham, Graves' idea of drawing as speculation was particularly objectionable. For him, drawing, like any other language, takes place as evidence of the end of speculation. He insisted that drawing is ideal architecture because the medium transcends matter. Slutzky insisted that transcending matter is not architecture; it is painting.

Scolari offered what seems to me the most promising and the least questionable observation about the recent architectural drawings, those by which we all understood a reference to neo-rationalism or something at least faintly Viennese; he sees them as a kind of architectural research, not outside architecture, yet not intended to be built; and that there is no longer a question of whether they are built, since now "anything" can be built. This last implication seems a needless and somewhat dubious rationalization for what otherwise appears a most agreeable description of the "New Draftsmanship."

My own attitudes incline me toward an acceptance of drawings as para-architecture or meta-architecture, but not as architecture.

It seems reasonable to suggest that Scolari's notion of "drawings as architectural research" is not totally dissimilar from the early modernists' notion of buildings as architectural research for a proposed future condition. They both allude to a future possibility that inevitably palls on the fact of its implementation. And in this sense, these drawings—and models—are merely the most recent attempt to design for the future—which is fine, except that this mode unfortunately has the disadvantage of avoiding the reality of the present. In fact, modern architecture has developed in segments that are recognizable principally as a return to a focus upon a "future condition."

Le Corbusier designed allusive fragments of an overall future condition, playing up their impact by contrasting them with their existing surroundings. More recently, Ar-

9 Leon Krier.

10 Julia Bloomfield, Massimo Vignelli, and Lella Vignelli.

11 Lauretta Vinciarelli and Barbara Jakobson.

12 Emilio Ambasz and Rafael Moneo.

13 The party following the Forum.

14 Joanna Alimanestianu and Michael Graves.

15 Raimund Abraham, Peter Eisenman, and Kenneth Frampton.

16 Emilio Ambasz, Susana Torre, and Deborah Nevins.

9

10

11

12

13

14

15

16

chigram managed to avoid designing for the present by employing only draftsmanship, and in a way began the present trend. Nowadays, it may be more difficult than it was in 1925 to find clients to build the drawings of a future. If this is so, it is probably fortunate for post-modernism for I see little in the built works of that alleged movement that implies significant alternatives to modernism.

The point is that modern architecture has always wished to pose significant alternatives for the future. As Colin Rowe once said, modern architecture sees itself at its highest level of operation as "the rational subversion of the status quo." Thus the self-image of modern architecture is distinctly un-classical, typically "modern" in its fluctuating dynamic, and typically post-Enlightenment in its forward focus.

As a result, modern architecture has always been more successful as graphic expectation than as built fact. It has always acted in ways that suggest it realizes this about itself. More than most architectures, it teeters back and forth between expectation and disappointment, suggesting that its mission is at least partly the avoidance of ultimate states and terminal conditions within its own historiography. This produces an established, already recognizable pattern that runs something like this: 1) expectation (recognizable break with, reaction against, or modification of the status quo, most often—especially recently—in graphic form); 2) implementation (disillusionment through the reduction of formerly assumed possibilities as allusion becomes fact); 3) *dénouement* (Mies, for current example); and 4) sentimental or elegiac revival (Koolhaas and Leonidov, for example—but, notably, through drawings, so as to be already again in the first phase expectation: building within the imagination; for the future, not the present; represented in drawings, not in themselves as buildings).

In short, the key to modern architectural

"satisfaction" often seems to lie in the extent to which the architecture is imagined rather than literally experienced.

These drawings and models are the latest realization of this sometimes disturbing paradox; but these observations do not suggest that architecture is an exercise in futility—even modern architecture. This cyclical aspect of architecture should be no more daunting a prospect than that of architecture conceived as some kind of perfected, ultimate proposition, and saying this is giving voice to an attitude that does in fact separate us from the earlier, more expectant period of modernism—whether we be "post" or not.

Just as architecture cannot be supposed mere building, so it cannot be imagined happily confined within painting or sculpture. Yet one cannot imagine architecture without the effort to turn itself into either pure painting or pure sculpture. Without this effort, architecture would revert to mere building, and the time honored difference between architecture and building that, despite certain early modern rhetoric, has always defined architecture would be meaningless; and the synthesis of building and art which has always made architecture unique would disappear. But given the necessity of this effort, one cannot imagine an architecture in which it would ever be literally successful, or would take place outside the parameters and jurisdiction of the built surroundings. In the last analysis architecture cannot reside whole on canvas, but neither can it do without those canvasses, or at least the kind and quality of thought that goes into the best of these drawings and models. They induce, they challenge, they direct, they inflect the course of current architecture. Physics envy has been replaced for the moment by pencil envy. But architecture, sponge-like and imitative, soaks up emanations and mimics models from outside itself, thriving by trying to enlarge boundaries that will not yield.

