

MODULOR 2

1955

(LET THE USER SPEAK NEXT)

Continuation of 'The Modulor' 1948

by

LE CORBUSIER

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Translated by

PETER DE FRANCIA

and

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and later in a 'monk' of the Mondrian type (for thirty years of his life) a power of hearing which represented a peak, not only of sensitiveness and concentration, but of will, of the spirit of clarity, the spirit of precision, those sole effective supports of poetry whose genius is to deploy the most exalted resources of the mind.

When we speak of Mondrian, for example, we note a striving after purity which was, as it were, his natural self-defence in this age of material chaos, the inevitable price of technical progress.

On solid ground once again, the problem oscillates in the boundless space contained in the word 'art', which means 'manner of doing': that vast panorama stretching from the material to the spiritual, a rainbow with both feet on the ground, achieving an ineffable miracle in the sky before our very eyes. It leads us on to a word which comes from the very essence of civilization, a word which can contain our desire: 'symmetry', expressing a limitless relationship between two terms, each raised above all vulgar acceptance, both placed, one in relation to the other, in positions that are unforeseeable, unexpected, astonishing, stupefying, enchanting: poetry.

* * *

Interferences.

Observe: here are plates showing the weave of three specimens of 'Zip-a-tone' superposed and thus furnishing patterns of the nature of waves, certainly of mathematical origin. I am neither a mathematician nor a mathematician and so I cannot supply the explanation; I must confine myself to observing the phenomenon.

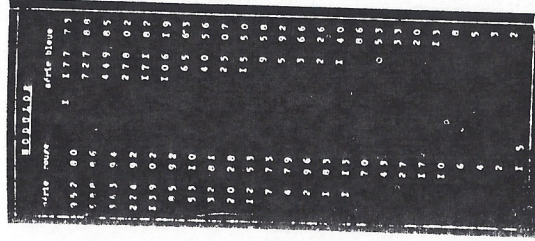


Fig. 56

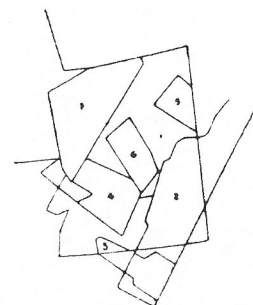
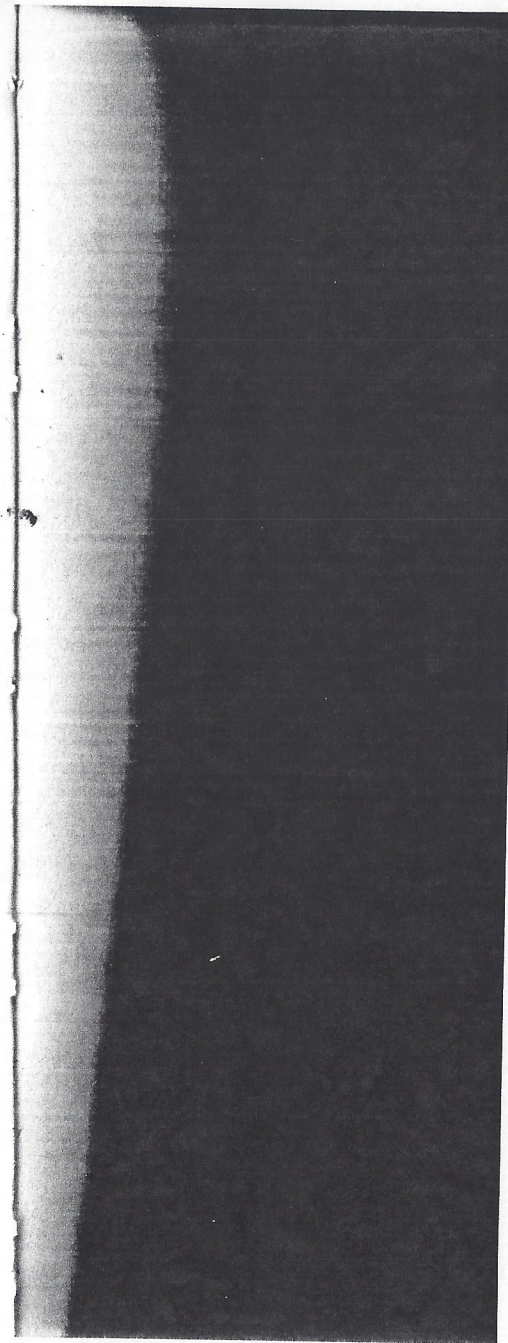


FIG. 57



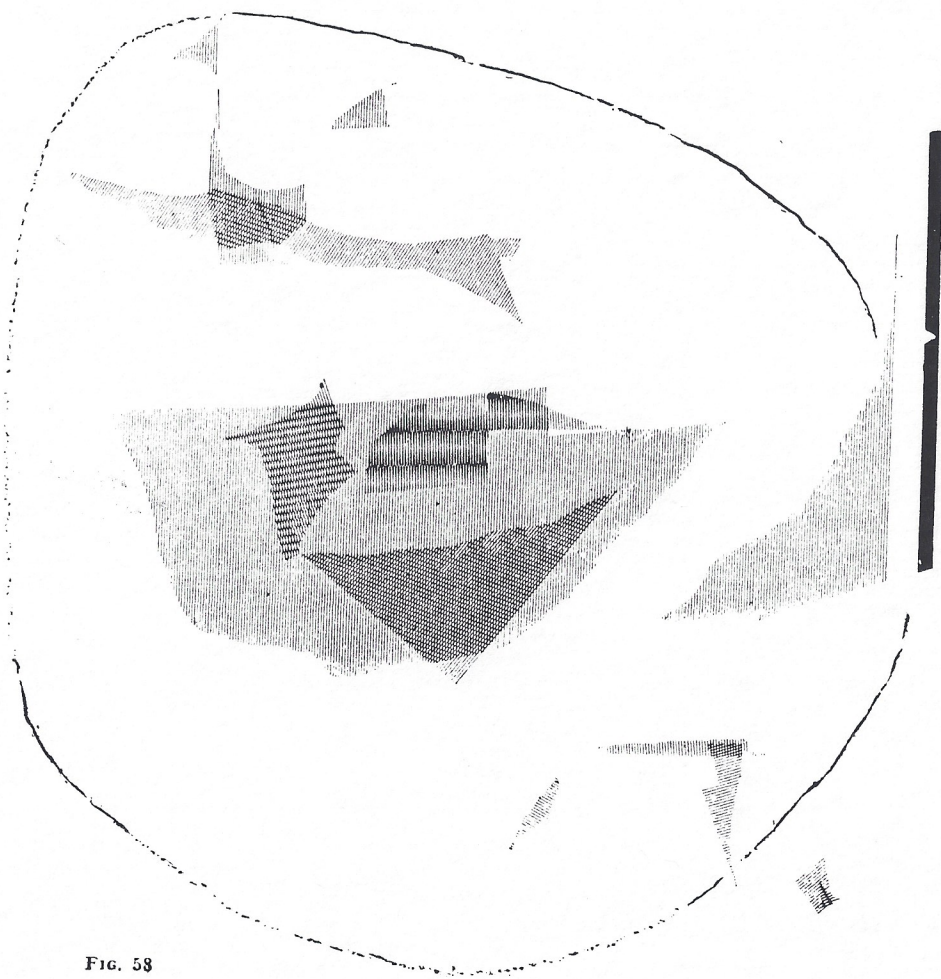


FIG. 58

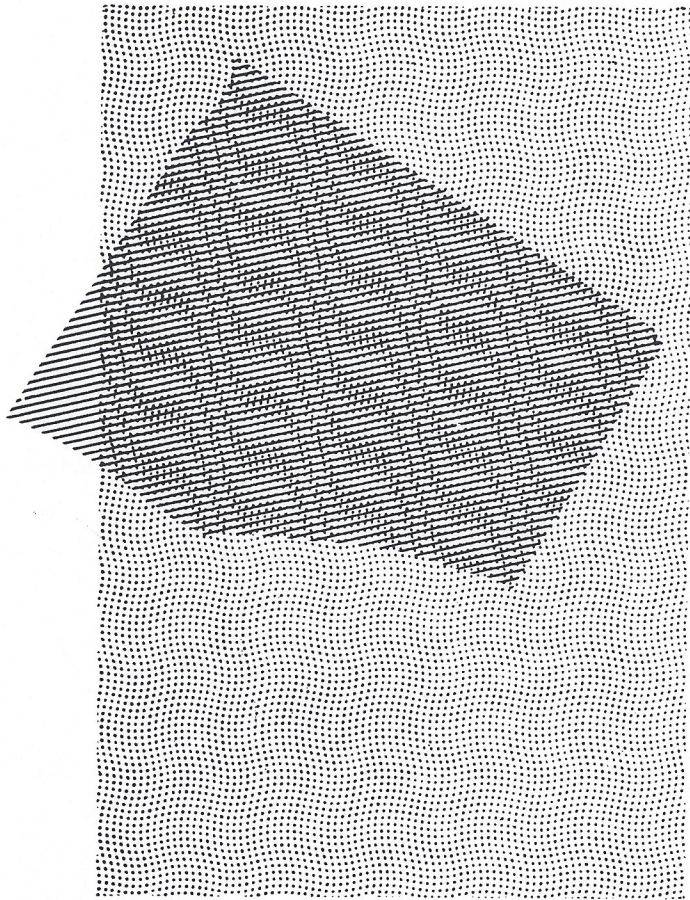
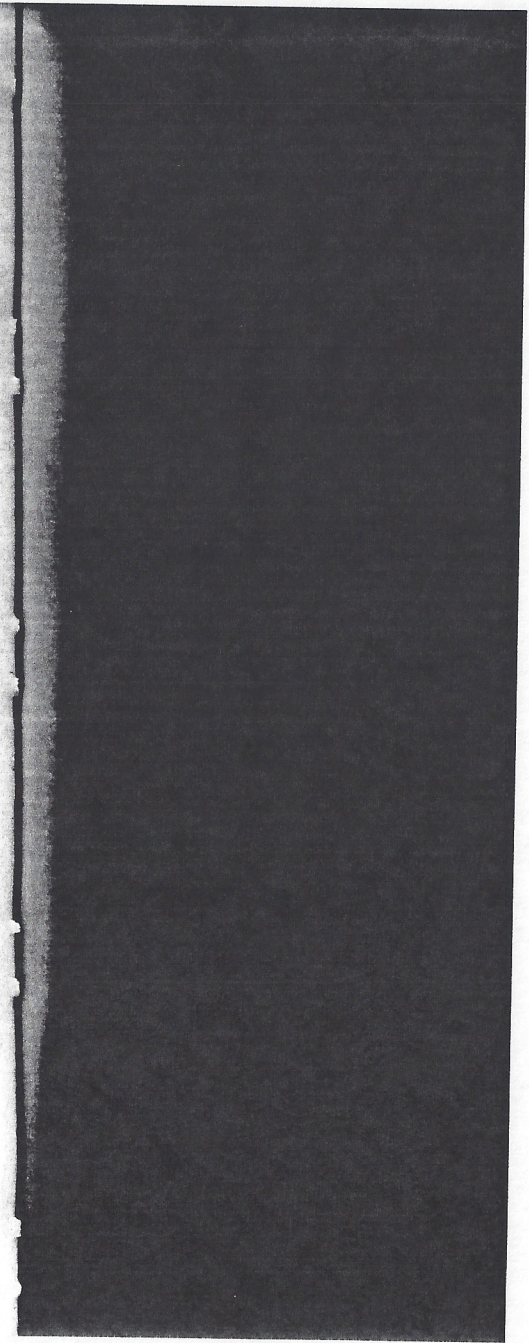


FIG. 59



'Zip-a-tone' is a product recently placed at the disposal of draughtsmen, photographers, and commercial artists. It consists of transparent cellophane sheets covered over by different patterns printed in black. Here, the first pattern is a regular set of points (Fig. 57); the second a regular set of lines (Fig. 58); the third, a combination of the two (Fig. 59). To play the game (an unexpected one) which I am suggesting, it is enough to take the first fragment of 'Zip-a-tone' that comes to your hand, put it on top of another, and turn it very slightly from left to right or from right to left. You will see that, within less than one-quarter of one rotation, you will have determined seven different drawings of a hexagon. It happens under your very eyes: within a second you see a thrilling geometrical phenomenon come to life and develop. But if, in turning your cellophane sheet, you do not stop at the right stages there will be no geometry; you will be left outside the door, in a world of inconsistency.

This phenomenon of interference denounces the hiatus as much as it demonstrates perfection. It all depends on you or on the circumstances in which you read, your lack of attention or a minute displacement of an object. The wealth of the world consists precisely in these infinitely fine nuances which vulgar man forgets to see because he imagines a wealth that is spectacular, noisy, torrential . . . dwelling only in privileged places, inaccessible to modest folk. It is enough to observe.

* * *

This was the outlook with which the Committee was instructed to pursue the studies begun at the 'Divina Proportione' in Milan.

