HOT-DRY REGION

HOUSING CHARACTERISTICS IN THE ARID-HOT DRY REGION

Cities: Riyadh, Medina, Gassim, Mecca

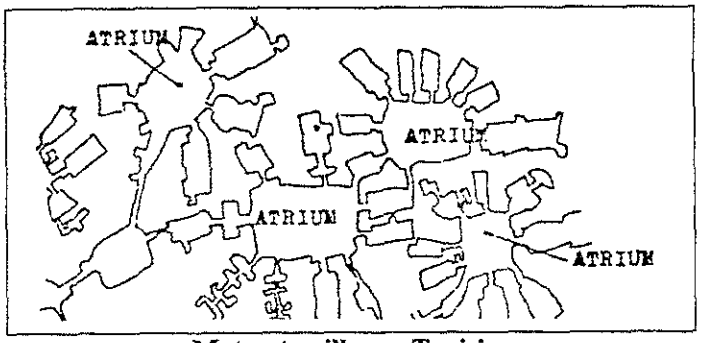
Climatic Characteristics (Example: Riyadh, Location 23 34 N 46 43E)

Average Daily Maximum: May to September approximately 40 C, reaching maximum average high of 43 C, in July.

Average Daily Minimum: November to January approximately 10 C, reaching lowest average minimum of 7 C in January.

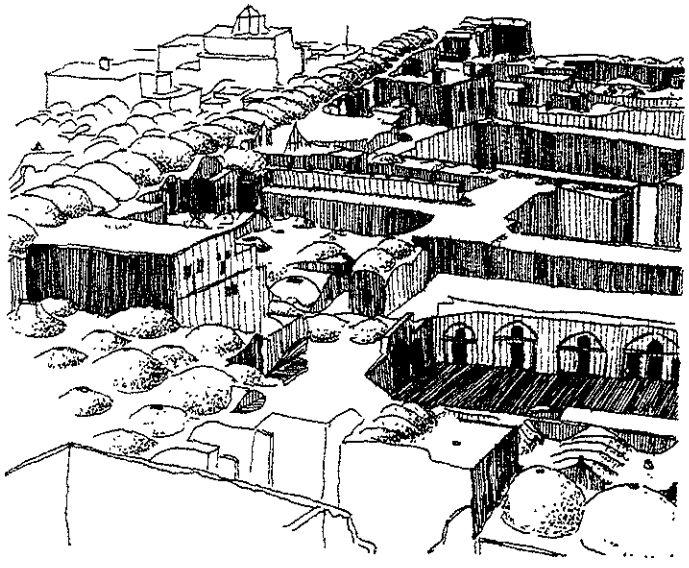
Average Relative Humidity:

Average relative humidity around 40 % to 50 % during November to February, reaching highest average of 50 % in December and Januray, thus indicating higher humidity during periods of colder temperatures and rainfall. Otherwise one finds a low average humidity of approximately 15 % to 16 % during June to August indicating low humidity during hot-dry periods. Rainfall: There is an annual a0verage rainfall of 59mm falling mostly during December to May, leaving June to November completely dry. The highest average rainfall of approximately 21mm occurs during March and April. (Climatological data summary period 1966-1975.See appendix for climatic zone maps.)



