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BARIZ CASE STUDY

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BARIZ: A CASE STUDY IN RURAL HOUSING
(New Valley - Kharga Oasis)
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Introduction, a Historical Note

1- Bariz is the Arabic pronunciation of Paris, a Ptolemaic name, not that of France which comes from the Parisii tribes. It is an oasis in the western desert, 60 kms to the south of the town of Kharga, the capital of the region.

2- There exists the old village of Bariz but the Desert Development Organization decided in 1963 to build a new Bariz around a newly discovered well, 6 kms to the north of the old one, as part of its plans for the New Valley. The irrigation potential of this well is estimated to be 1000 acres of farm land, which allows New Bariz to become a mother village serving a region of 40 kms diameter with six hamlets besides the old Bariz.

3- It happened that I had been working as director of the Pilot Projects in the Ministry of Scientific Research at that time and H.E. Dr. Salah Hidayat, the Minister, put my name to the D.D.O. to undertake the design and supervision of the project which was to be carried out as a scientific research.

4- This project presented an interesting case study in rural housing in general as it represented markedly the environmental conditions common to the whole rural area in the country but which are not so acutely felt in the valley as they are in the oasis. Unfortunately, this project was stopped for lack of funds after it has started to yield most valuable results.

5- Recently, it was found that there are millions of cubic meters of fresh underground water flowing from
the equatorial African plateau to the Mediterranean in the western and eastern deserts. This water is sufficient to irrigate 2 million acres of desert land and H.E. the President of the Republic decided that projects for land reclamation be started, covering the area from the shores of the Red Sea to the oasis in the western desert.

6- If we add to these 2 million acres, the prospect of reclaiming 2 other millions from the High Dam, Egypt will have increased the area of arable land by 60%, which implies a revision of the distribution of the settlements over the whole geographic area of the country.

7- By necessity, this enterprise would need scientific research to be done and Pilot projects to be carried out to ensure the success of this most important enterprise for redressing the ecological balance in the country. To exploit new land of such a size would need recommending a particular balance of occupations for the settlements to maintain a fair standard of living and the creation of hierarchized rural and urban human settlements, graded from farm to hamlet, village, mother village to town city, and provincial capital. These should be distributed logically over the geographic area. The Crystalliser system can be of great help in plotting these settlements on the map. Bariz had to be part of the scheme representing a case-study for a settlement of the order of a mother village to serve a population of 5 to 10 thousand people and it is hoped that funds will be provided and the built part be scientifically evaluated and that the construction be restarted and the scientific research resumed very soon.
About the Philosophy of the Planning for Rural Areas

8- When an engineer designs a machine, a bridge, or a regulator, every single line of his drawing is the result of a great accumulation of laws and principles from a dozen different mechanical sciences. He designs the machine to stand a certain amount of strain and to do a particular job; in both these aspects he must consider and apply all that he has been taught in college, of physics, dynamics, structure mechanics, the resistance of materials, etc., and into each line goes a whole library full of expertise.

9- When an architect designs a town or a building, each line is determined in the exact same way by the application of the same complex of mechanical laws, with the addition of a whole gathering of other sciences whose provinces are less well defined; the sciences which concern man, his environment and society and to which he must add his own artistic and creative sensitivity.

10- These sciences, sociology, economics, geography, demography, climatology, physiology, the theory of architecture, aesthetics... are no less important to the architect and planner than the mechanical ones, for they are directly concerned with man, and man is the end of architecture.

The touch stone in evaluating any project lies in the answer to the question: "is it for man or for something else?"
If it is for man we can discuss and argue, but if it is for something else; politics, economy, etc., there will be no discussion because really, anything could be done then.
The Humanistic Attitude

11- Over many centuries, the people in each part of the earth have learned, by trial and error, how to deal with their environment. They have adapted the rhythm of their life to it, and their habitat and clothes, and they have built houses which are more or less satisfactory. Their solutions to the problem of housing were not the result of scientific thinking. They grew out of the countless experiments and accidents, out of the experience of generations of builders who kept what worked and rejected what did not, and these solutions were handed on in the form of tradition.

In any act prescribed by tradition, it is essential that every injunction of the tradition be strictly observed. Any unthoughtful change, in just one element of traditional building and town planning may well be enough to destroy the whole validity of the design.

