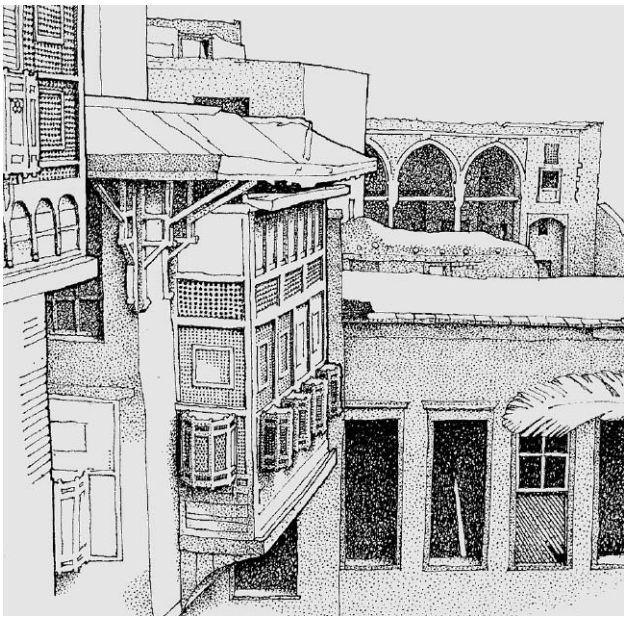
Edition Axel Menges GmbH
Esslinger Straße 24
D-70736 Stuttgart-Fellbach
tel. +49-711-5747 59
fax +49-711-5747 84
AxelMenges@aol.com
www.AxelMenges.de



Friedrich Ragette
Traditional Domestic Architecture of the Arab Region
296 pp. with 670 ill., 242 x 297,5 mm, hard-cover, English
ISBN 978-3-932565-30-4
Euro 78.00, £ 68.00, US $ 98.00, $A 109.00

Probably for the first time the domestic architecture of the whole Arab Region, from the Atlantic to the Gulf, is being considered. In systematic fashion the factors influencing architecture are analyzed and the extent and character of the Arab Region are determined. Construction materials and building techniques are reviewed and the evolution of settlement from the nomad's tent to the tightly packed town is discussed. The domestic planning elements are identified, from roof to basement and from the closed cell to systems of courtyards with loggias and galleries. Water and waste management also receive proper attention.

From this information traditional design strategies concerning privacy, variable space needs, environmental control and a specific concept of beauty are derived. Exceptions to the rule are identified as related to special geographic or climatic conditions, or the need for defense.

The analytical part is supported by a collection of more than 200 domestic examples from all thirteen countries comprising the Arab Region. Each building is briefly described and documented by means of plans, sections and elevations arranged for easy reading at uniform scales and with uniform reference numbers.

Having treated the traditional architecture, the author turns to present times and the impact of the West on Arab architecture. He contrasts Eastern and Western ways of planning and design, again largely based upon environmental differences. Old restrictions are compared with new freedoms, the Industrial Revolution and globalization are considered. The challenge of adaptation and integration is discussed through an exchange of views between an Iranian traditionalist and a Turkish modernist.

In an appendix brief appreciations of Hassan Fathy and the Aga Khan Program for Architecture are added, as well as two contemporary projects and planning guidelines for the region. A glossary with about 600 Arabic terms and a bibliography with credit references complete the work.

Friedrich Ragette has published standard books on architecture in Lebanon and Baalbek. He spent about 30 years teaching and practicing architecture in the Middle East. The past couple of years he was professor of architecture at the American University of Sharjah, which supported the preparation of this book through a reasearch grant.

Distributors

Brockhaus Commission
Kreidlerstraße 9
D-70806 Kornwestheim
Germany
tel. +49-7154-1327-33
fax +49-7154-1327-13
menges@brocom.de

Buchzentrum AG
Industriestraße Ost 10
CH-4614 Hägendorf
tel. +41-062 209 26 26
fax +41-062 209 26 27
kundendienst@buchzentrum.ch

Gazelle Book Services
White Cross Mills
Hightown
Lancaster LA1 4XS
United Kingdom
tel. +44-1524-68765
fax +44-1524-63232
sales@gazellebooks.co.uk

National Book Network
15200 NBN Way
Blue Ridge Summit, PA 17214
USA
tel. +1-800-4626420
fax +1-800-3384550
custserv@nbnbooks.com

DA Information Services
648 Whitehorse Road
Mitcham, VIC 3132
Australia
tel. +61-3-9210 7859
fax +61-2-8778 7788
books@dadirect.com

Probably for the first time the domestic architecture of the whole Arab region, from the Atlantic to the Gulf, is being considered. In a systematic fashion the factors influencing architecture are analyzed and the extent and character of the Arab region are determined. Construction materials and building techniques are reviewed and the evolution of settlement from the nomad's tent to the tightly packed town is discussed. The domestic planning elements are identified, from roof to basement and from the closed cell to systems of courtyards with loggias and galleries. Water and waste management also receive proper attention.

From this information traditional design strategies concerning privacy, variable space needs, environmental control and a specific concept of beauty are derived. Exceptions to the rule are identified as related to special geographic or climatic conditions, or the need for defense.

The analytical part is supported by a collection of more than 200 domestic examples from all thirteen countries comprising the Arab region. Each building is briefly described and documented by means of plans, sections and elevations arranged for easy reading at uniform scales and with uniform reference numbers.

Having treated the traditional Arab architecture, the author turns to present times and the impact of the West on Arab architecture. He contrasts Eastern and Western ways of planning and design, again largely based upon environmental differences. Old restrictions are compared with new freedoms, the Industrial Revolution and globalization are considered. The challenge of adaptation and integration is discussed through an exchange of views between an Iranian traditionalist and a Turkish modernist.