Matmata village - Tunisia

Troglodyte dwellings in Tunsia - presently used as a hotel for tourists

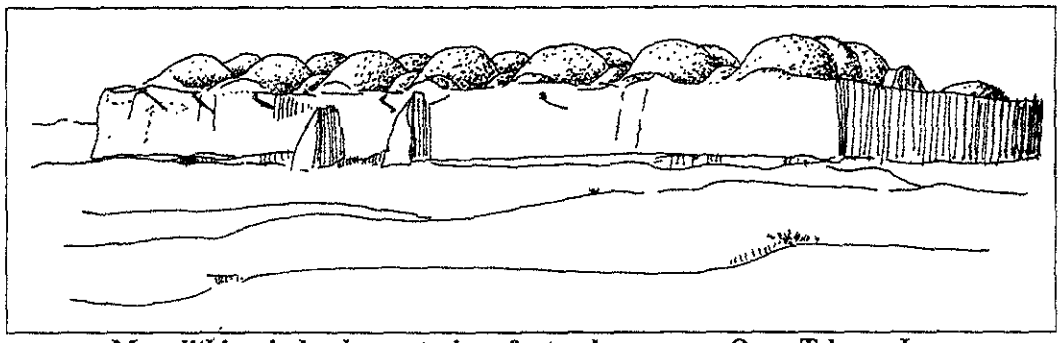


Courtyard houses - Isfahan, Iran

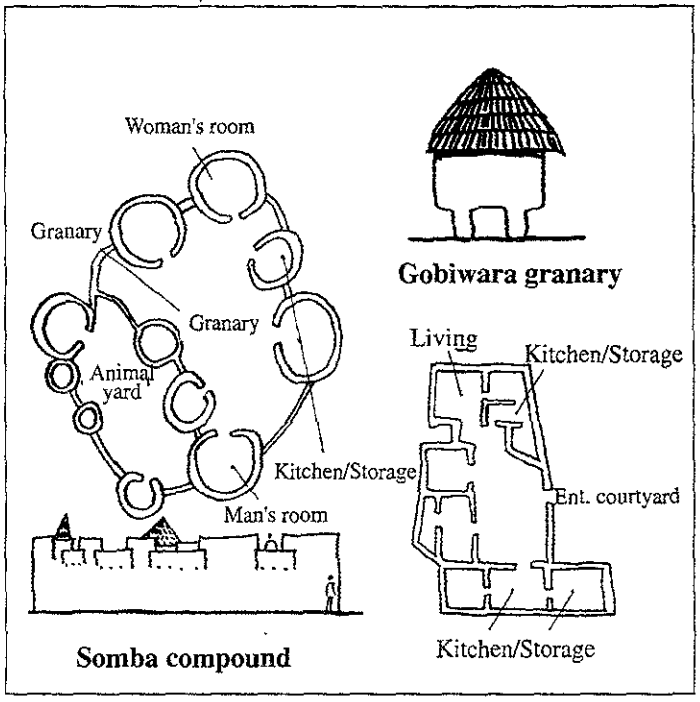
Traditional Climatic Design Response - Atrium Adobe Houses - Introduction:

Introverted atrium houses are found everywhere in the arid regions of the world. The atrium which forms the core of a house not only acts as a climatic moderator but generates a unique private lifestyle of cultural as well as spatial significance to the designers. The atrium houses possess a unique spatial quality in providing a small out-door space within the house. In Arab countries, where the sense of privacy differs from that in the western countries, atrium houses provide satisfactory cultural advantages along with climatic benefits.

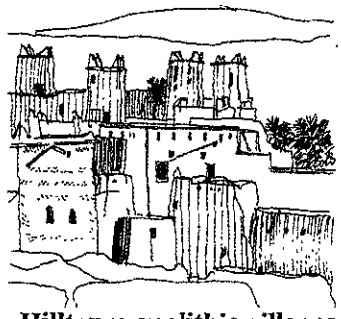
Atrium adobe houses may be looked upon as earth sheltered spaces for living. Thick adobe walls act as above-ground earth shelter while the atrium provides the necessary daylight and air-change. The atrium adobe houses in Saudi Ara-