The subject under discussion was the reason for the Committee's existence and the nature of the work it should undertake. The Committee felt that it was faced with an alternative: either to continue the work begun by the first 'Divina

Proportion' congress and so to become embroiled in mathematical deliberations which would become more and more scientific, getting further and further away from the immediate tasks set aside for the arts themselves. Or else to renounce the consideration of past ages, to abandon scientific exegesis, and to strike out for a goal attainable by studies of this kind, that of bringing harmony into modern times. If the Committee retained, purely and simply, its title of 'Divine proportion', it would be linked most particularly with the works of the Renaissance. Those members of the Committee who were present at the Milan meeting in September 1952 agreed that it would be better to stand further aside.

Striving to grasp the essence of its purpose, the Committee came to agree that the problem facing modern society is above all one of harmony. Modern society possesses unimaginable riches which can, along the line of progress, increase, flourish and fructify without limit. On the other hand, disordered modern progress has created an enormous muddle, the poisoned fruit of disharmony in relationships between all things: disharmony of man in relation to his own inventions, his work, his daily life, both private and collective. And so the Committee decided to adopt a title to replace that of 'Divine Proportion'. That title is *Symmetry*. The word symmetry, as it may be adopted today by the advance guard of modern thought, pursues a double goal: that of denouncing its false meaning of equality, maintained by a still vocal academic tradition; and that of putting the concept of symmetry back in its proper place, on the plane of equilibrium: the very essence of proportion. 'Proportion' seemed to the Committee a term too concretely linked to questions of measures, dimensioning, strictly objective relationships. 'Harmony' is a term which can open for discussion those very horizons which we must explore. We felt that existing disciplines are unfortunately isolated, each within itself, each for itself alone. Because, by the effect of their development—specific in each case—they foment progress,

they must be made co-existent. A category of persons drawn from various fields of contemporary work may lead them towards unity. The Committee therefore thought it right to follow this new line, taking 'Harmony' as the theme for its next meeting. And it also thought it right to convoke this second meeting in Siena, historic city of Italy, whose authorities had made generous offers of hospitality.

In doing so, the Committee felt itself on solid ground.

3. MAN . . . SUFFERED FROM BLINDNESS

Man, though seeing, suffered from
blindness. . . . And, for him, I found
Numbers, the purest of inventions.

PROMETHEUS CHAINED
(Aeschylus)

The 'Poem of the Right Angle' was drawn, written and calligraphied between 1947 and 1953, during my various voyages, in the solitude of the airplane or of hotel rooms. In the poem, homage to numbers has its place.

One of the seven exercises of the poem, marked 'B 2: The Mind', deals with the Modulor. In order to validate it, like all the other subjects of the poem, the exercise had to be constructed in a valid architectural order (Figs. 60 and 61).

* * *

Numbers lend dignity to the houses of men. They make a temple out of an ordinary dwelling: the 'family temple'. But there should be no break, no separation with the buildings where work is done, those which house institutions and gods. Contiguous, continuous events. Not for an instant can there be any question of introducing or tolerating, through weakness or poverty, any simplification that would spell failure, under the pretext of multiplying, quickly and cheaply, the sorely needed houses of men. Here, compromise is detestable. Alas, it is a daily fact. To put it simply, my case is that where the engineer cries 'halt' for immediate reasons of convenience, time or cost, the architect should pick up the relay and, by applying his mind for a longer time, find, propose and finally impose the whole solution. The engineer's and the architect's roads are the same for a long stretch

- A. Environment
- B. Mind
- C. Flesh
- D. Fusion
- E. Character
- F. The hand
- G. The right angle

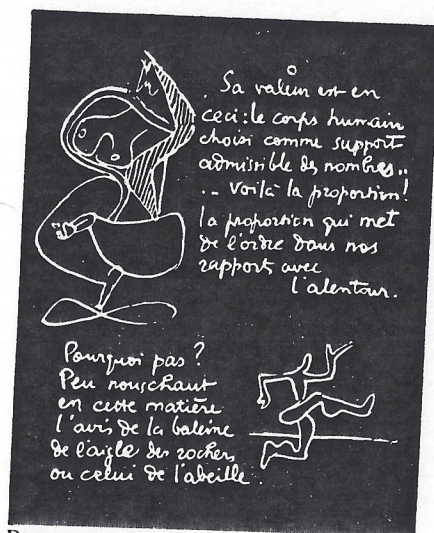
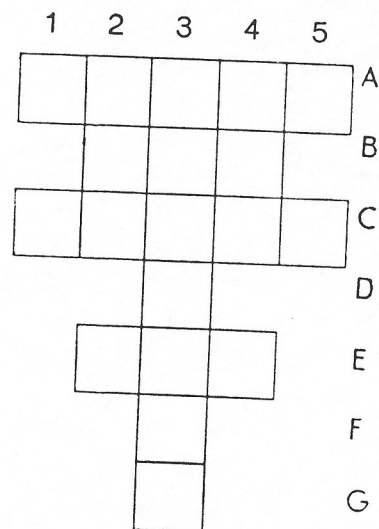
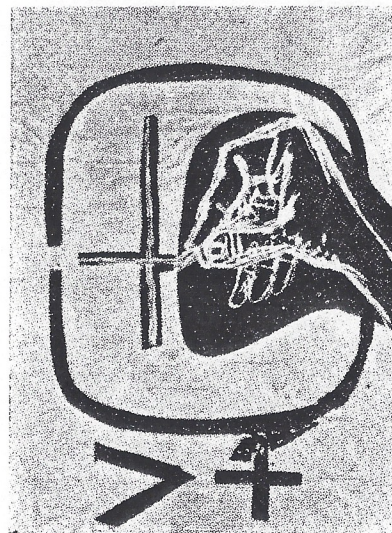
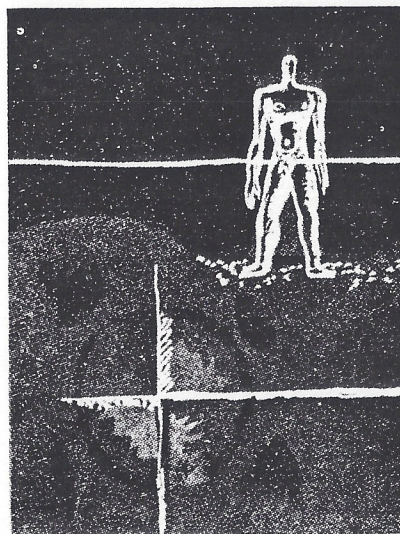
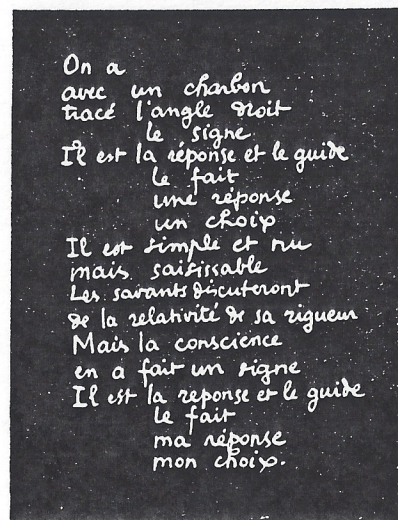
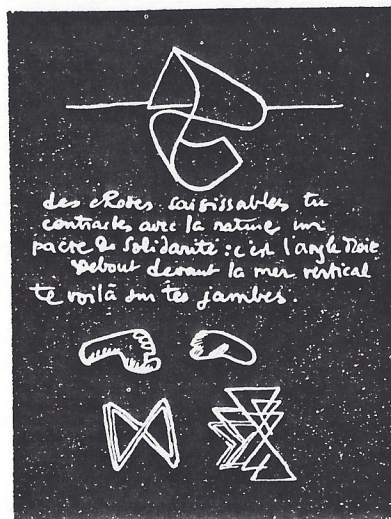


FIG. 60

Deux pages de B2 - ESPRIT.



FIG. 61



of the way. But, at some point, the engineer must stop and say 'here my empire comes to an end'. The engineer and the architect are destined to work together, tirelessly and with full efficiency. Let us eschew vanities. Let us immerse ourselves in realities.

* * *

All academic ambiguity aside, this humble picture postcard from the Bassin d'Arcachon puts us face to face with our tasks: without phrases, without pretensions, without big words, the fishermen have built their houses, dug the canal, equipped the boats, planted trees and created a complete and ingenious symphony to the human scale. Here is the true essence of architecture! (Fig. 62).



FIG. 62

* * *

'Four million houses to be built in France . . .'

The problem of housing is one of the principal themes of contemporary economy. In all continents, it exercises minds inspired by the same motives. The road is open, to be covered from end to end, teasing the impatient ones. Poets do

not mince words: here is a postcard from Blaise Cendrars dated Monday (?) (the postmark shows the 25th July, 1950):

‘My dear old chap, thank you for the Roman dedication, but I don’t give a hang for your Modulor. It must be wrong because nowhere in the world can one find a flat. Here’s my hand, in friendship. Blaise Cendrars.’

On the back of the card it says: ‘You are one of the kind who believe in what they talk about.’

* * *

He who criticizes must, at the least, propose a substitute solution. Meanwhile, he who is criticized has a proposal to make.

‘A line of conduct for tomorrow.’

‘The purpose of this communication is, above all, to call for the creation of a new body in the building industry: that of the “Nomenclators” (or classifiers). This category of technicians would be placed outside or beside that of the surveyors; their work would be allied to that of architects whose plans are drawn up with the help of the Modulor. The “Nomenclator” would break down the plans into elements of all kinds: wood, iron, miscellaneous materials, etc. He would possess full information on the productive capacities of the country (workshops, factories, plants, etc.) and would therefore be able to distribute orders according to “classified order lists”. Assembly orders drawn up parallel with these order lists would help to guide the construction work on the building site itself, by combining the elements thus manufactured at the most efficient production points.

‘A harmonious measure, both human and mathematical (the Modulor), ensures certainty in proportioning by methods similar to those which, in even the

greatest epochs, have guaranteed a wealth of combinations—variable, contrasting, capable of infinite gradation — through craft secrets and the traditions of builders. A means of standardization, fascinating, bringing about economy of materials, and above all opening the way to organization of manufacture.

‘But we must face it: there is, as yet, no such thing as a science of housing.

‘This is not a pipe-dream: it may well be one of the next stages in the progress of building, technical achievement, and general economy. It implies, on the part of those described here as “architects”, a development towards efficiency, an intimate knowledge of materials, etc.

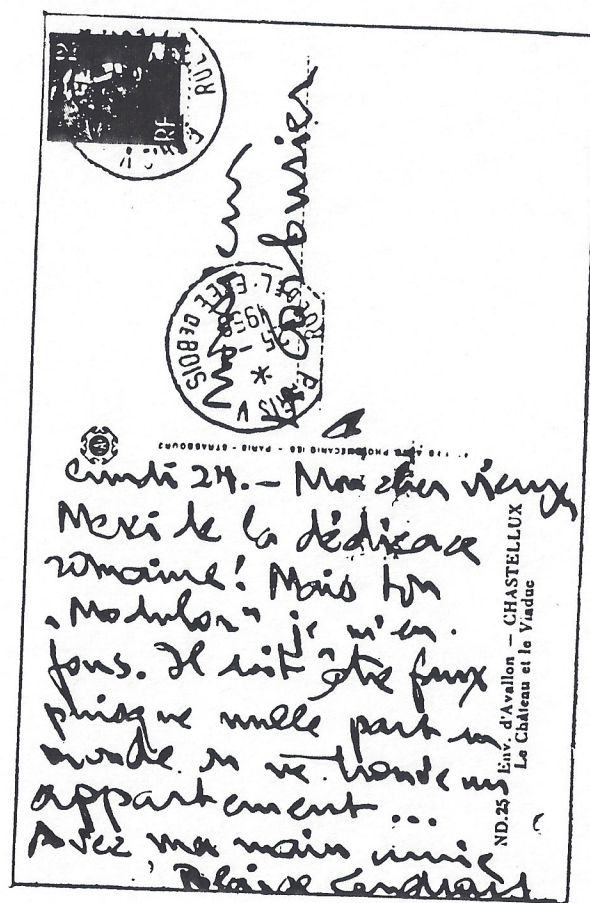


FIG. 63

'The School which awards architectural diplomas in France has never put the problem of housing on its programme. It seems an obvious thing to train technicians to tackle this task (four million homes to be built!). These technicians will be architects or plastic artists, makers of domestic equipment, mechanics, family planners; all their efforts will be centred on the family, men, women and children. From the "domestic hearth", or home, to the entire city and country, there will be no break and each thing will react upon the other. In housing practice such as this, there will be continuous contact between the associated industries and techniques. All the producers of modern society will be called in to make a useful contribution.

'The economy of the country can henceforth benefit from the "laboratory" set up at Marseilles.

'The *Unité* at Marseilles made it possible to create 26 communal services so as to free the housewife from domestic drudgery and to further the bringing up of children. Women have their place in the realization of this task. They can draw up the right programme for it, but they can also put it into practice. The architect's vocation is open to women in all matters connected with housing. Architecture is no longer the right term for the activity that is expected. The vocation must be broadened. Those who devote themselves to it must always be faced with realities: the workshop, the factory, the building site. Those who have acquired sufficient knowledge in this field might be awarded a "diploma of housing" and authorized to build and to equip homes.