The Forum ended on a sour note. It occurs to this reviewer that the Institute once had touch football games. Now it has Forums. At times they seem to be very similar events. In both, the pain usually outstrips the actual injury. About this Forum, it is difficult to say.

Figure Credits
1–16 Photographs by Dorothy Alexander

Eric Dluhosch

Eric Dluhosch was born in Czechoslovakia. He received his B.Arch. from McGill University, 1960, his M.Arch. from Cornell University, 1965, and his Ph.D. from the University of California, Berkeley, 1973. He has taught at Ohio University (1965–1967), California State Polytechnic College (1967–1969), the University of California at Berkeley (1971–1973), Cornell University (1973–1975), and has been teaching at the Massachusetts Institute of Technology since 1975. He has lectured extensively and has worked in many architectural offices. His published works include: articles on industrialized building technology in AIA Journal, Systems Building News, Bauen + Wohnen (*Switzerland*), Element and Fertigbau (*Germany*), DMG Journal; *translation of El Lissitzky,* Russia, An Architecture for World Revolution (*The MIT Press, 1971*) *and Yuri Egorov,* The Architectural Planning of St. Petersburg (*Ohio University Press, 1969*). *He is currently working on a research agenda for housing in the Department of Architecture at M.I.T.*

Peter Eisenman

Peter Eisenman is an architect and Director of the Institute for Architecture and Urban Studies in New York City. He has taught at the University of Cambridge, Princeton University, and at present at the Cooper Union. In addition to a series of single family houses which he has designed and built, he has worked on several urban design and public housing projects. He was one of eleven architects who represented the United States at the 1976 Venice Biennale. Most recently he was awarded a Guggenheim Fellowship for a study of post-functionalism. Two of his books will appear later this year: Giuseppe Terragni *(The MIT Press); and* Houses of Cards *(Oxford University Press).*

Jacques Guillerme

Jacques Guillerme began his career as a biologist for the French Navy and taught toxicology at the Medical Faculty of Besançon. He was named Focillon Fellow at Yale University in 1959 and was a Guest Professor at the University of Montreal for three years. He is presently a researcher at the CNRS in Paris. He is the author of many studies in several fields, including the history of science, aesthetics, and the theory of architecture. His published works include "L'atelier du temps" in Thales, *a special issue on the "Commencements de la technologie," and he has recently edited an issue of* Revue du 18e siècle. *He is presently preparing the* catalogue raisonné *of the drawings of Lequeu (CORDA), a work on the history and theory of figuration, and an international exhibition on Lequeu.*

William S. Huff

William S. Huff was born in Pittsburgh, Pennsylvania, in 1927 and graduated from Yale University in 1952. He was awarded a Fulbright Fellowship in 1956 to the Hochschule für Gestaltung, Ulm, where he became a permanent guest teacher from 1963–1968. During 1958–1960 he worked in Louis I. Kahn's office in Philadelphia. From 1960–1966 he was also Assistant Professor of Architecture at Carnegie-Mellon University becoming Associate Professor during 1966–1972. He is presently Associate Professor, since 1974, at the State University of New York at Buffalo. His design projects include the G. A. Steiner Museum for Indian Baskets, Portersville, Pa., built in 1968. His written works include "The Hochschule für Gestaltung Ulm-Donau" (1957); "Richardson's Jail" (1958); "An Argument for Basic Design" (1965); "The Computer and Programmed Design: A Potential Tool for Teaching" (1967); "On the Syntactic Aspect of Design for Beginning Students" (1970); Symmetry: an Appreciation of Its Presence in Man's Consciousness. *Part 4, "Man's Conceptualization of the Universe" (1967); Part 6, "Man's Aesthetic Response/Man's Contemplation on Himself" (1970); Part 5, "Man's Observation of the Natural Environment" (1971); Part 2, "The Six Isomorphic Coverage Operations" (1975); Part 3, "The Seven Homeomorphic Coverage Operations" (1977). Part 6 and Part 4 were reprinted in* Oppositions 3 *and* Oppositions 6 *respectively.*

Philip Johnson

Philip Johnson was born in Cleveland, Ohio in 1906 and graduated from The Harvard School of Design in 1943. He worked as Director of the Department of Architecture at The Museum of Modern Art from 1930 to 1936, and 1946 to 1954, and is a member of the American Academy of Arts and Letters. His built works include: the Glass House, Connecticut (1949); the Munson Williams Proctor Institute in Utica, New York (1960); and the New York State Theater at Lincoln Center (with Richard Foster, 1964). With John Burgee he has designed the Art Museum of South Texas, Corpus Christi (1972), the I.D.S. Complex, Minneapolis (1973), Niagara Falls Convention Center (1974), Pennzoil Place (1976), General American Life Insurance Company (1977). His published works include International Style *(1932) with Henry-Russell Hitchcock,* Machine Art *(1934),* Mies van der Roe *(1947) and* Selected Writings by Philip Johnson, *Tokyo (1975).*