12- To give an example: the town plan of old Kharga (the town is of the traditional type with narrow meandering streets which are covered in parts), the houses are introverted, opening onto inner courtyards which modern scientific research proved to be the most suited to the desert climate*

Recently, the Desert Development Organization, remodelled the town and the planners changed the traditional concepts radically, adopting the modern

grid-iron pattern with very wide avenues and extraverted buildings opening directly onto the hostile desert including the offices of the D.D.O.

When I visited the offices of this Organization in the town of Kharga there was a sandstorm. The heat was intolerable and hot wind was blowing sand into our faces like lead shot. I asked Hassan Effendi, one of the clerks, to take me to the old town. He was reluctant because he was ashamed and said that there was nothing to see there "the town is old fashioned and the streets narrow and full of flies...". But I insisted telling him that before going on with the design of Bariz, I wanted to see what his forefathers had to tell me and whether they could guide me, or, if they had failed, to know what they had done in order to avoid their mistakes. Seeing my insistence, he agreed and lifting the collars of our shirts, we jumped into a jeep car which took us to the old town. After entering the old town no more than 15 meters, we found that there was not a speck of dust in the air and the temperature was cool and nice.

When I remarked to Hassan Effendi how agreeable it was there and that his forefathers were not at all backwards but that it is we who are, he was astonished. He told me how vexing it was for him not to have recognized how comfortable it was in the old town and that he had to wait until I came from Cairo to make him notice it. He started to cry and told me that he had sold his family house in this paradise for 200£ and had bought a flat in the new town for 800£, and that now his children did not sleep and kept crying and had pimples ever since they moved.

Seeing how affected he was, I wanted to confirm him in his new discovery and hummed a sourat from the
Koran which says:

Hast thou not seen those who exchanged
the bounty of God with unthankfulness
and caused their people to dwell in
the abode of ruin?
Gehanna, wherein they are roasted;
and evil establishment.

Hearing this sourat, he cried even more, cursing
the architects who made him dwell in the abode of ruin.
To calm him, I reminded him that I am myself one of the
architects whom he was cursing, and then he stopped.

This story shows how certain false ideas about
modernity and progress can act in brain-washing a clerk,
not to mention a peasant, making him fail to notice on
his skin a difference of air-temperature of no less
than 20°C. It also shows how imperative and urgent it
is that scientific research be conducted by some
recognized center or institute to evaluate all the
solutions and design concepts, old and new, with regard
to architecture, town planning and climate, before going
on with the design in such specific regions, and to
correct the meaning of modernity and anachronism,
progress and retrogression in the minds of planners and
of the masses.

Environment

13- The architect does not put his building in the
interstellar space, he puts it in two environments:

-number one is the God-made environment which
consists of the landscape with all that makes it
and its configuration, valley or mountain, or
plain, etc., as well as the fauna and flora and
man himself, the climate and the atmosphere
with its seven zones that envelop the crust of
the globe, and even the stratosphere beyond with
regard to the cosmic rays which affect life on
the globe.
-number two is the man-made environment, the
built or urban one.

If the architect does not respect the first, it is
a sin against the Creator, and if he does not respect
the second it should be considered a lack of civility
towards those who preceded him, on condition that they
themselves had respected the one made by God.

14- In Bariz, there was no man-made environment on
the site of the project. But this does not mean that
I am freed from the constraints imposed on the
designer by respecting the work of his predecessors
in the area, and Bariz should be a continuity of human
response to the natural environment. There was Bagawat,
a fourth century settlement of about 250 buildings,
dwellings, churches and tombs which were built by the
Christian refugees fleeing from Roman persecution who
arrived empty handed and with severed connection to
civilization. They built their shelters of the
materials that were there on the site mainly; silt
and stone - with no means of transportation, with no
industrialized materials, with no bulldozers, no cash
and no contractors, etc., depending entirely on their
hands and brains and the inherited technique of
brick-making and building construction. The houses
they built endure today as a most beautiful community
of great architectural and structural sophistication.
The solution to the roofing problem with vault and
dome in mud-brick is a structural feat, especially when
they used combinations of the two to roof the same
space permitting the covering of larger spaces without
increasing the height.