'The diploma given today is a barrier to much of this potential energy. The type of mind necessary to win the official diploma is not necessarily the same as that which will devote a lifetime to the service of men in their homes.'

(Published by *Le Point*, November 1948.)

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Nomenclature may fill the gap (sometimes it is an abyss) which separates the engineer's mind from the architect's mind. It can do so quite naturally, without any need for change.

* * *

From Konrad Wachsmann, Chicago, January 1950.

'I am happy to be able to tell you today of the realization of a plan which I mentioned to you in a *bistro* at St-Germain-des-Prés in the autumn of 1947. The Illinois Institute of Technology in Chicago has created for me a department of studies and research into modern methods of building, i.e. the study of industrialization of building off the beaten track, and also the study of mechanics: installations, electricity, heating, etc. My part consists in educating young architects in their task of industrialization of building and its consequences. You will understand that this is a vast programme which will take years to carry out and needs a tremendous amount of work before a visible result is reached. I am assured of the collaboration of the scientific laboratories of the Institute of Technology and we have adopted a programme which will include not only the study of new methods but also that of new materials.

'I hasten to tell you all this because I know that you too are convinced of the need and the usefulness of such an Institute. We intend from the start not to confine ourselves to America but to work on a basis of international collaboration. We want to form a Consultative Committee composed of the most highly qualified men in the problems linked to our own, and who are also versed in the "pure sciences" such as physics, chemistry, mathematics, etc. May I hope that you will not refuse to take part?'

* * *

In their review *Arkkitehti Arkitekten*, No. 1, 1954, the Finns published a

communication on 'volumes of habitation' formed by cubic prisms.

I do not read Finnish, but the drawings speak for themselves. These are volumes of habitation governed by a modular unit and allowing numerous combinations of dwellings to be created. The unit is a cubic prism whose dimension seems to be roughly 2.50×2.50 metres, i.e. a container sufficiently large for the determining elements of habitation to be placed within it: bed, table, kitchen utensils, etc.

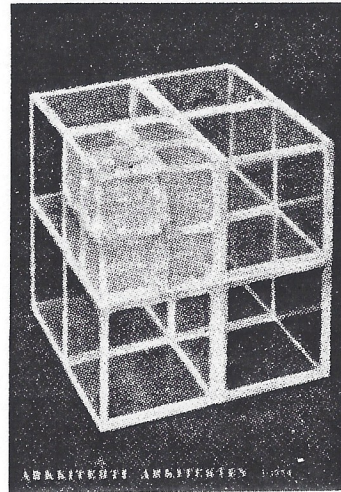


FIG. 64

However, further on I find a note in French explaining the system:

'The review *Arkkitehti Arkitekten* published, in its issue No. 7, 1943, the results of a competition which the Society of Finnish Architects had announced to its members several months previously. The subject of the competition—a summer residence for an architect's family with *n* children—was related to the principle

of the "extensible" dwelling, i.e. a house that can be enlarged during the years.

'Thanks to the *Suomen Kulttuurirahasto*, I had an opportunity [the writer is M. Blomstedt] of returning to this theme and developing it during the years 1946-48. I believe that this is one of the ways whereby, despite the standardization and industrialization of building processes, the dwelling can be given the human characteristics it is required to possess.

'The system of progressive division of a cube (Fig. 64)—continuous breaking down into eight fresh cubes which become increasingly smaller, or re-grouping them into cubes which become progressively larger—is one of the subjects of the present work. The mathematical formula is $8n$, where "n" is a whole number prefixed by the sign + or —. The simple principle of division seems to offer certain possibilities to a general system of measuring in architecture (provided that a basic measure can be agreed upon: 1 cm. (and thence the series 2, 4, 8, 16, 32, 64, etc. . . .) which might be given as a basis for arithmetical and technical studies).

'The author of this communication wishes to thank in advance any person who will help to cast light on this question. Up to now I have been assisted in this work by the architects Paul Bernouilli-Vestera and Keijo Petâjâ.'

'AULIS BLOMSTEDT.'

New combinations are described as the article goes on (Fig. 65) and still further ones were added in 1947-48. Another French text provides this further information:

'The economic advantages of mass production in industry are self-evident. But there seems to be a contradiction between the industrial manufacture of a house in its elements of construction and the requirements—always diverse and manifold—of housing.

'It is impossible—and would be pernicious—to standardize human habitation.

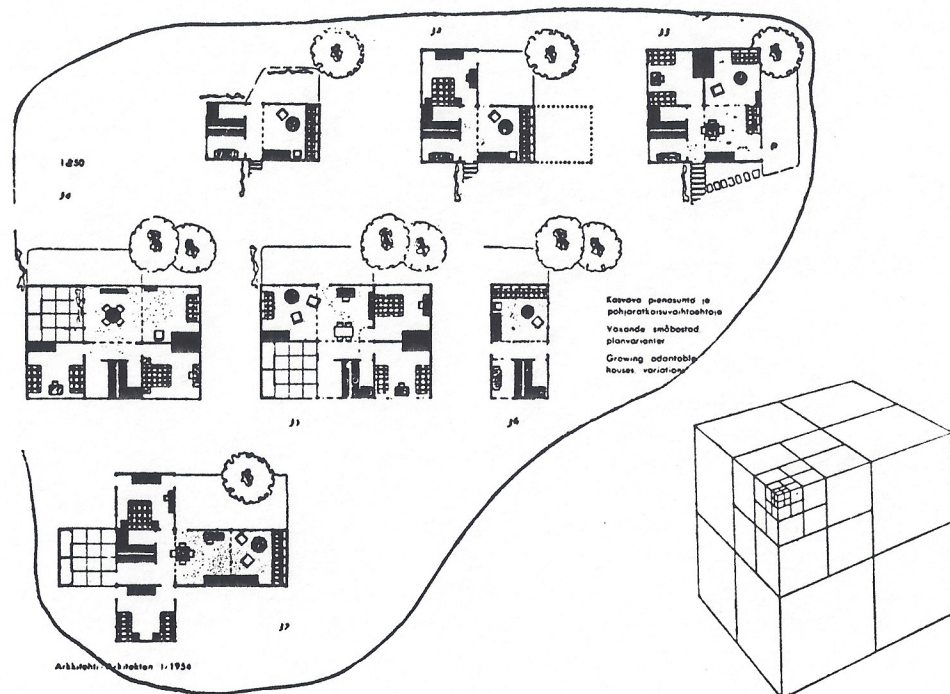


FIG. 65

'On the other hand, mass production of prefabricated elements is advantageous provided it is invariable.

'How, then, can industrial mass-production be applied to the production of housing?

'As, in arithmetic, we seek the common denominator of two figures, so a common denominator must be found between mass production and a human type of habitation. This common denominator is given by reason of the simple fact that industry is a creation of man.

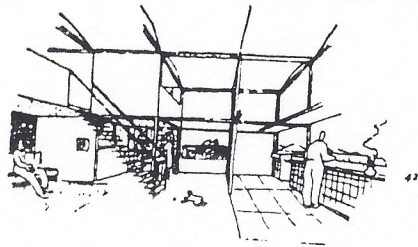
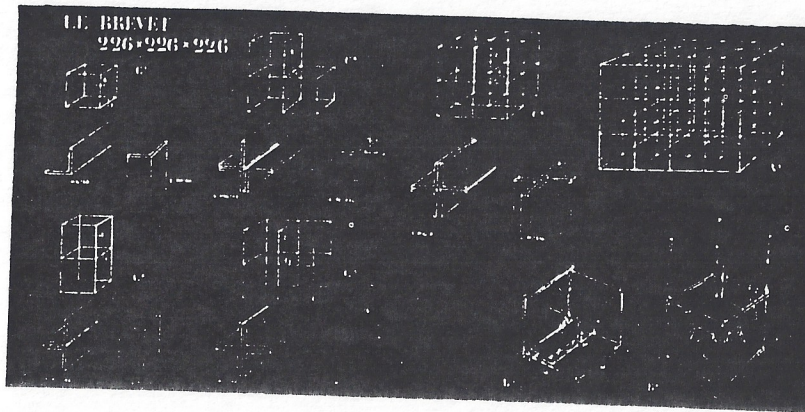


Fig. 66

'The present study shows that the theory of industrial manufacture and that of housing can be happily married in practical applications.—This geometrical and constructive system, "rigid space" (the red prisms), adapts itself to mass production and, at the same time, allows all the conditions of a dwelling to be satisfied.

'There has been much discussion on the subject of "elastic standardization", but in order that life may retain its freedom and flexibility, standardization must be exactly applied, remaining rigid as its name implies.'

'AULIS BLOMSTEDT.'

* * *

This communication is directly followed in the Finnish review by another study: 'ROQ' and 'ROB' (patent $226 \times 226 \times 226$ taken out by us in Paris on 15th December, 1950). (Fig. 66.)

Our patent did not cover any solution as regards equipment, which had been studied and partially solved long before. It concerned a problem of construction: that of finding a material (folded sheet metal) combined in assemblies furnishing favourable moments of inertia (square, T and cross) and having so small a range that compression, traction or bending stresses can, as it were, be merged due to the close-knit nature of the structure, all this made possible by a modern technique: electric welding. The whole constitutes an 'alveolar volume of habitation'.

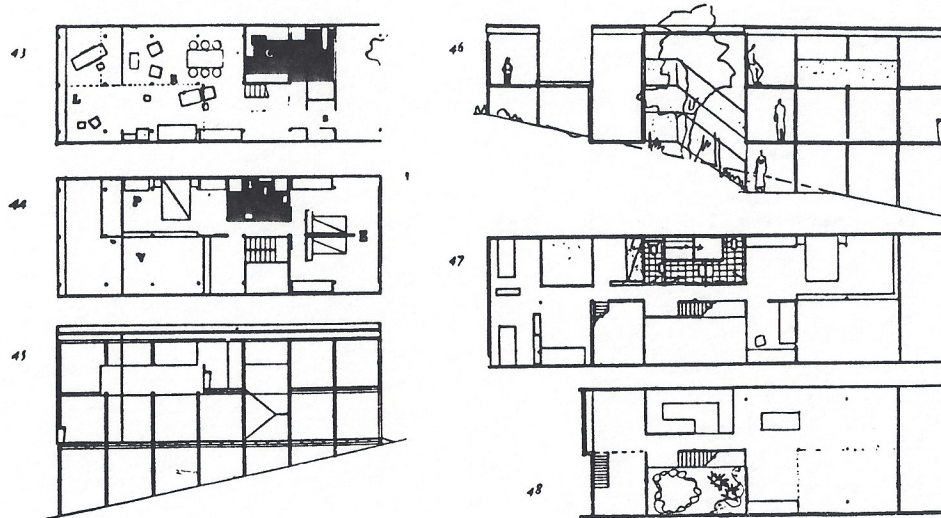


FIG. 67

An example of application is furnished by the two studies 'ROQ' and 'ROB' on the Côte d'Azur. The module adopted is the very key to the Modulor: the man-with-arm-upraised: 2.26 metres (Fig. 67).

The first idea of alveolar volumes dates back to 1950, when we were installing,

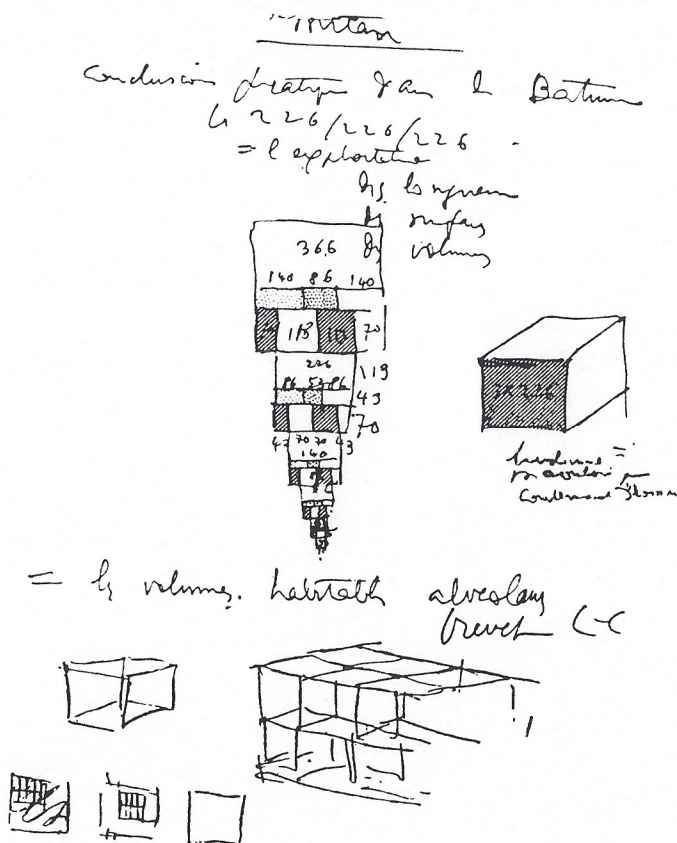


FIG. 68

at the *Unité d'Habitation* at Marseilles, small girders of folded sheet iron designed by Jean Prouvé, which offer remarkable resources of lightness, easy transport and easy installation.

* * *

'From town to drinking flask: from drinking flask to town.'