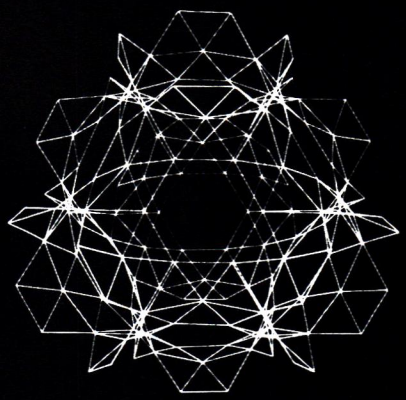
Robert A. M. Stern

Robert Stern was born in New York in 1939 and received his M.A. in architecture at Yale University in 1965. Since 1970 he has taught at Columbia University where he is now an Associate Professor of Architecture. He has been in private practice since 1969 (with John S. Hagmann 1969–1976) and his built work includes the Paul Henry Lang Residence, Washington, Connecticut (1973–1974), the Residence and Outbuildings, Westchester, New York (1974–1976), the New York Townhouse (1974–1975), and Jerome Green Hall at Columbia University (1977). In 1976 he was one of twelve architects invited to represent the United States at the Venice Biennale. His published works include New Directions in American Architecture *(1969, revised 1977),* George Howe: Toward a Modern Architecture *(1975). He is editor of* Philip Johnson: Writings *to be published in the fall, 1978. He is a former President of the Architectural League of New York and is a Director of the Society of Architectural Historians.*

Kestutis Paul Zygas

Kestutis Paul Zygas was born in Kaunas, Lithuania in 1942. He graduated in architecture at the Graduate School of Design, Harvard, in 1968 and is a Ph.D. candidate in architecture at Cornell University, Ithaca. His doctoral dissertation is entitled, "The Emergence of Constructivist Architecture: Ideas and Images to 1925." Zygas's interests are in the field of twentieth-century architectural history and current design theorists. He is currently teaching architectural history and theory at the School of Architecture of the University of Southern California.

Two much-anticipated books are now available



On Streets

based on a project of The Institute for Architecture and Urban Studies
edited by Stanford Anderson
$45.00

Contents

People in the Physical Environment:
The Urban Ecology of Streets
Stanford Anderson

Streets in the Past
The Street: The Use of Its History
Joseph Rykwert

The Scenes of the Street:
Transformations in Ideal and Reality, 1750–1871
Anthony Vidler

Structure of Streets
The Spatial Structure of Streets
William C. Ellis

Buildings and Streets:
Notes on Configuration and Use
Thomas L. Schumacher

Street Form and Use:
A Survey of Principal American Street Environments
Victor Caliandro

Streets as Channels
Toward an Evaluation of Transportation Potentials for the Urban Street
Peter Wolf

Street as Locus of Communication and Signification
The Street as a Communications Artifact
Thomas V. Czarnowski

Toward a Theory of Production of Sense in the Built Environment
Diana Agrest

The MIT Press

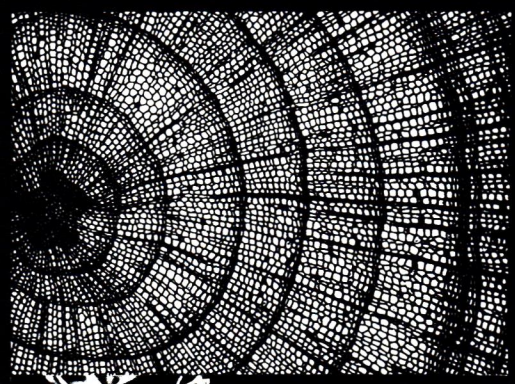
Massachusetts Institute of Technology
Cambridge, Massachusetts 02142

Structure in Nature Is a Strategy for Design

by Peter Pearce
$45.00

The structural designs that occur in nature—in molecules, in crystals, in living cells, in galaxies—are proper sources of inspiration, Peter Pearce affirms, for the design of man-made structures.

Nature at all levels builds responsive and adaptive structures that conserve material and energy resources through the use of modular components combined with least-energy structural strategies. This book—itself designed with graphic modularity and richly illustrated with examples of forms created by nature and by man, including some remarkable and surprising architectural structures developed by the author—leads the designer in this "natural" direction, beyond the familiar limitations of the right angle and the cube and into a



richer world of forms based on the triangle, the hexagon, and general polyhedra, as well as saddle polyhedra spanned by minimal continuous surfaces.

Pearce's work follows in the tradition established by D'Arcy Wentworth Thompson and Konrad Wachsmann, and reflects his earlier close working association with Charles Eames and Buckminster Fuller.