For 1600 years, these buildings have stood
in the desert an inspiration for the architects and
engineers who had no chance of knowing about their
existence, and it is time now that they be evaluated scientifically and make use of the solutions and examples achieved by these early builders. Fortunately, I had in mind to use the same technique of roofing for New Bariz.

New Gennah

A second man-made environment in the area to be considered is the contemporary village of New Gennah, not for its architecture and structures which are not as distinguished as Bugawat, but for the way it is built cooperatively with no cash.

The old Gennah was submerged by the moving sand and so the villagers built a new Gennah to which all but one old man moved. This old man refused to move because of his attachment to his home of many years, although only two rooms remained unburred. When I asked the Mayor: What would happen when the whole house is covered? He answered: Don't worry, we have already built him a house in the new village down there with us. This could not have happened except in a cooperative system where no cash needs to change hands. The architect who would build for the poor must consider the virtue of the cooperative system which permits individual situations to be community responsibility without the expense of cash which is not there.

Among the intentions of the designer of Bariz was to continue the custom and example of these two cooperatively built neighbour settlements.

Apart from that, there were old Bariz and all the other villages in the oasis to which new Bariz will be added and must match with. Unfortunately, we had no plans of old Bariz or of any other town or village in the region to guide me in the design. But there was the village itself, built in the traditional lay-out and configuration, with its narrow and meandering
streets and introverted houses, in which I experienced the same comfortable climate as in old Kharga. However, for the design purposes, I had to see these villages in architectural plans and drawings, so as a tentative to explore how the design should look like with respect of the complex of disciplines and criteria. I chose an image of a typical desert town plan of a Tunisian village which was projected on a hypothetical plot-plan of a neighbourhood for Bariz. I then superimposed on it the various solutions with respect to the different factors to be considered, correcting and adapting it each time with the image of the previous solutions under sight. These factors were: the climatic, the demographic, communications and the aesthetic factor. (fig. 2-3-4-5).

The Climate

The problem of climate and architecture is vast and there exists a substantial literature on the subject. I will present here only those experimental ideas that were actually applied in the buildings erected or conceived in plan. These ideas and experiments are not yet scientifically evaluated although the buildings have been standing for more than twelve years.

Climate in Bariz and Kharga Oasis

Meteorological records in Kharga Oasis show that the air temperature in July and August reaches 48°C in the shade near the ground which surpasses by far the comfort zone and carries serious physiological consequences. It is known that the life span of the bedouins in the region is short because of the kidney diseases resulting from the excessive heat and dehydration of the body.

In the design of the village, we must take the greater care to create a comfortable atmosphere indoors
and out of doors, ensuring that air temperature and humidity do not go out of the comfort zone.

Natural Cooling

This is to say that the prerequisites of natural cooling and air movement must be respected in both house design and town planning. Air at the higher levels is cooler during the day than near the ground. In many traditional house in Egypt and Iraq, Iran and India, this phenomenon is put to use for air cooling and for creating drafts indoors with wind catches and "badgeers".

The wind catch is a shaft rising above the house and designed with a large opening facing the prevailing wind in such a way as to catch the air from the higher cool layers and to blow it into the room. The use of the wind catch goes back to antiquity as can be seen in the frescoes of the tomb of Neb-Amun in Gourna, dating from the 19th dynasty.

Our new idea of the wind catch was tried in the market in Bariz, to cool down the food stores in the basement and on the ground floor.

It consisted in having two shafts, one with the opening facing the windward side, the other to the lee side with a metal chimney pot with blades leaning downwards to the outside, as can be seen in some places in Italy, to ensure suction by the venturi action, and painted black to get hot and draw air from below by convection as well. In order to add to the cooling effect of this wind catch, it was designed to have sheets of straw-mats hanging inside and wetted by a hand pump drawing water from a basin placed in the basement. The residue of cool water is repumped every now and then to wet the mats adding cooling by •••••
evaporation to the system. A friend of mine who visited Bariz last July told me that he was shivering with cold in this basement while the air temperature outside was 46°C. This without the wetted straw-mats. This bodily experience remains to be confirmed by scientific measurements of air temperature and air movements outside and inside of the rooms and within the two shafts of the wind catch at the inlet and at the outlet.

The House Design

In almost all the towns and villages of the hot arid zones, the houses are of the introverted type with rooms opening onto inner courtyards. This design concept proved to be the best for protection against the hot winds of the desert and for cooling the air, by storing the cool air, which deposits in the courtyard during the night (there is a drop of about 20°C), and keeping it until a late hour in the day.