I am speaking of the only big lecture I have given on the Modulor (Milan Triennale, 28th September, 1951, on the occasion of the Congress of the Divine Proportion).

After explaining the alveolar volumes with the aid of an open drawing on either side of $226 \times 226 \times 226$, I thought it necessary to say: 'This work, so far, is only concerned with modulatoric texture, the constituent elements of the housing cell. But the "Housing Sector" comes in at the desired moment to divide the "green city" into compartments and to ensure, freely, outside the Modulor and governed by other rules, the flow of its traffic and the daily administration of its population.' Speaking of Chandigarh, I drew a 'Sector', a piece of urban territory, 800 m. \times 1,200 m. in size, set aside for housing a population of 5,000, 10,000 or 20,000 inhabitants (according to the categories imposed by the programme), constituting a district called 'sector' and enjoying autonomy. Within this area, I marked locations reserved for 'houses'. Let the architects, the businessmen, the prefabrication industries get on with it, with or without the Modulor, inside that area! Other events, 'extra-modulatoric' in nature, were taking place. It was a cardiac system leading to the door of each of the habitation cells of a sector, but fitting in also with the constituent elements of the city—an urban entity. This cardiac network is composed of seven types of roads of specified purpose, to which an eighth type was added later. I have called the rule which lays down the order of importance of this distribution of modern traffic, spreading

Chandigarh
Modulo

Le système module = cellule d'habitation

Mais la habitation est répartie en ville verte,
dans la vallée, dans d'autres régions.

avec le secteur

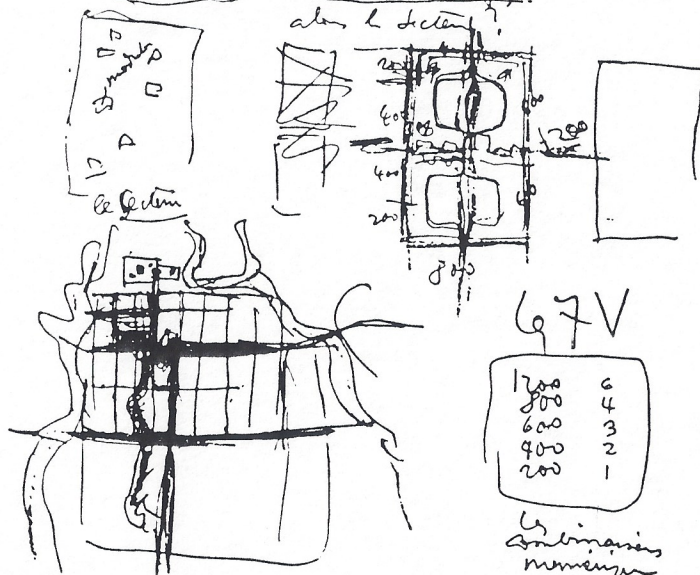
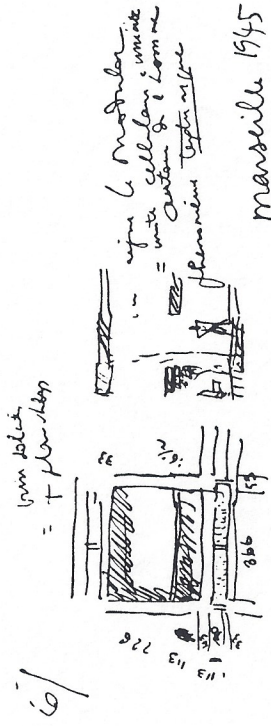


FIG. 69

over continents and leading within the town right up to the door of a habitation cell, the 'Rule of the 7 V' (which should, in fact, be 8). It is a phenomenon of circulation, biological in nature, developing on the surface under the sign of different speeds. The second constituent element of Chandigarh is, then, the



manilla 1945

manilla
1957

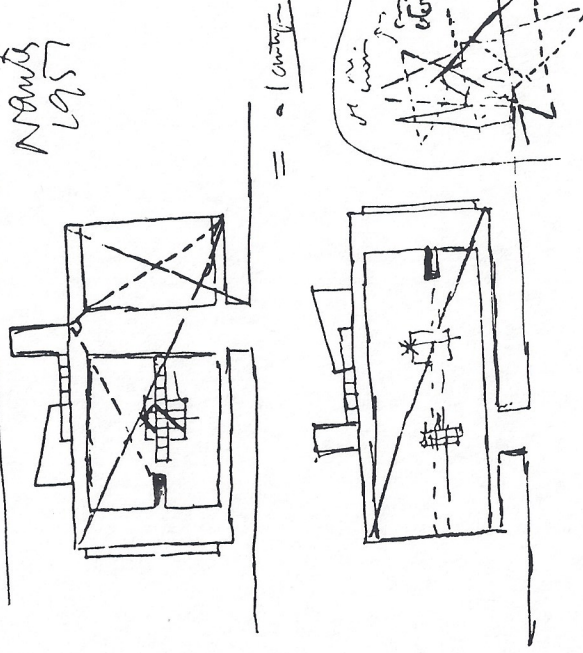


Fig. 70

'sector', which, with its sub-divisions—internal or adjacent—no longer obeys irrational numbers such as Φ , but a simple, childish, immediately comprehensible

arithmetic. This arithmetical series is 1,200 metres—800 m.—400 m.—200 m., expressed by the simple relationships 6—4—3—2—1.

During that lecture, and leaving Chandigarh aside, I returned to the theme of the house whose external dimensions (the casing or 'envelope') are not necessarily governed by the Modulor. I mean the 'Housing Units of Proportional Size'. Here the mould (or casing) is no more than an additional consequence. (I was referring to the new *Unité d'Habitation* at Nantes-Rezé.) I tried to show that the housing cell itself could be usefully 'modulorized', so giving the edifice a generalized texture. On the other hand, the edifice as a whole is an independent function resulting from the number of apartments and the nature of the communal services incorporated in it. Also a function of traffic on both the horizontal and the vertical planes, etc. The decisive architectural sensation is linked to these palpable elements: a volume, upright under the sky. The modularic rhythm becomes secondary. The wealth displayed—or the poverty confessed—will be geometrical in nature: plastic attitude, lyricism . . . Sculptural phenomenon independent of constructional reasons or of the value of equipment. Primary volume eloquently sub-divided. Silhouette to the left, to the right, above and below the building. Now comes the moment of the 'regulating lines': bringing invention, lyricism and poetry . . . or not.

All this is not easy to explain, still less to do!

(Lecture given at the Theatre of the Triennale, 28th September, 1951.)

* * *

The paragraph was entitled 'From town to drinking flask and from drinking flask to town' in order to express two things: the possible existence of a perfect family container (I am calling it 'the drinking flask') and the non-dependence of the town on the drinking flask, the latter remaining, in this case, outside certain

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specific events of town planning. The purpose is to demonstrate, quite clearly, that there is no need to modularize everything.

* * *

Twenty-three small illustrations are now given to make the reader understand how our present concern with proportioning came about, and why all these cases are different and diverse, multiple and symphonic in their effect, the problem extending from a domestic object to the very conception of a great city.

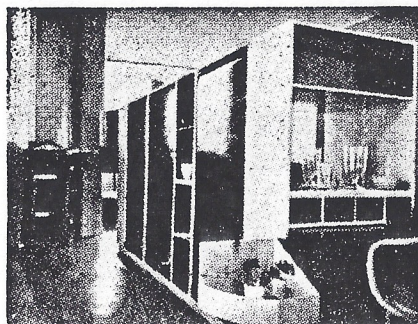
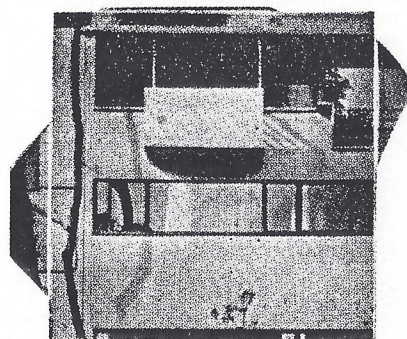
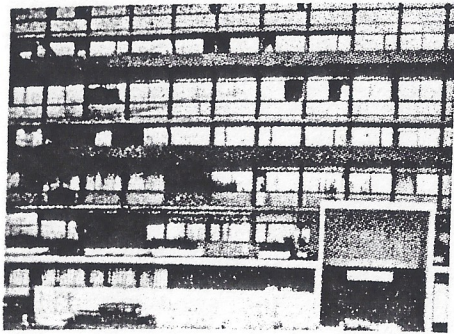


FIG. 71

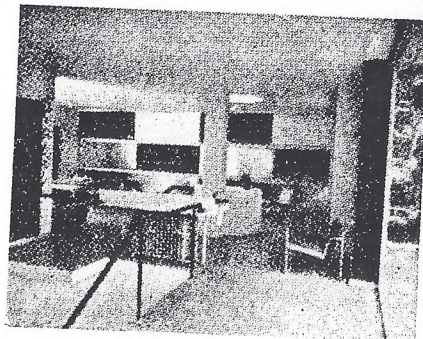
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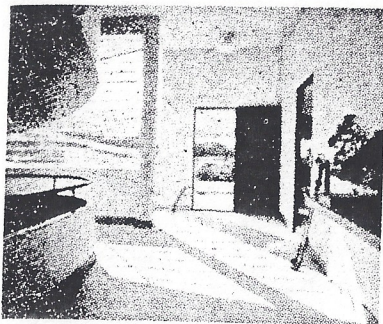
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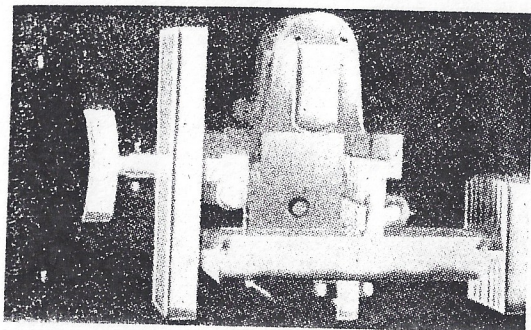
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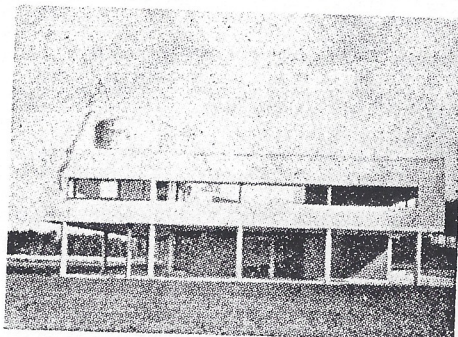
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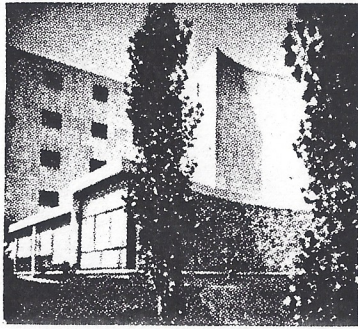


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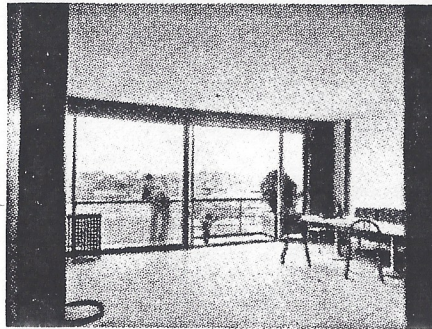


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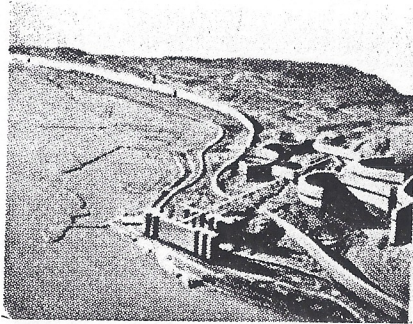