Monolithic windowless exterior of a tea-house near Qum-Tehran, Iran



Somba compound



Hilltop monolithic villages of Morocco and Tunisia

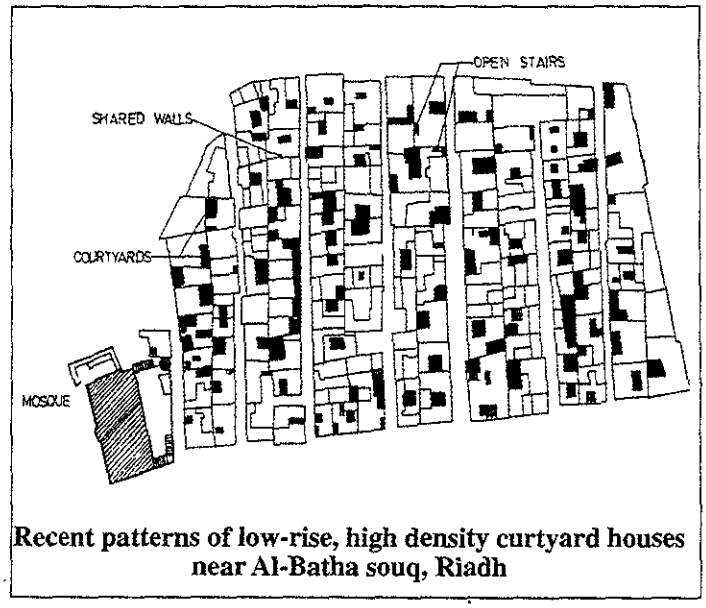
bia represent exemplary links to the formation of communities in the past. Their culturally and climatically significant design methodology has equal relevance to contemporary architecture. Historically, several examples of atrium architecture are known to us in Iran, Iraq, Saudi Arabia, Morocco, Tunisia, Egypt, Jordan, Yemen, and most other Arab countries. Underground as well as above-ground atrium buildings were built as far back as 3,000 B.C.

Most famous among such developments in Matmata village in southern Tunisia, where people continue to live in underground courtyard houses. The underground houses as well as other building types were built to over come the severity of the climate as well as for defense against hostile nomadic tribes. In recent times some of these courtyard houses have been converted to serve as guest houses and hotels for tourists. This further emphasizes the usefulness of underground atrium buildings for contemporary use.

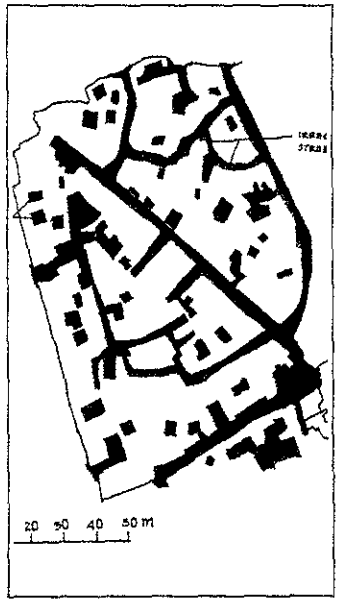
In Isfahan:

Iranian courtyard buildings are interwoven to form the fabric of a large city which provided an interesting environment for living. All entrances and windows open into the courtyards. Such a development for all practical purposes represents one huge interwoven earth-sheltered structure, because only the roof of each building is exposed to solar radiation while all other building elements remain protected from the sun. The sun penetrates the courtyards only at high noon. Most of the walls except those forming court are shared walls.

In Morocco one finds inter-



Recent patterns of low-rise, high density curtyard houses near Al-Batha souq, Riadh