Town Planning and Climate

Thermal comfort depends on air temperature, air movement, relative humidity and radiation. Shading is the first means of protection against heat, this is demonstrated in the traditional village configuration with narrow, covered and meandering streets.

Air movement is generated by pressure differential and by convection or the stack effect, with hot air rising and cool air replacing it, creating the movement.

There are two interesting historical examples of this principle of directing air movement where it is wanted. One is the arrangement for the tablinum in the Pompeian villa. It is a sort of loggia between the impluvium and the cortile. The cortile being larger.
VILLAGE OF PARIS, KHARGA OASIS
NEIGHBOURHOOD UNIT FOR NON FARMERS

FIRST FLOOR PLAN
SCALE 1:200

ARCHITECT HASSAN FATHY
VILLAGE OF PARIS - KHALGA OASIS
NEIGHBOURHOOD UNIT FOR NON FARMERS

ARCHITECT: HASSAN FATHY
it heats up more readily with the air rising as a result. This air is then replaced by cool air coming from the impluvium through the tablinum which gives the effect of the under bridge. The second example is the "takhtabosh" in the Arab house, which is in fact a transposition of the tablinum. It is covered loggia giving onto the courtyard or sahn on one side, and on the other side is opening onto the garden through a mushrabeya screen.

The garden being larger, hot air would rise more readily in it, drawing cool air from the courtyard which will pass through the Takhtabosh, providing a comfortable place to sit in.

The principle of the Takhtabosh and Tablinum was tried in the town plan of one of the neighbourhoods for non farmers in New Bariz. As so to speak, Takhtabosh was placed between two squares one smaller than the other, thus generating a draft by convection. The smaller square was designed facing North and the larger facing South thus helping air circulation by the pressure differential and, at the same time, creating drafts by the stack effect. On the southern side, it has an over-hang for shading in the summer when the sun is high and letting it in in winter when the sun is low, making it usable in both seasons. (fig. ).

The Demographic Factor

In New Bariz, I did not know at the beginning the name of even one individual for whom I must design. All I had at my disposal were the demographic facts, the climatic information, the geographic facts, some numerical indication of professional class; I myself brought the aesthetics; the feeling for man in man-made space.
A human settlement made of farmers only does not make an organic community. There should be a diversity of occupational groups to ensure the provision of all the services required to maintain an acceptable standard of living. For instance, if there were no plumbers, there would be no sanitation.

In 20 agricultural counties in England, the working population engaged in farming was 41%, the remaining 59% being distributed among the various trades, professions and services. While in the region of Hilla in Iraq, the working population engaged in farming was 92% with only 8% of the other trades to serve the region. This according to a survey carried out in the fifties.

As to planning with regard to the problem of occupational balance, the I.L.O. has provided the International Standard Classification of occupations in 1958. It gives a full list and specifications of the different trades and professions which can be used as a reference and check list.

For the Bariz project, these professions were chosen by kind from this list, then by number. It was decided to have accommodations for a community of 150 families of farmers and 100 of the other professions to serve Bariz and the region around it.

Recruiting of Immigrants

We said before that there is an overpopulation in the existing villages and to my mind the best system is to recruit the inhabitants for every new village from one of the over populated villages, in inter related family groups, in a well balanced demographic composition with regard to sex, age, professions, habits and culture. In this way, if they were to loose their attachment

...
to the place in the old village, they would not be deprived of their attachment to the community, and will still benefit of the traditional system of cooperation in satisfying those of their needs which demand collective efforts. Thus, they will take roots in the new place more easily.

There was a village called Reyad in the province of Assiout which was chosen for recruiting the immigrants for New Bariz. This Reyad is on the edge of the desert with similar climate and consequently culture as the Oasis.

The training system included the professions needed for the construction of the New Bariz by its own inhabitants as well as the other professions needed for maintaining an acceptable standard of living.

The Aesthetic Factor

Unity in variety and not in uniformity

The architecture of a house, its location in the village and its size are all expressions of the personality of the owner and the social status of his family. The house is, in fact, the portrait of its owner with which he faces the community.

In Nature, not two men are alike. Even if they are twins and physically identical, they will differ in their dreams. The architecture of the house emerges from the dream, this is why in villages built by their inhabitants we will find no two houses identical.