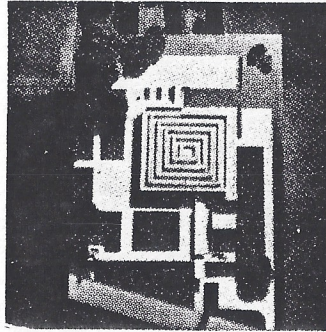
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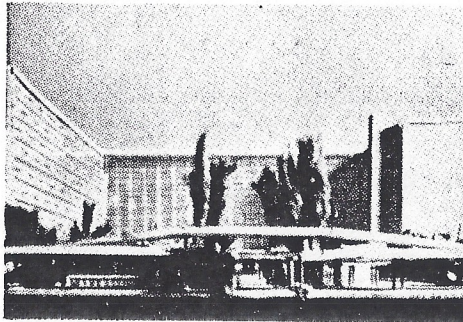
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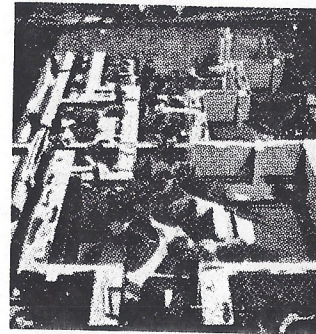
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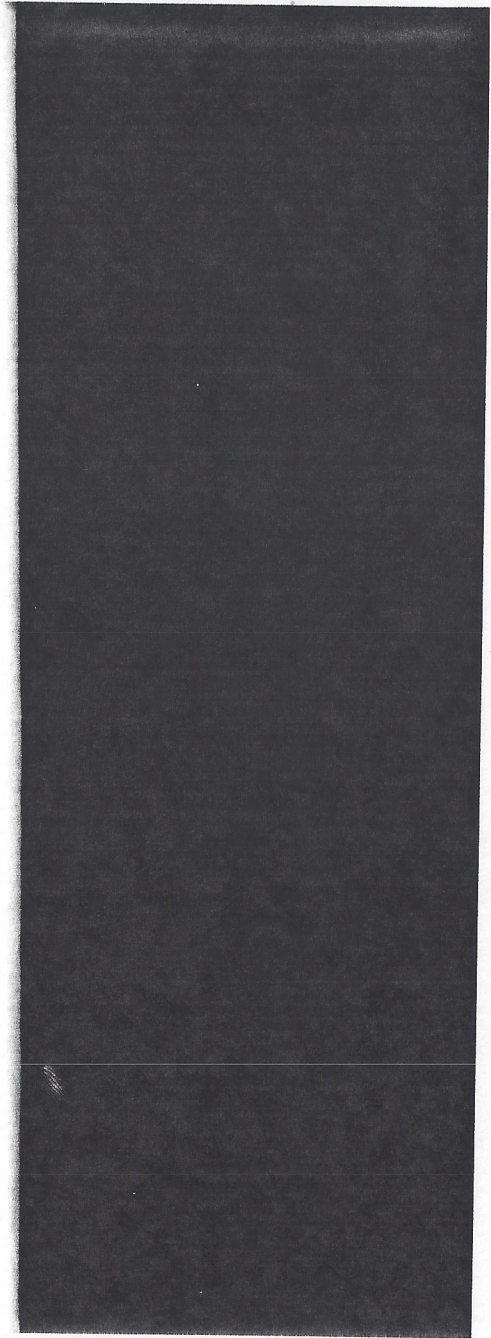
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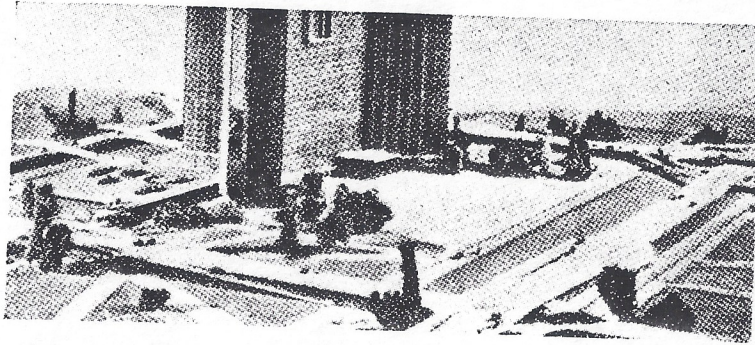


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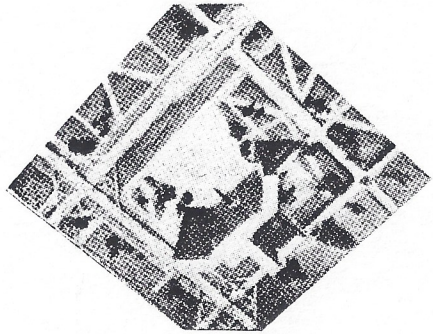


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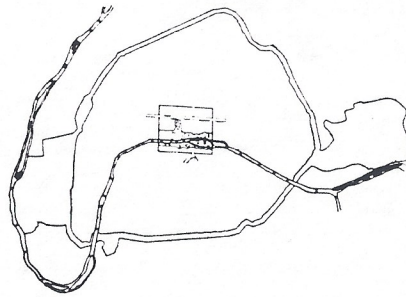




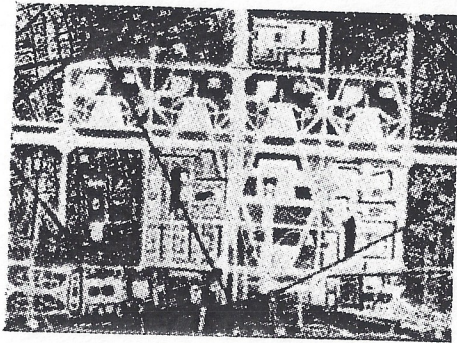
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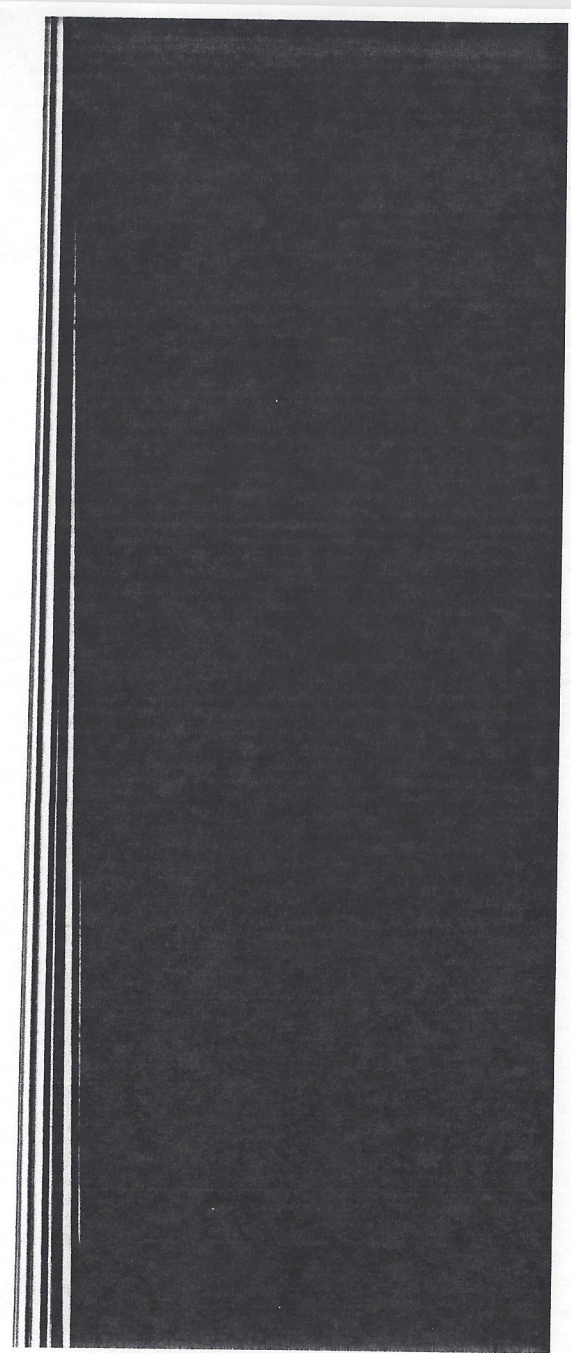
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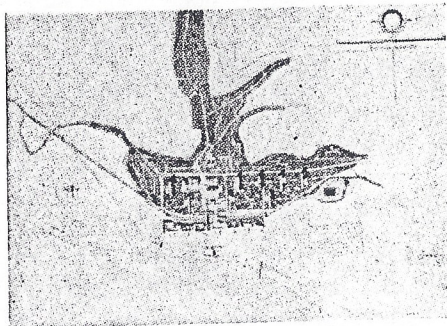


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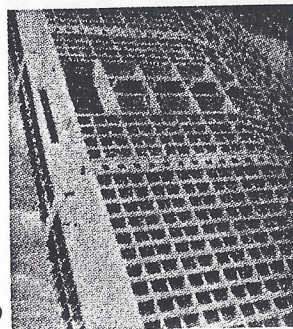


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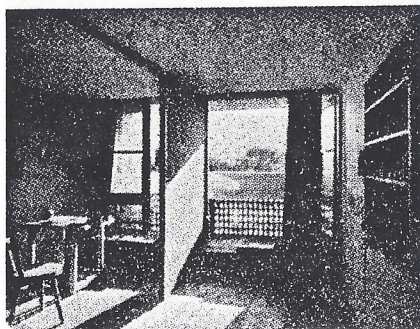




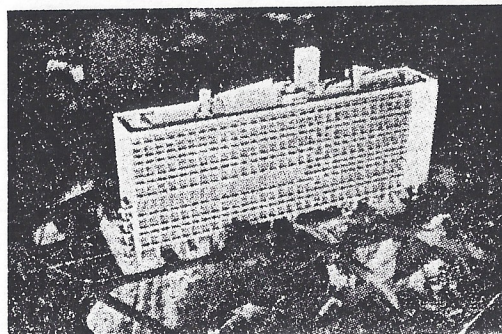
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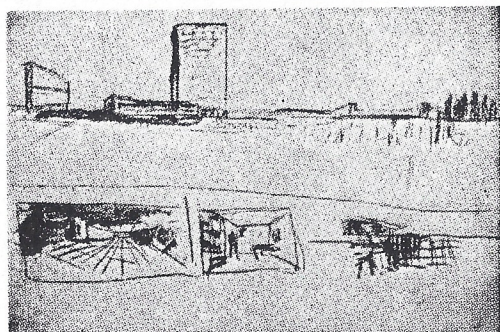
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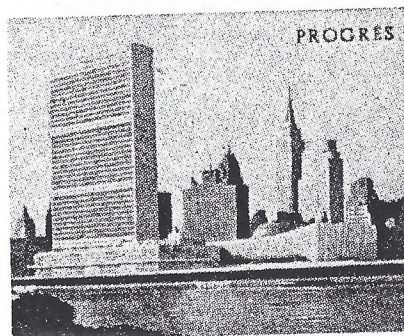
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22



23



1. Pavillon of 'L'Esprit Nouveau', 1925
2. The Cook house, 1926. Paris
3. The 'Maison Clarté'. Geneva, 1928.
4. Villa at Ville-d'Avray, 1928
5. Villa Savoye, 1929. Poissy.
6. Villa Savoye, 1929. Poissy.
7. 'Centrosoyuz' Palace, Moscow, 1928.
8. Swiss pavilion, Paris, 1930.
9. Apartment house. Paris 1931.
10. Town plan of Algiers, 1932.
11. Museum of Knowledge, 1930-1939.
12. Ville Radieuse, 1932.
13. Ville Radieuse, 1932
14. Cartesian skyscraper, 1935
15. Cartesian skyscraper, 1935
16. Plan for Paris, 1922-1955.
17. 'Plan of Paris 37', 1937.
18. Plan for Saint-Dié, 1945.
19. Business quarter of Algiers, 1939.
20. Children's nursery, Marseilles *Unité*, 1946
21. Marseilles *Unité*, 1946-1952.
22. United Nations building on the East River, 1947.
23. United Nations building on the East River, 1947.

* * *

A random reading at the studio, 35 rue de Sèvres, from notes taken on 10th January, 1952: 'Unity and Symphony'.

1. Draughtsmen: Samper, Perez and Doshi.

The 'V2 Capital' at Chandigarh.

I had decided (at that time) that on one side of this road there would be a shopping arcade, 2 kilometres in length. It would be 7.75 metres high, divisible into three times 2.26 or twice 3.66 plus residual amounts, or once $4.78 + 2.95$, or as a single height of 7.75. The distance between pillars could be 7.75, 4.78 m., 2.95 m., 3.66 m., 5.92 m., and so on *ad libitum*, without there being any need to impose one figure rather than another.

This left a large number of possible combinations for the tradesmen who would buy the shops.

* * *

2. Provisional administrative offices of the city.

Mr Thapar, State Administrator, at that time in charge of building admini-

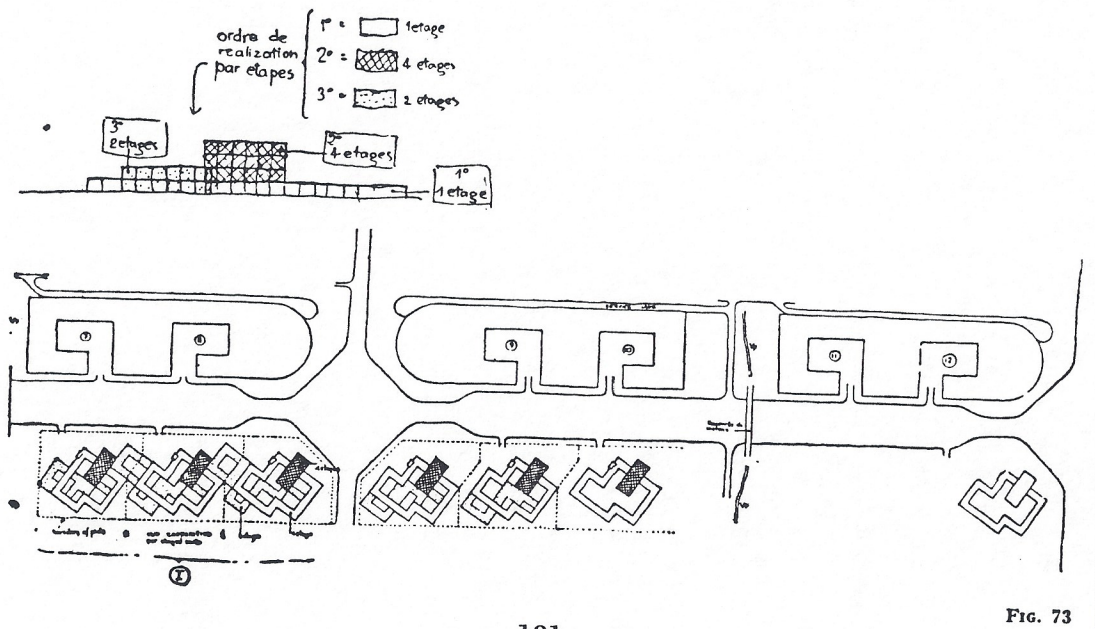
roads: Station Avenue. Later, these offices would be given up by the administration and transformed into a hostelry (or hotel) (Fig. 73).