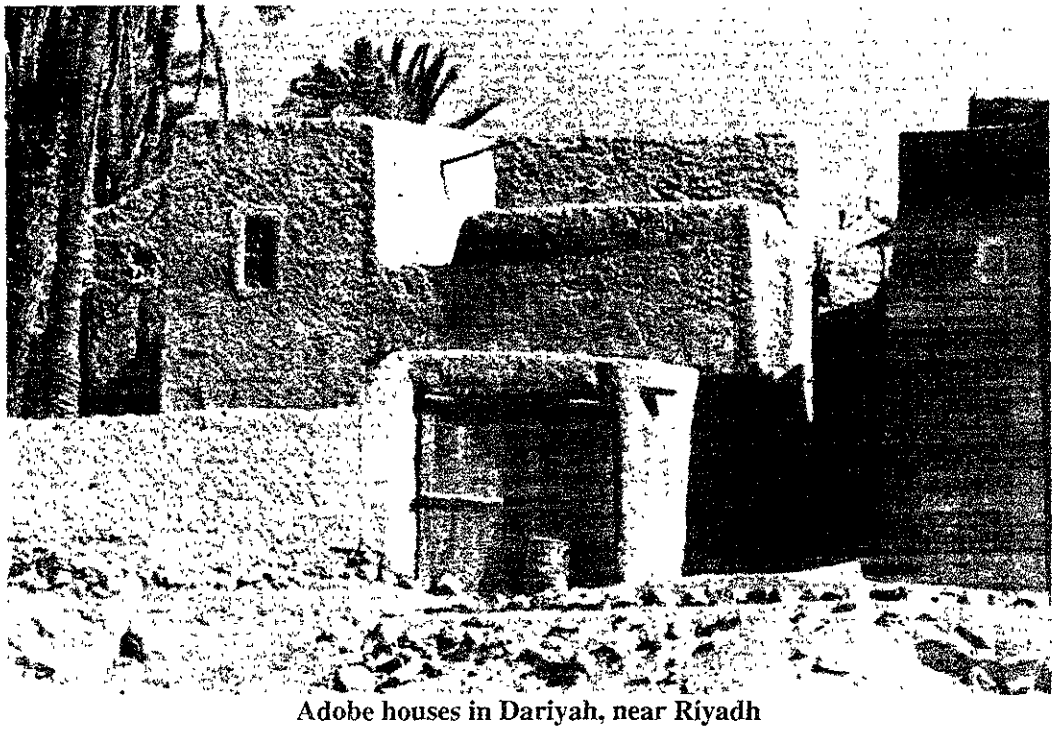


esting villages in the valleys as well as on the hilltops which are monolithic structures containing all types of buildings under one roof. The roof of such a continuous structure is perforated for light and air by atriums or lightwells. These fall adobe buildings are the most extraordinary forms of earth-sheltered above-ground buildings and are well worth studying for possible applications in temperate climates.

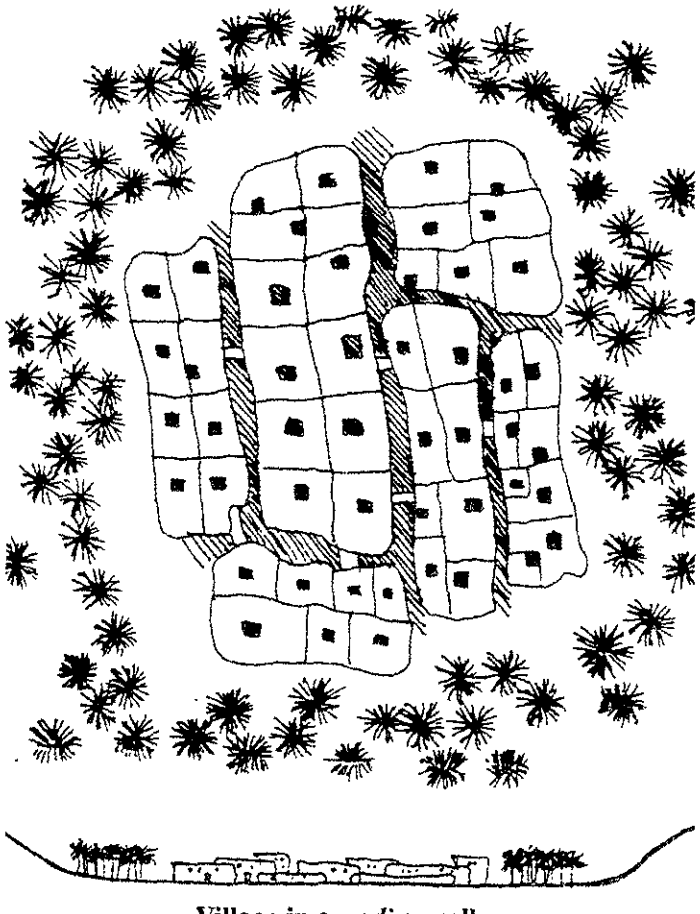
Group Forms And Communities :

Courtyard houses, when grouped together sharing as many as three walls with each other with only narrow streets in between, create an environmentally consistent solution as a whole. The courtyards and narrow streets in such a situation become the only openings in the large "mud-lump" structures illustrated here.