This variety grew naturally as men designed and built their many thousands of dwellings through the millennia. But when the architect is faced with
the job of designing a thousand houses at one time, rather than dream for the thousand whom he must shelter, he designs one house and puts three zeroes to its right, denying creativity to himself and humanity to man. As if he were a portraitist with a thousand commissions and painted only one picture and made nine hundred and ninety nine photo copies. But the architect has at his command the prosaic stuff of dreams. He can consider the family size, the wealth, the social status, the profession, the climate, and at last, the hopes and aspirations of those he shall house. As he cannot hold a thousand individuals in his mind at one time, let him begin with the comprehensible, with a handful of people or a natural group of families which will bring the design within his power. Once he is dealing with a manageable group, of say 20 to 30 families, then the desired variety will naturally and logically follow in the housing.

Compartmenting the village into such neighbourhoods will bring it to the human scale. At the same time this could allow for the creation of closer relationships and breed cooperation and concern within the group. This is a prerequisite to the owrkability of the owner-builder system (the only realistic solution to the problem of housing the poor).
Building Materials and the Techniques of Construction

Conditions of rural housing in the Arab world are far from satisfactory. Several governments and organizations have been seeking practical solutions for nearly forty years without coming to a satisfactory conclusion.

According to statistics published by the U.N.O., some fifteen years ago, there were 800 million people of the so-called "Third World" doomed to a premature death because of the bad conditions of housing this figure must have surpassed the billion by now because of population increase and lack of proper action.

Several governments and international organizations have addressed the problem and carried out researches and pilot projects but no valid solution has been reached so far which was inexpensive as well. As a matter of fact, all experiments up to date have shipwrecked on the rock of costs.

U.N.O. had fostered the system of aided self help to reduce the cost of building by providing the peasants with concrete shakers for making prefabricated elements but this did not succeed in bringing the costs within reach of the people nor within reach of their governments.

At the end, the unworkability of this system was confessed by the E.C.A. one of its reports from which I quote:

"...But the fact is a practical unsurmountable obstacle where the policy is that housing must normally be paid for. Between the limits imposed by the financial profitability of buildings and the solvency of the occupants, the few thousand dwellings built in all Africa are finally inhabited by the
privileged minority of the country. The rest of the population continues to swell in the shanty towns of the suburbs...

... It is without a doubt time to say that there is no chance of finding a satisfactory technical or financial solution to this situation before the African states have attained a certain level of economic development."

In fact, the problem does not lie in the labour which the peasant can provide but in the material, cement, steel, and other industrialized materials which need to be bought in cash.

This should have been obvious to anyone who stopped to consider that the average income per capita per year throughout the so-called "Third World" is £20 to 30.

But if the peasant cannot provide cash, he may provide labour. We have existing examples to show that he can easily convert available materials into housing. From historical times, he was forced to find the right solution to this seemingly intractable problem in many places, with only the available materials at hand such as stone, mud, bamboo, and reeds, etc.

In agricultural areas mud is the natural building material. But mud-brick is a lively material, it does not set once and for all after drying and is affected by humidity and water. There is almost no rain in the Oasis, however, it would be useful to say a word about this matter.

The modern science of soils mechanics has solved the problems arising by using stabilizers by paraffin and bitumin emulsions. The late Dr. Mustapha Yehia built a wall with ordinary mud brick and rendered it with bitumin stabilized plaster and carried out the wetting and drying test on it, exposing it to a controlled shower with the impact of a hard rain, half an hour in the morning and half an hour in the afternoon for six weeks without the plaster being affected.

This test showed that it was enough to stabilize just the outside plastering to make the material fit for use even in the humid zones.

If peasants can easily manage to put up walls, they are defeated by the roof. The roof requires materials which take up bending and tension stresses such as wood, reinforced concrete, etc. These materials, not available on the site, have to be paid for in cash. From antiquity, the people of Egypt, Iran and Iraq have devised an ingenious method for roofing with mud brick solving the problem of stresses and resistance of materials by the geometrical form. They made the roof in the shape of a vault with the profile of a catenary curve, thus annulling the tensile stresses and bending moments exposing the crust of the vault to compression only. They devised an ingenious and simple method for the construction of these vaults, right out in space, without the need for any centering or support. This, they achieved by building the vault in successive rings with bricks laid end to end in a plane slightly inclined to the vertical, leaning against an end wall.