- (a) Climatic orientation: prevailing winds, sun and shadow;
- (b) Adaptation of a schematic plan repeating itself later all along the future avenue.

A second scheme was to make it possible to double the accommodation by adding another floor.

Lastly, a third combination provided for an alternative building of four storeys, thus completing the specification.

On the sunny side, shadow was provided by verandahs with a projection of 3.66 metres, supported by $2.26 \text{ m.} + 2.95 \text{ m.} = 5.11 \text{ m.}$ pillars. The windowed wall



under the verandah could be divided according to the module of 226 (common measure). The office partitions, behind the wall and the windows, could be placed at intervals of 2.26 m., 2.95 m., 3.60 m., 5.25 m., etc.

* * *

3. Draughtsmen: Maisonnier and Samper.

The Palaces of the High Court of Chandigarh and of the Secretariat (group of seven Ministries) obey, first of all, the climatic conditions; they are placed crosswise to the prevailing winter winds and the prevailing summer winds which come from the opposite side. On the sunny side, the office windows are shaded by *brises-soleil*.

'The Climate Grid of the studio at 35 rue de Sèvres' serves to put the problem of the winds, shade and temperature in relation to each of the locations taken into consideration (Fig. 74).

* * *

4. Nantes-Rezé, Unité d'Habitation. Revision of the regulating lines.

Draughtsman: X.

'Your drawing is incorrect; there is an illusion here which may have grave consequences for the later stages of the operation. There are drawings and drawings. On what points, what surfaces, what volumes do you base your drawing? (your differently coloured diagonals). Do not confuse this with the Modulor. Regulating lines are outside the Modulor. They might sometimes meet the Modulor, but it is hardly likely that the Modulor can dictate a drawing, unless it be based on additive series which are rare in practical application, etc. . . .'

.

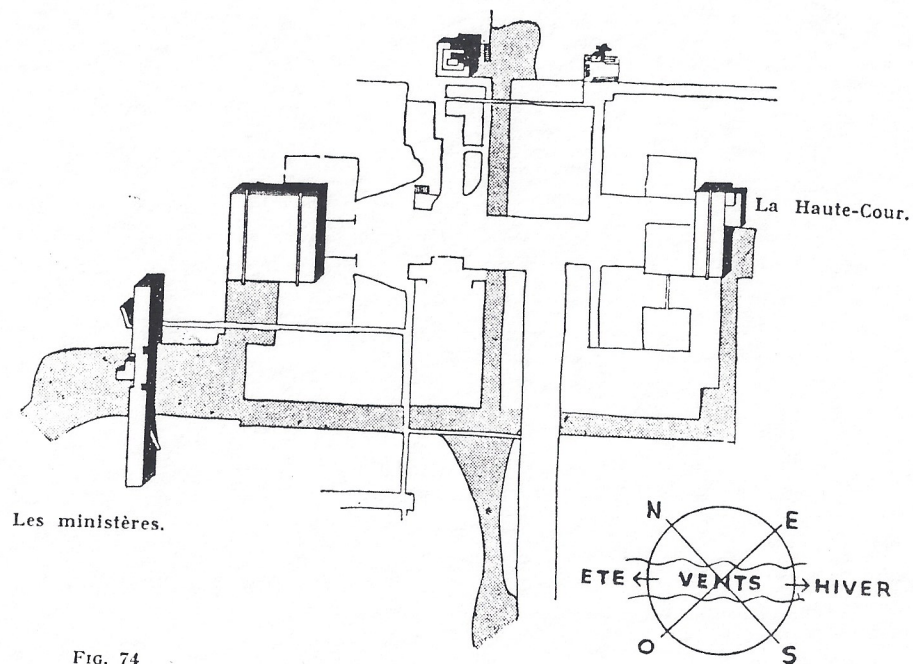


FIG. 74

These discussions at the studio show that in a single afternoon the gravest questions may arise in connection with a variety of problems; and that everything is a matter of appreciation, judgment, intelligent reading. And that thoughtless automatic action is still worse than ignorance itself.

* * *

Epilogue on the development of the window.

It was Alazard, a former member of the team at 35 rue de Sèvres (he is now the head of a mirror-making works) who, coming back from Nantes, said to me on 18th May, 1954:

'What a continuous, meticulous, minutely detailed development of the window there has been since your articles of 1920 in *L'Esprit Nouveau* to the present day! Windows 'in length' born of industrial construction of wood, iron or reinforced concrete, and the measures of the human body. Then the 'glazed panel' which did away with expensive lintels and spandrels (see Fig. 33); this added considerable resources to one of the principal functions of the façade: that of lighting. Then, over the years, the glazed panel became 'the fourth wall of the room'. It is no longer entirely made of glass; some panels are opaque; bookshelves are attached to it; tables stand against it; it plays its part in lighting the side-walls, ceiling and floor at strategic points. (Fig. 75). Then came the *brise-soleil* to conquer that mortal enemy of the glazed panel: the heat of the sun (Fig. 76). The *brise-soleil* creates shade on glass in summer and, in winter, allows the sun to penetrate into the depth of the room. Socrates had already spoken of it, calling it 'the portico'. Thenceforth the glass panel becomes a feature of individual usage right in the midst of the agglomeration that is an '*unité d'habitation*'. The balcony-*brise-soleil*, becoming a porch, becoming a loggia, enables each tenant to control his own window space both inside and out: cleaning, choice of curtains, etc. Since the glass is now sheltered from the rain, wood may once again take the place of iron. The wooden window is now no longer an inserted frame but an integral part of the structure. There is a new aesthetics of

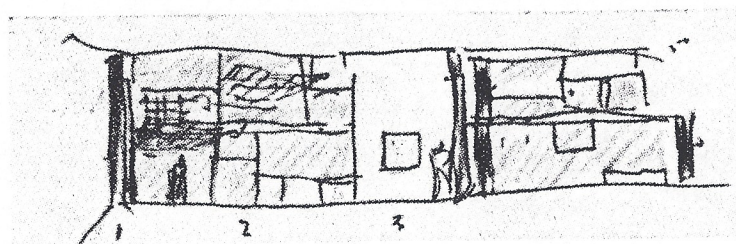


FIG. 75

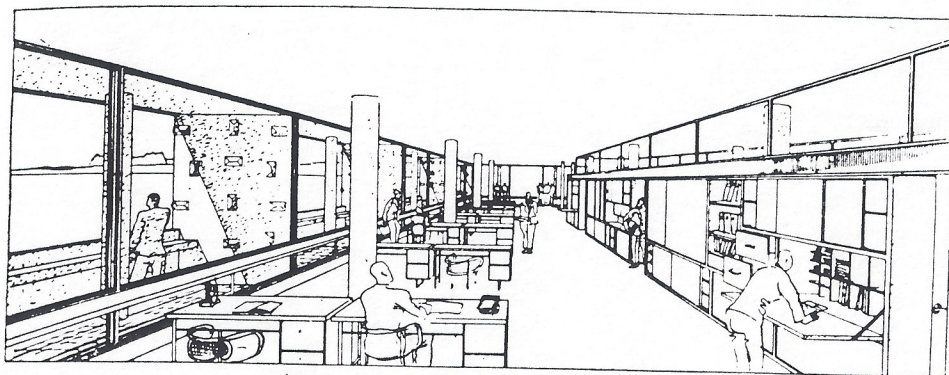
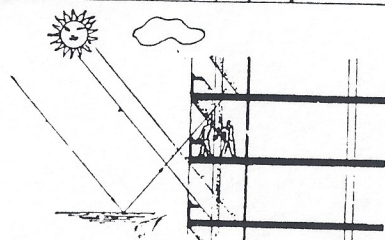


FIG. 76



windows. The window is no longer part of the fittings of a house or flat, it can be an architectural subject in itself, inside and outside . . .' (The Jaoul houses at Neuilly, 1955.)

I replied to Alazard: 'It is not finished yet. In India I came to grips with the problem of respiration, and therefore also of ventilation, inside buildings. I have classified the two functions of the glass panel: lighting and ventilation. And I have separated these two functions, achieving economy and efficiency. Principle No. 1: in order to pour new wine into a bottle filled with old, it is necessary first of all to get the old wine out of the bottle. Otherwise the thing just can't be done (another obvious statement). This is not taken into consideration by architecture;

but it is by the builders of submarines and modern cinemas. Enough said! In installing fixed panels of glass (non-opening) for the purpose of lighting, and hollow pillars to support them, the vertical slot in the pillars gave me the solution of variable and adjustable ventilation, which you can shut off at will, from floor to ceiling, thus regulating ventilation from the narrowest vertical chink to an opening 17 centimetres wide. You would be surprised how much air can pass through a vertical slot 2.20 metres high and 1 centimetre wide, or 3, 4, 10 or 17! If there are several hollow pillars in a room, the possibilities of ventilation become quite extraordinarily good. To crown the invention, a copper mesh nailed to the outside of each pillar efficiently keeps out the mosquitoes. But (the



FIG. 77

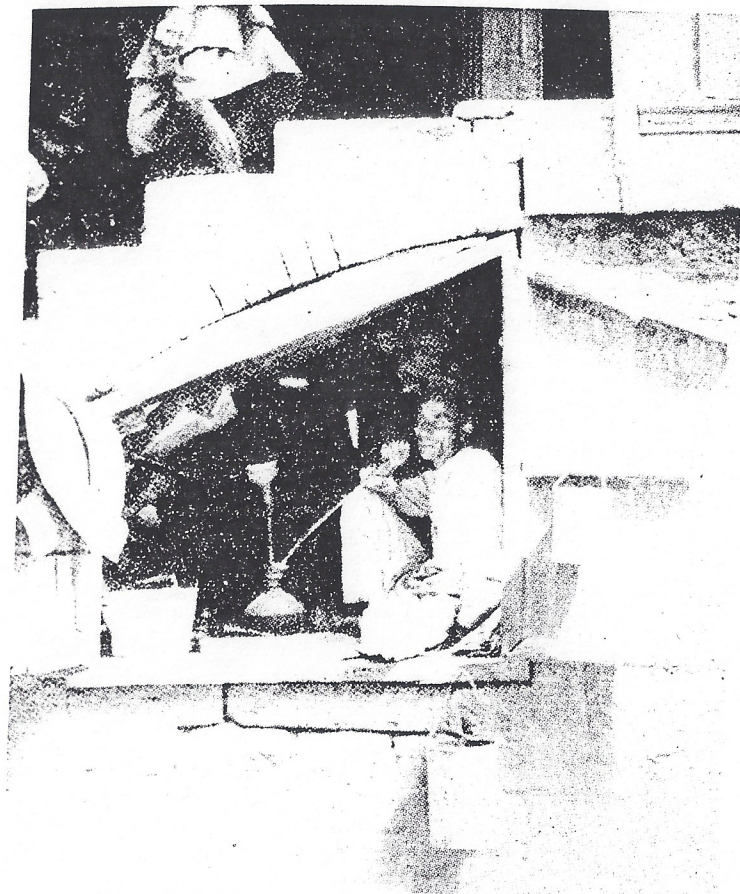


FIG. 78

obvious again) do not forget to open the equivalent of such slots in the opposite wall of the room.'

* * *

From the Riviera 'Blue Train' to an Indian merchant at Simla and an eating-place keeper at the foot of the Himalayas. Pictures which need no comment: traveling at 130 km. an hour, the buffet car of the Blue Train transports its passengers from Paris to Nice and Italy. They are inside a house—a house on

wheels. They are in France's most luxurious train and very proud to be there. A luxury house of this kind would be banned throughout the world by hygiene regulations. The sleeping car, restaurant car and buffet car have a height of 2 metres plus 40 centimetres roof arch. They hold fifty people. If the regulations

allowed the (true) dimension of 2.26 metres to be applied to housing, everything would be transformed.