An organically evolved adobe atrium building pattern employing adobe construction and the atrium form provides space for various functions of the oasis community, such as historic Dariyah, near Riyadh. This development is shielded from the harsh elements of the environment by the thick growth of palm trees around it. The narrow streets and courtyards are the only open spaces in such "mud-lumps". In such a densely built development, the sand-storms cannot enter the narrow streets or the courtyards. The densely built structures sharing as many as three walls shade each other throughout the day. The houses on the periphery of the development have limited exposure to the low sun, but the sun is able to penetrate the development only when it is di-

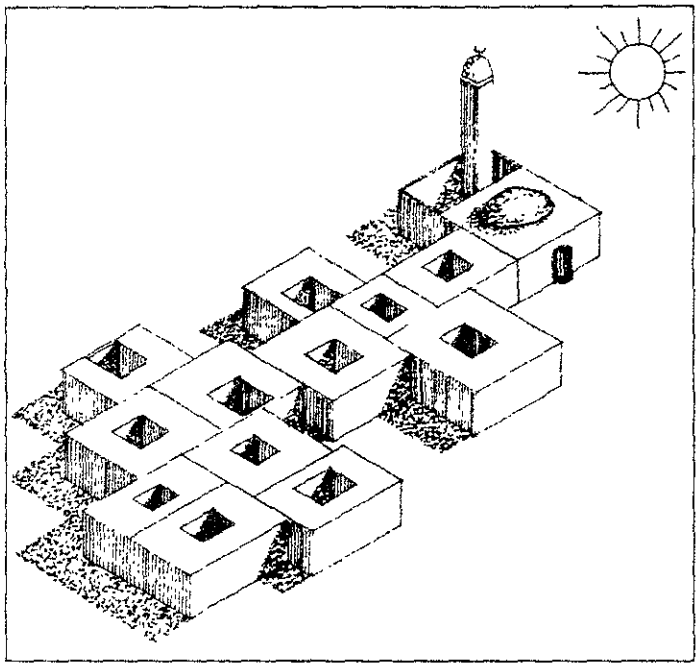


Adobe houses in Dariyah, near Riyadh



Village in a *wadi* or valley

Historic Dariyah - ruins of palace buildings above and abandoned adobe houses on the right

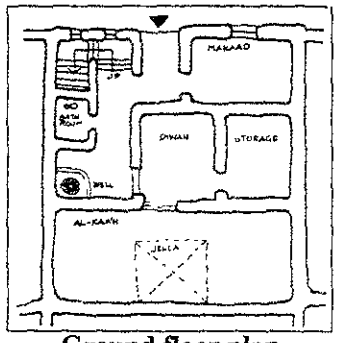


Closely-knit community remains protected from the sun by shades and shadows

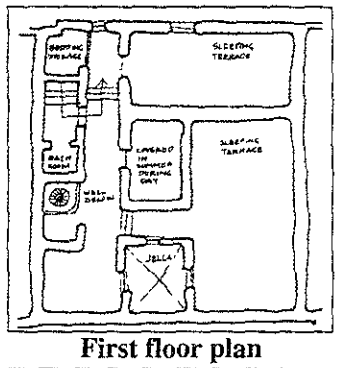
rectly overhead. The narrow, winding streets remain shaded for pedestrian movement.