Pleine main j'ai reçu
pleine main je donne.

The Open Hand:
Essays on Le Corbusier
edited by Russell Walden
$25.00

"Because Le Corbusier is the most complex and enigmatic of the masters of modern architecture, this informative collection of 14 essays ranging across his entire career is most welcome. The subjects are organized into five parts dealing with his theory, his early Paris period, his concern with an urban utopia, his spirituality, and his work at Chandigarh. These include some fascinating inquiries into the sources of his ideas and his iconography, a few personal reminiscences, and some accounts of his dealings with clients. The material that attempts to shed light on Le Corbusier's thinking predominates and is excellent."—*Choice*

Among the contributors are Maxwell Fry, Jane Drew, Paul Turner, Mary Patricia May Sekler, Charles Jencks, Stanislaus von Moos, and Anthony Sutcliffe.

The Mathematics of the Ideal Villa and Other Essays
by Colin Rowe
$15.95

"The most brilliant essayist in the field of modern architecture is Colin Rowe, Professor of Architecture at Cornell University. His writings are passionately followed by a sizable number of people on both sides of the Atlantic and are a myth among many more architects and historians—a myth because a curious reticence on Rowe's part has kept many of his essays from wide circulation."—Stanford Anderson, Professor of Architecture, MIT

Charles Jencks wrote in *Modern Movements in Architecture* (1973): ". . . when Colin Rowe published his article 'The Mathematics of the Ideal Villa' in 1947, those who had been following the emergent Neo-Platonism were not surprised. Here was New Palladianism fully born right from the top of Corbusier's head."

The Modulor
by Le Corbusier
$5.95, paper

Modulor 2
by Le Corbusier
$7.95, paper

The City of Tomorrow
by Le Corbusier
$6.95, paper

Lived-in Architecture
Le Corbusier's Pessac Revisited
by Philippe Boudon
$5.95, hardcover

The MIT Press
Massachusetts
Institute of Technology
Cambridge,
Massachusetts 02142

L-C

Individual Sponsors

Michael S. Adams
Diana Agrest
Emilio Ambasz
Stanford Anderson
Lily Auchincloss
Edmund N. Bacon
George Baird
Richard A. Baiter
Edward Larrabee Barnes
Jonathan Barnett
Armand Bartos
Werner Blaser
Lawrence Booth
Robert F. Borg
Charles H. Brewer, Jr.
Lance Jay Brown
John Burgee
Duarte Cabral de Mello
Alan Chimacoff
Henry N. Cobb
Elaine Lustig Cohen
Stuart Cohen
William J. Conklin
Arthur Drexler
Anthony Eardley
Peter Eisenman
William Ellis
David Elwell
Michael M. Fieldman
Earl Flansburgh
Kurt W. Forster
Kenneth Frampton
Suzanne Frank
Ulrich Franzen
James Ingo Freed
Jonathan Friedman
Mario Gandelsonas
Robert Geddes
Frank O. Gehry
Romaldo Giurgola
Robert Golder
Michael Graves
Jordan Gruzen
Robert Gutman
Charles Gwathmey
John Hagmann
Frances Halsband
John Hejduk
Richard Henderson
Peter Hoppner
Franklin Israel
Arata Isozaki
Estelle Jackson
Barbara Jakobson
Philip Johnson
Robert Jones
Gerhard Kallmann
J. Michael Kirkland
R. M. Kliment
Alexander Kouzmanoff
Etel Thea Kramer
Theodore Liebman
Donlyn Lyndon
Rodolfo Machado
Andrew P. MacNair
Michael McCarthy
N. Michael McKinnell
Richard Meier
Carl Meinhardt
John C. C. Meunier
Henry Millon
Rafael Moneo
Charles Moore
Peter Papademetriou
Anthony Pergola
G. Daniel Perry
Steven K. Peterson
James Polshek
Stephen Potters
Louis R. Pounders
Jaquelin Robertson
James Rossant
Colin Rowe
Paul Rudolph
Peter Samton
Pieter Sanders
Denise Scott-Brown
Sean West Sculley
Vincent Scully
Werner Seligmann
Robert Siegel
Jorge Silvetti
Carla Skodinski
Robert Slutzky
Jerzy Soltan
Bernard P. Spring
Frank Stanton
Robert A. M. Stern
Friedrich St. Florian
Peter Szilagyi
Frederieke S. Taylor
Stanley Tigerman
Robert H. Timme
Susana Torre
O. Matthias Ungers
Robert Venturi
Anthony Vidler
Massimo Vignelli
Lauretta Vinciarelli
Ralph Warburton
Benjamin H. Weese
Richard Weinstein
Tod Williams
Peter Wolf
Timothy Wood
Michael Wurmfeld