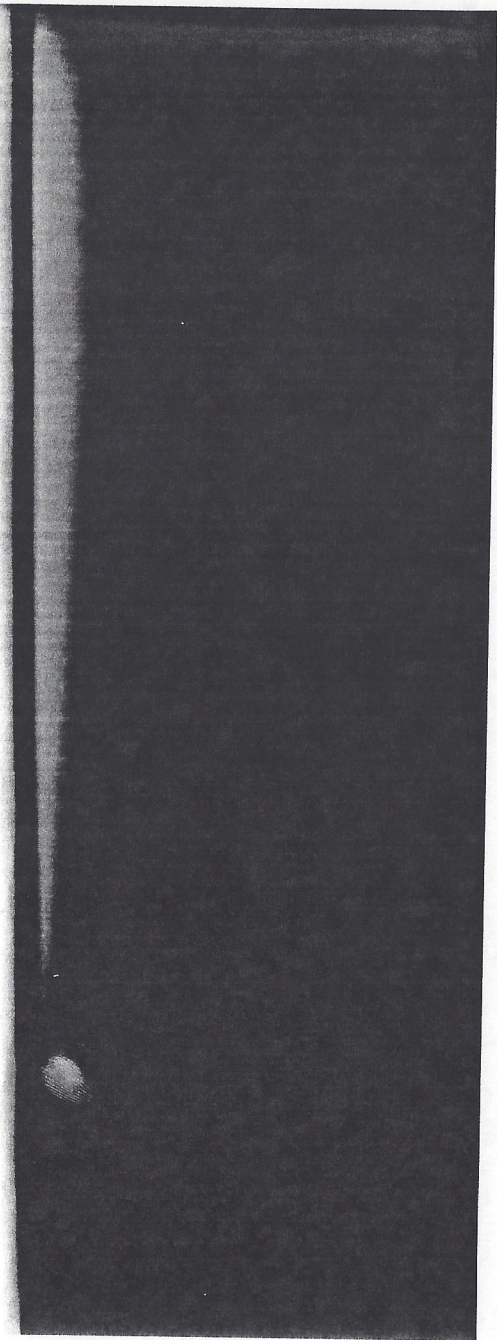
The Simla merchant does excellent business. He has put his shop roughly (I say roughly) 1.13 metres from the ground. There he sits, smoking, chatting. At night, he shuts up his shop, as you can see from the shutter in the picture.

His colleague, an eating-house keeper on the river bank, once more demonstrates the relative nature of dimensions in the matter of utilisation of premises and 'services rendered'.

These three visual documents published here should give food for thought.



FIG. 79



4. LET US RISE HIGHER

In the last series of the Architect's Yearbook, No. 5, published in London by Jane Drew and her friends, at the end of 1953, Professor Rudolf Wittkower contributes an essay which precedes the outstanding events of the architectural year throughout the world.

In connection with proportioning systems, a series of pictures is published: the Five Platonic Bodies; Euclid's pentagon; the Triangulation of Milan Cathedral, 1391; the Pythagorean triangle, taken from an edition of Vitruvius, dated 1521; Doubling and Halving the Area of the Square, from the same work by Vitruvius; Dürer's 'Serpent Compasses'. I will not dwell on the drawings by Leonardo da Vinci and Villard de Honnecourt, expressions of a subjective and personal quest, the one—a study of a head by Leonardo—giving the proportion 1:3; 1:2; 1:2, the other a sketch from Villard de Honnecourt's album.

What, then, is the nature of these pictures collected here? They represent the gist of the studies of antiquity and the Renaissance in the matter of proportions. They are a treasury of the mind. Their basis is outside the material facts of the human body (pentagon, square, triangle). They can be pretexts for giving free rein to divagations of the mind (divagation, here, means, 'roaming at will'). But in those epochs (those of Pythagoras, Plato, Vitruvius, Dürer) there still existed the solid counterweight of the anthropocentric measures: the foot, the palm, the cubit, etc. . . . and the talent (no less!) which adapted the work thus conducted to its 'brother man', reaching to the heart of man's reality as to that of his senses.

Gradually, matters of proportioning became more and more jeopardized. Rudolf Wittkower concludes his study by an observation on the Modulor:

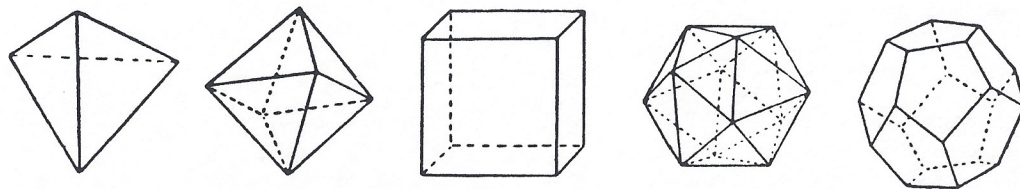
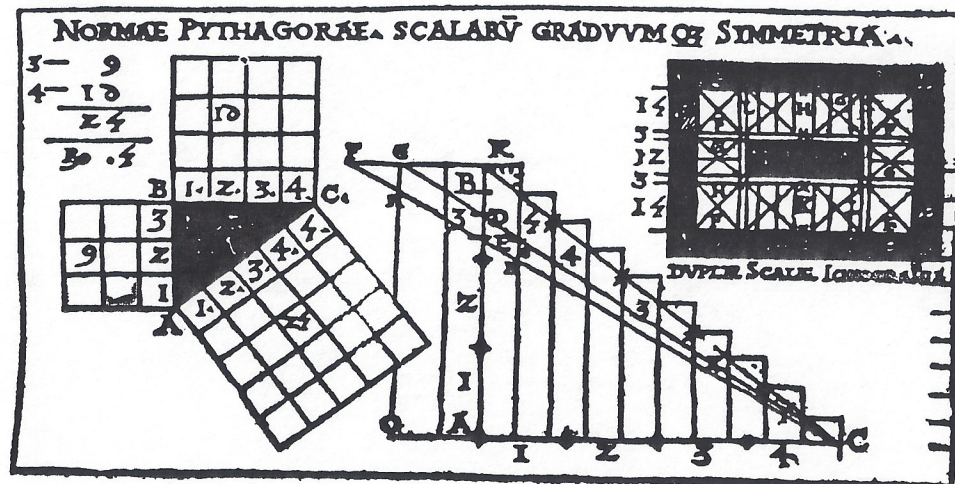


Fig. 4. The Five Platonic Bodies

Fig. 80

REMARKS:



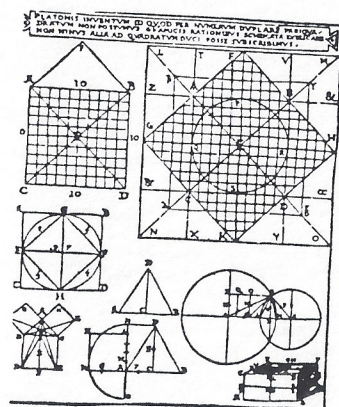


FIG. 81

Fig. 81. *Thinking and Making the Area of a Square*
 Vatican, edited by Cesarino, 1921

"But there are many indications that the era opposed to "systems of proportion" is approaching its end. It is a truism to say that the artist is a sounding-board of the civilization in which he lives. Even when revolting against it he will express its particular discipline. We all know that when, at the end of the last and the beginning of this century, non-Euclidian geometry became the basis of the modern view of the universe, the break with the past was as fundamental, or even more fundamental, than the break between the scholastic hierarchy of the Middle Ages and the Euclidean mathematical universe of Leonardo, Copernicus and Newton. What bearing on proportion in the arts has and will have the replacing of absolute measures of space and time by the new dynamic space-time relationship? A preliminary answer has been supplied by Le Corbusier's Modulor. In the light of history it appears as a fascinating attempt to co-ordinate tradition with our non-Euclidean world. First, by taking, instead of universals, man in his environment as his starting point, Le Corbusier has accepted the shift from

absolute to relative standards. But on this level he attempts a new consolidation. The older systems of proportion were what I might call one-track systems, in so far as they were coherent developments of basic geometrical or numerical concepts. Not so Le Corbusier's Modulor. Its elements are extremely simple: square, double square and divisions into extreme and mean ratios. These elements are blended into a system of geometrical and numerical ratios: the basic principle of symmetry is combined with two divergent series of irrational numbers derived from the Golden Section. Whatever one may think of it, this is certainly the first consistent synthesis since the breakdown of the older systems,

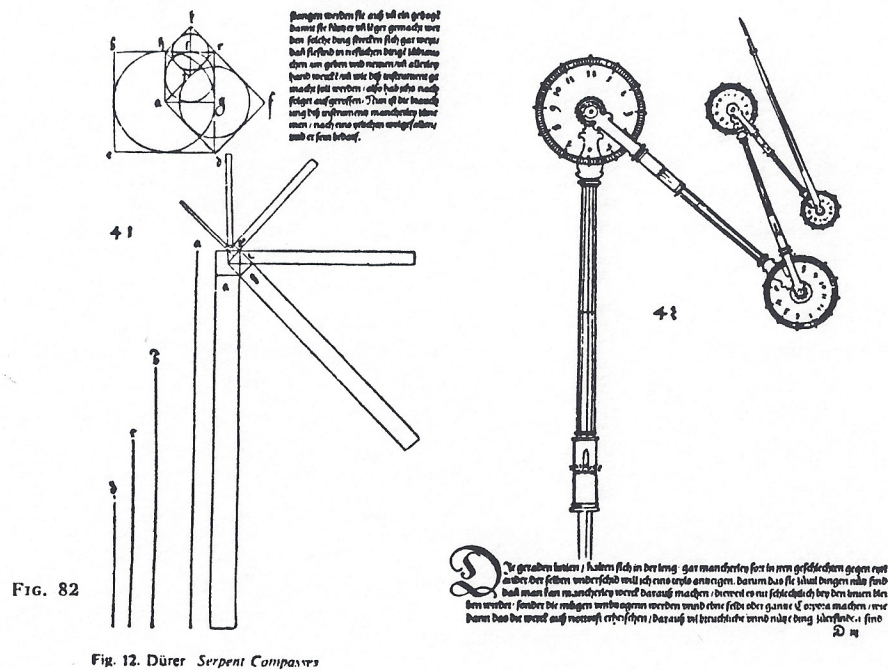


Fig. 12. Dürer's Serpent Compass

reflecting our own civilization into the bargain. At the same time it testifies to the coherence of our cultural tradition.

'Like the proportions of plane geometry used in the Middle Ages, like the arithmetical musical proportions of the Renaissance, Le Corbusier's dual system of irrational magnitudes is still dependent on the conceptions which Pythagorean-Platonic thought opened up for western mankind.'

* * *

Drawn from certain sources, words sometimes take on a shattering significance. From the Apocalypse: '... he measured the wall and found 144 cubits, measure of man which was that of the angel'.

Or: '... he measured also the wall of 144 cubits, measure of man which is also the measure of an angel.'¹

* * *

When, after twelve years of practical application, we record the constant appearance, in all kinds of plans and projects, of a moduloric value which imposes itself like a key (I mean the dimensions $226 \times 226 \times 226$), we have a right to see in this a 'container of men', affirmation of a volumetric element capable of introducing order, of transforming rules, and of helping modern architecture in its onerous task of creating housing for the machine age (see pp. 59 and 168).

* * *

But the mind refuses again and again to accept shackles, and I begin to reason thus: when I compose some of my pictures with the help of the Modulor—when the internal measurements of my plastic and poetical invention are regulated by

(1) Pointed out by Michel Bataille.

intervals of the Modulator (series of pictures painted in 1952, 1953, 1954) I wonder suddenly whether I have not deprived myself of the joy of getting outside myself (the human dimensions) in order to enter the realm of art, the realm without dimension and without limit.

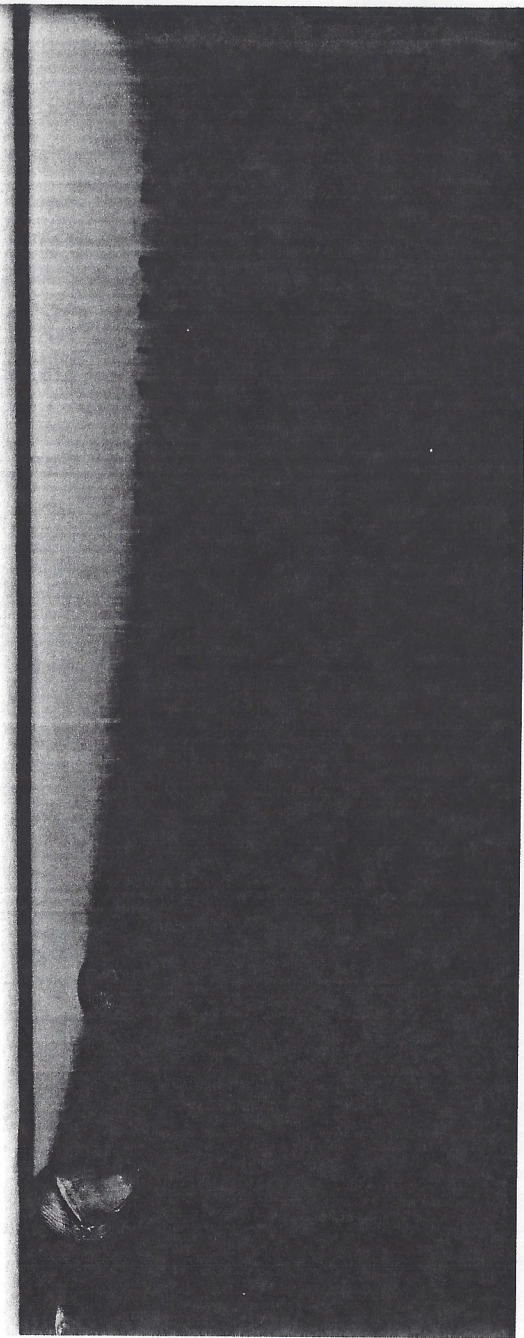
The Modulator holds me in the extension of my limbs; I remain within my universe. Am I right? Cannot, on the contrary, a harmony outside the human stature lead to *magic*? I am spelling 'magic' as the English and Americans do to emphasize a neologism of the picturegoer's slang, sign of a rightful desire to escape. But the work of art, by definition, is an object of supreme escape, sailing the open seas, being carried to sublime regions (all this without using 'big words'). The experience of my life, a deeply rooted conviction, forces me to admit that escape—as a poetic event—is the product of precision.