A community where neighbours share as many as three walls necessarily develops its own intimate life-style. The front of the house faces a narrow street and thus it is the least protected facade. This may also be the only wall which is not shared with the neighbouring houses, and a decorative entrance to the house is placed in this wall. A limited number of openings in the front wall are carefully arranged so that they do not face the neighbour's windows. Most of the windows are further protected by wooden shutters which may be closed during sand-storms. Such continuous "mud-lumps" achieve temperature equilibrium in the desert climate, where the diurnal range could be as much as 20 °C. It has been observed that the difference between the external and the internal temperature in such a development can be 5 to 15 °C. At night the development as a whole stores coolness which is dissipated slowly during the day, thus acting as a passive cooling system.

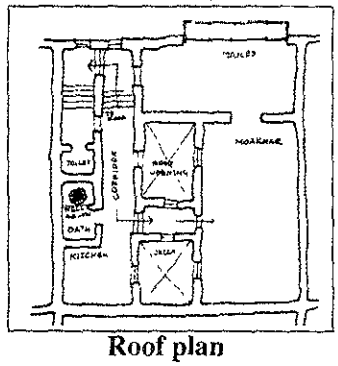
The temperature at night falls by as much as 20 °C on an average during the winter, and in such conditions the "mud-lump" once again achieves equilibrium by slowly releasing the stored heat during the day to the cool night air. The atrium house by itself is an effective form of climatic moderator, but the "mud-lump" monolithic development further enhances the passive design concepts of environmental control in such traditional developments.



Ground floor plan



First floor plan



Roof plan

In recent times, some of the historic communities have been destroyed under the pretext of modernization. One such development plan, in which the author intervened, is in Al-Qalah-Qatif. It had been scheduled for redevelopment by government order. Several proposals have since been made by the author to save this community from complete destruction and to rebuild it in consonance with what evolved over a period of a few thousand years.

Synopsis

* **Subject of the Issue :**

Analytical Study on Shelter in Bahariya Oases

Arch. Mahmoud Tarek Hammad

This research deals with the environmental factors that affect the plan form of the house in Bahariya & Kharga Oases. The research analyses a part from the urban fabric of the traditional housing gatherings in Bahariya Oases as well as the different elements of the house which express the Oasis architecture in the entrances, living rooms, sleeping, bedrooms, services areas, and internal courts and the relation between them. The purpose is to get acquainted with the features of this architecture which was influenced by the environmental in order to define its values and characteristics. (P. 10)

- **Projects of the Issue :**

- Kafr El-Gouna Village - Red Sea

Arch. Ramy El-Dahhan, Sohair Farid in association with Arch. Ahmed Hamdy

Hurghada is one of the areas that has the highest rates of internal and external tourism which led to growth of tourist constructions in and around Hurghada. One of the most important places is El-Gouna Resort, especially the area of "Kafr El-Gouna". This project started in 1992 when a residential complex, for a group of employees working in tourist hotels in the area, was needed, and so it was necessary to find a living community for them suitable for the surrounding conditions. After completing the units (70 units), they were found completely consistent with the surrounding environment. This heped to use the place for tourism in an excellent way and to find an alternative solution for employees housing outside "Kafr El-Gouna". The tourism development operation for the area started by adding other residential units, chalets, hotels, shops, bazars and cafeterias ... in addition to a museum, theatre and health club. (P. 17)

* **New in Construction materials :**

Bimarestan Al-Moayed "Hospital" (821 H. 1418 - 1420 a.c)

This hospital belongs to the Mamlouk Era. It comprises several sections for all medical specializations. It is divided into two divisions, one for male patients and the other for female patients. The architectural elements characterizing this era were used in the main buildings. (P. 33)

* **Interior Design :**

Ramses Bazar

Arch. Yehia Wazir

The project presents a special kind of tourist shops in which the arabic style is used for interior design. It is distinguished by star units for wooden fillings in forming ceilings & floors with pointed arch units, used in exhibition, to create harmony between wood & marble. (P. 26)

* **Technical Article :**

Eng. Khaled Shedeed

Introduction to elevator design process. (P. 29)