In Bariz, we are in the same situation as the ancients and we must have recourse to the same methods and techniques. Today, in order to ensure the practicality of mud brick architecture into the design
and building, altogether three persons are necessary: the soil mechanics engineer, the structural engineer specialized in shell structures and the architect specialized in mud brick architecture and the techniques of vaulting.

My collaborators in Dariz were Dr. Mohamed Said Yousef, Professor of Soil Mechanics at the Cairo University and Dr. Ibrahim Gafaar, Professor of Structures at the same University.
Cooperation is the Basis of Development in Rural Housing

With reference to the statement of E.C.A. about the unsurmountable obstacle where the policy is that housing must normally be paid for in cash, we can say that the only alternative is to revert to the traditional cooperative system by finding means to make it work under the non-traditional conditions prevailing nowadays. The snag in cooperative building is that one man cannot build a house, but ten men can build ten houses easily.

For cooperations, families have to know each other. Studies have shown that beyond a certain number, anonymity is introduced leading to abstraction of the individual and hindering cooperation. Experience shows that, beyond thirty families, there is confusion. So if the village community be broken up into neighbourhoods of 20 families each, it will be possible for the neighbourhood to build its houses easily.

One team of two masons and four labourers can build a house in 45 days, and if the neighbourhood of 20 families can raise a group of workers of 24 young men and girls, i.e., 4 teams of masons, the neighbourhood can be built easily in about 8 months. It is by releasing the productive potential of the peasants by cooperation that we can have the only answer to the economic obstacle.

In-Service Training

In the past, every village had its non skilled labourers and masons who were integrated into the social and the economic web of the community. They were guided by age-old traditions in the design and
construction. Today, these traditions do not exist any more in most peasant societies and it is implicit that we secure the assistance of the specialized architects to revive the lost expertise and traditions among the peasants until a new tradition is established. Training on building techniques, especially the vault and dome construction for roofing is one of the first things to do.

The best way of training the villagers in building construction is to train them while they are working on a project as helpers, usually called in-service training.

A training course has been devised and actually tried in the Qourna Village Project. By this system, one master mason had trained 46 boys from among these masons helpers who mastered all the operations that go into the construction of every element in the house: walls, arches, vaults, domes, stairs, etc., in 3 months only. By now, they have become 80, seeing the benefits of the craft they taught one another in their village by themselves.

The Auto Construction Centre

If a village is to be built by its own future inhabitants, it is not enough to give them the skills and the materials. We have to add to that the necessary tools and equipment for building construction, a striking proof of the practicality of this system appeared in the building of the school at a village called Fares. This is an isolated village which lies on the western bank of the Nile opposite Kom Ombo with no easy communications, in fact an oasis like Dariz. The contract for building this school had been
offered to the contractors for three successive years for which no one submitted a tender. The school building organization had given me the project as a research work and I proposed to have it built by the small local builders who happened to master the technique of vaulting which they used in their village for roofing. We bought L.E. 200 worth of equipment: scaffoldings, trowels, adges, ropes, etc. and lent it to these local builders against 10% of their due as a rent for using it. The school cost only L.E. 6000.- which was one third as much as normal ones in more accessible places in the region. This school has ten classrooms, a specially designed library and a large multi-purpose room backing an open-air stage for theatricals. It was built in mud-brick with vaulted roofs. The building construction (the gros œuvre) including the roofing, cost L.E. 4000.- so the S.B.O. got back its loan plus L.E. 200.-, and kept the equipment which it used in building another school.

It was this experiment that brought to me the idea of proposing the creation of the auto-construction centre with all the equipment and tools necessary for building as a new amenity to be held in every new and even old villages.

In Bariz, it was the first building we started with.
The Hospital Caravan Serail

When a villager has to go to hospital in town, he is usually accompanied by some of his parents or relatives who would be staying in a hotel. In many cases when these parents are very poor and cannot afford the hotel expenses, they are obliged to sleep in the open somewhere in town. As there are no hotels in Dariz and parents being bedouins who would come on a camel or a donkey back from their villages, the hospital was designed with a caravan serail attached to it to take care of the parents and their mounts. (fig. ).