On careful reflection, the possibility we have just considered does not seem to me to constitute a serious threat.

If the magic of escape can be sought by the means of non-determination, non-will, objective non-manifestation, there exists yet another escape, one which keeps recurring in the pages of this book: the escape sought by those who dwell above or outside the common throng, in the abstraction of symbols, in the lofty heights of metaphysics. I have already said that I cannot rise as high as that. My attitude is explained in the first volume of the Modulator, pages 50–51.

'We may, therefore, say that this rule pins down the human body at the essential points of its occupation of space, and that it represents the simplest and most fundamental mathematical progression of a value, namely the unit, and the two golden numbers, added or subtracted.'

And page 51 gives the drawing which was, perhaps, the crucial moment of the Modulator: an image of harmony, an invention by a plastic artist who, across the grid of figures (or numbers), draws that which is close to his heart: a harmonious



spiral (or shell), a material phenomenon that can be grasped by the eye, dazzling in its scope (see also, in this volume, p. 80).

At that point the key was the figure 108, coming from 175 and leading to 216. The date: 10th January, 1946, right in the middle of an Atlantic storm, on a freighter without ballast, dancing in the waves. This key—108 derived from 175—later transformed itself usefully into 6 (feet), i.e. 183 centimetres, leading us by way of Φ to 113 and from 113 to double that number, i.e. 226.

Now on 16th December, 1950, I had taken some notes at the Bibliothèque Mazarine, from a book called 'Natural Architecture' to which my attention had been drawn by M. Rouhier of the Vega bookshop in Paris:

'The fundamental Hindu key is the Avalokiteshara of the 108 names.

$$8 \times 108 = 864$$

108 and 7

$$216 = 2 \times 108$$

$$\text{or } 223 = 216 + 7 (= \text{paraclete}).$$

'108 and 7 are universally regarded as mystical and fundamental numbers.

'108 and 49 (7×7), — double that sum = 314 = relationship between the diagonal and the short side of the "long silvered square" dedicated to the Skati

$$\left(\frac{108}{7 \times 7} = \sqrt{5} \right).$$

I had gone from 108 to 113 in order to make peace with the foot-and-inch, that is to say I had exchanged the man of 1.75 metres for the man of 182.9 and I had obtained 226.

But the figure 113, it appears, is also a great number, a key. I had found it myself, again and again, in many measurements taken during my voyages ('Modulor I', pages 205, 208, 202, 198, 197, 194, etc.). M. Guettard had already said to me, mysteriously: '113 is a key'. As for me, however, I speak of 113

centimetres or 108 centimetres and I do not see any keys in centimetres!

In the same book found in the Mazarine library, a Hindu value is given as decisive: the Purusha of the Brahmins: a man lying fully outstretched, the arms forming an extension of the body. At Chandigarh I wanted to add to my know-

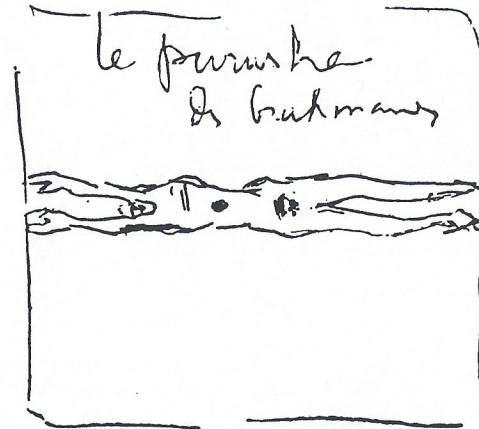


FIG. 83

ledge of religion; I asked Shri Varma, the Chief Engineer of the Capital, a deeply religious and learned man, whether he knew the Purusha. He did not know it. But perhaps that means nothing. . . .

I, as a layman, find this Purusha most attractive.

* * *

We could go on forever like this, along the endless path of delectations. An end has to be made. Others, long before us, have occupied themselves with these matters. The inventor of the 'Holy Bottle' made the Lady Noble Lantern Bacbuc ask this question: 'WHICH OF YOU IS IT WHO WANTS THE VERDICT OF THE LADY BOTTLE?'

.

'... arrived at the island of our desire ...

'Today at least we have what we have been seeking with so much toil and labour.

'... were inscribed two verses:

Ere you pass this postern, pray

Get a lantern on the way.

... How we descended the Tetradic Steps

... the steps one, two, three and four makes ten

multiply by the Pythagorical tetrad =

ten, twenty, thirty, forty

Makes a hundred, answered Pantagruel

Add the first cube: 8

=108

'At the end of that fore-ordained number of steps we shall find the temple door ...

=true psychogony of Plato, which was so highly praised by the Academicians, but so little understood. The half of it is made up of unity, of the first two plain numbers, two squares and two cubes (1, 2 and 3 squared = 4 and 9, and cubed = 8 and 27). That makes 54 (said Plato).

(They go down 108 steps).

'... Most wondrous lady, I beg of you with a contrite heart, let us turn back. For, by God's truth, I'm dying from sheer fright (says Panurge).

'... was carved ... this iambic verse ...

Fate leads the willing, but the unwilling drags.

and:

ALL THINGS MOVE TO THEIR END.

'How the water of the fountain tasted of different wines, according to the

imagination of the drinkers.

“Drink”, said Bacbuc, “once, twice, and three times. And now again, changing your thoughts, and each time you’ll find the taste and savour of the liquor just as you imagined it. After this you must confess that to God nothing is impossible.”

‘ . . . Bacbuc asked:

“Which of you is it who wants the Verdict of the Lady Bottle?”

“I,” said Panurge.

“My friend, I have only one thing to say to you. When you come to the oracle, be careful to listen to the verdict with one ear only.”

Then she wrapped him up in a green gaberdine, tied a fair white nun’s snood round his head, muffled him in a mulled-wine strainer, on the end of which, instead of a wool-tuft, she tied three skewers, put two ancient codpieces on his hands for gloves, gave him three bagpipes tied together for a belt, bathed his face five times in the fountain, and after that threw a handful of flour in his eyes, stuck three cock’s feathers on the right hand side of his mulled-wine hood, made him turn nine times round the fountain, take three pretty little jumps, and give seven bumps with his bottom on the ground. All the time she was muttering some spells or other in the Etruscan tongue and sometimes reading from a book of ritual, which one of her mystagogues carried beside her.

‘ . . . Led him by the right hand through a golden door out of the temple into a round chapel. . . .’

‘In the middle of it was a fountain of fine alabaster, heptagonal in shape . . .

‘Within it was half immersed the sacred Bottle . . .

‘ . . . made Panurge kneel down and kiss the edge of the fountain, and then ordered him to get up and perform three Bacchic dances around it . . .

‘ . . . opened her book of ceremonies and made him sing an old Athenian vintage-song, which goes as follows:

O
Bottle full
Of mystery,
With a single ear
I hark to thee.
Do not delay,
But that one word say
For which with all my heart I long.
Since in that liquor so divine
That your crystal flanks contain
Bacchus, India's conqueror strong,
Holds all truth, for truth's in wine.
And in wine no deceit or wrong
Can live, no fraud and no prevarication,
May Noah's soul in delights dwell safe and long,
Who taught us use in moderation
Of our cups. Be kind to me,
Let the fair word be said.
From misery set me free
Then no drop, white or red
Shall perish. There shall be no waste of thee.
O Bottle full of mystery,
With a single ear
I hark to thee.
Do not delay.¹

¹ From J. M. Cohen's translation of Rabelais published by Penguin Books.—*Translators*

‘... Bacbuc threw something into the fountain and suddenly the water began to boil fiercely, as the great cauldron at Bourgueil does when there is a high feast there. Panurge was listening. . . .

‘... when there issued from the sacred Bottle a noise such as bees make that are bred in the flesh of a young bull slain and dressed according to the skilful method of Aristaeus. . . .

‘... Then this one word was heard: Trink.

‘... Then Bacbuc arose and, putting her hands gently beneath Panurge’s arms, said to him:

“Give thanks to heaven, my friend. You have good reason to. For you have most speedily received the verdict of the divine Bottle; and it is the most joyous, the most divine, and the most certain answer that I have from it yet, in all the time I have ministered to this most sacred Oracle . . .

“... Go, my friends, under the protection of this intellectual sphere, the centre of which is at all points and the circumference at one, and which we call God; and when you come to your country bear testimony that great treasures and wonderful things are hidden beneath the earth.”’

.

Panurge was waiting for ‘the word that would deliver him from wretchedness’. He demanded a miracle. The Bottle replied ‘Drink!’ (or ‘trink’).

To assist my own understanding, I interpret: act, and you shall see the miracle. Do not seek a gloss! Do not try to escape! The Bottle tells you: Drink.

* * *

On 18th May, 1950, after reading ‘The Modulor’, Henri Kahnweiler wrote to me: ‘I am very touched by the kind things you say in connection with my book on

Juan Gris. I believe, however, that it would be of some use if I were to explain myself on the subject of geometry and mathematical relationships. I think, as you do, that it is perfectly legitimate to "take these things into account". I think that present-day architecture has much to gain by adopting your ideas and the Modulor. I think that, by so doing, it can escape anarchy and will arrive at correct propositions. That is a great deal, but it is not everything. In this way we shall have some harmonious cities: and that means a tremendous amount.

'What I do not believe, however, is that it will be possible, in this way to *create beauty* all at once. Buildings will be constructed which are *pleasing*. I repeat: that means a tremendous amount.

But beauty is a mysterious gift which some—the great artists—confer upon their work.

'You, Corbu, are a great architect, the greatest of our age, a marvellous *creator of masses*, and—what is more—of *spaces*. Geometry is to you a springboard, or if you dislike the term, a rule, as it is to Gris. But when you create *beauty*, you do so without knowing it. I shall always maintain that no true artist ever *aims* at beauty. He pursues his goal, which does not always means the same thing. You, like Solness, create "dwellings for men". Beauty crowns them with a mysterious nimbus that has no explanation.

'That, my dear friend, is my opinion on the matter.

'Always yours,

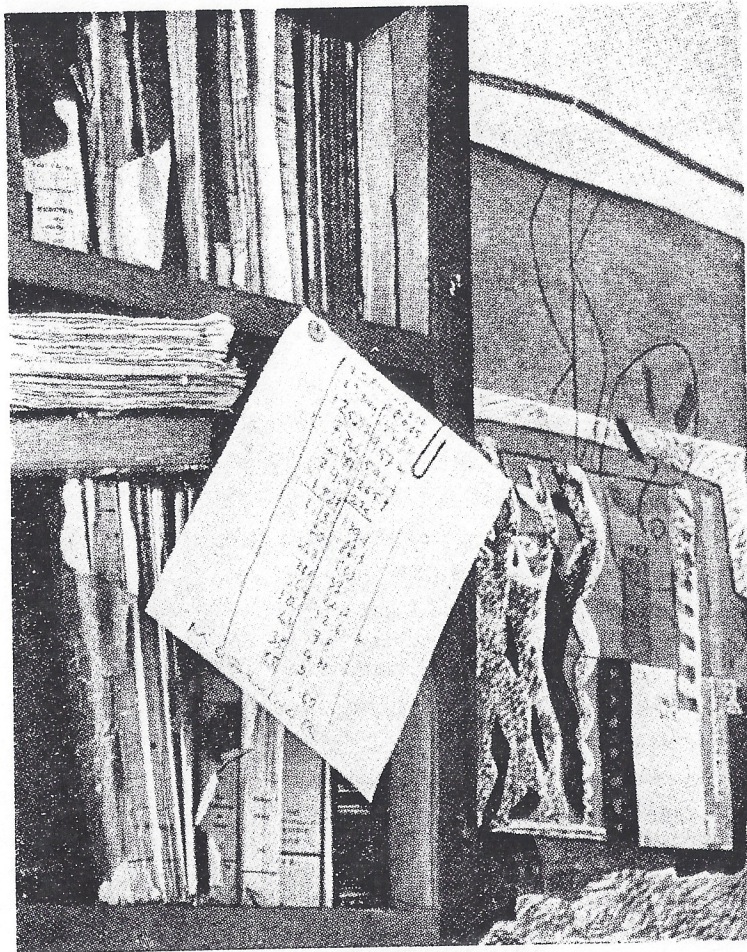
'KAHNWEILER.

'In substance, what I have just written is only a clumsy paraphrase of Einstein's admirable words which you quote.'

* * *

Behind the wall, the gods play with the worlds, with souls. As they pass along

their side of the wall, men sometimes hear noises, words, pick up snatches; they are but crumbs from the rich man's table.



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FIG. 85