In an appendix brief appreciations of the Egyptian Hassan Fathy and the Aga Khan Program for Architecture are added, as well as two contemporary projects and planning guidelines for the region. A glossary with about 600 Arabic terms and a bibliography with credit references complete the work.

Friedrich Ragette grew up in Vienna and received a Fulbright scholarship for studying at the Illinois Institute of Technology in Chicago in the 1950s. He spent about 30 years teaching and practicing architecture in the Middle East. The past couple of years he was professor of architecture at the American University of Sharjah, which supported the preparation of this book through a research grant. His earlier publications include standard books on architecture in Lebanon and Baalbek.

Friedrich Ragette Traditional Domestic Architecture of the Arab Region

Menges

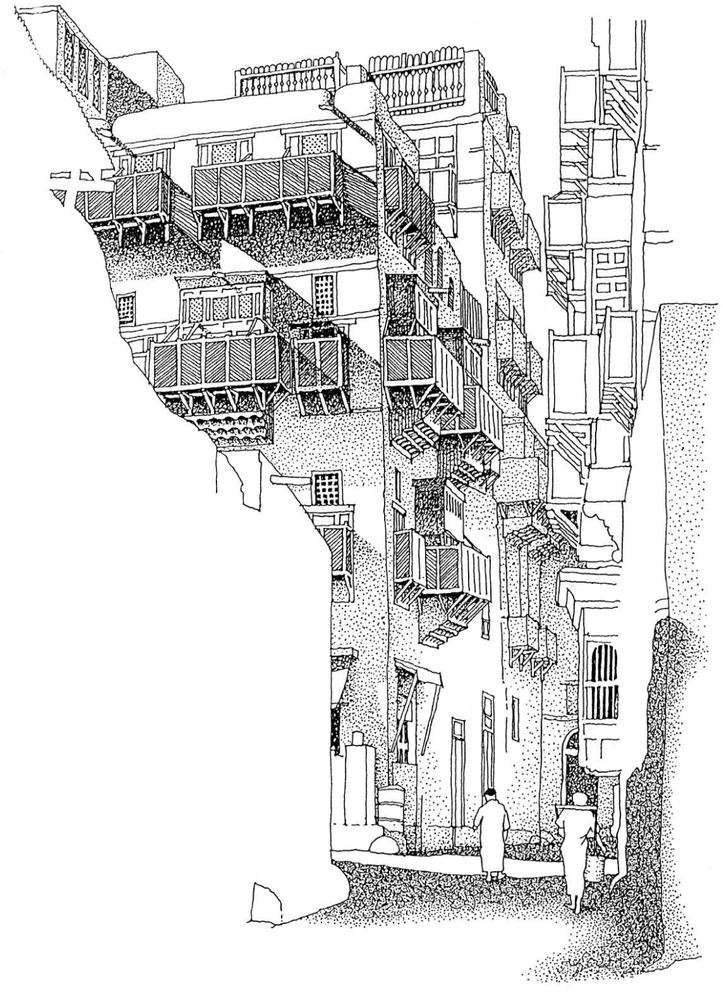
078.00 Euro
068.00 £
098.00 US $
109.00 $A

ISBN 978-3-932565-30-4

9 783932 565304 59800

Friedrich Ragette

Traditional Domestic Architecture of the Arab Region



Friedrich Ragette

Traditional Domestic Architecture of the Arab Region

Edition Axel Menges

ISBN 978-3-932565-30-4

Third, unrevised edition

Reproductions: Friedrich Ragette
Printing and binding: Graspo CZ, a. s, Zlín, Czech Republic

Design: Friedrich Ragette
Layout: Helga Danz
Cover: House in Jidda, drawing by Jan Cejka

Contents

»Tradition ist Weitergabe des Feuers und nicht Anbetung der Asche.«
Gustav Mahler

»Tradition is to pass on the fire, and not to worhip the ashes.«
Gustav Mahler

Acknowledgements

Above all my thanks go to His Highness Sheikh Dr. **Sultan Bin Mohammad Al-Qassimi**, Supreme Council Member, Ruler of Sharjah, Founder and President of the American University of Sharjah, who by creating this institution opened the way for my return to academia and the writing of this book.

Many others have contributed in significant ways, the most important I shall list in alphabetic order:

Jan Cejka, friend and colleague, whose parallel studies inspired me and whose superb draftsmanship graces much of this book;

past and present colleagues, whose work I found in the libraries of many countries;

Jean Falloux, who shared with me his atelier d'architecture in a village above the Côte d'Azur. His precision photocopier was essential for my work;

Roderick French, Chancellor of the American University of Sharjah, who was instrumental in providing a research grant for the preparation of this book;

Heinz Gaube, orientalist and arabist at the University of Tübingen, being a great source of information and finding the most hidden references;

Martin Giesen, Dean of the School of Architecture and Design, American University of Sharjah, who persuaded me to get out of retirement, refresh my lecture notes and give a course in Regional Architecture, thereby precipitating this book;

Axel Menges, publisher of beautiful books in the fields of architecture, art and design. He took an immediate interest in the manuscript and made a thrifty offer to turn it into a book;

Pierre Ratcliffe, my neighbor in France, without whose computer savvyness and tireless advice I could not have faced the publishing world of the 21st century;

the sponsor of this work, a high-minded friend of the University and leading Sharjah citizen, for providing the subsidy needed to publish this book;

Hannelore, my wife, last but not least, helping me all along the way with criticism, typing and tolerance for my preoccupation with the book.

Friedrich Ragette

Preface

This book is dedicated to the future generations of Arab architects, who will more and more become the sole masters of the architectural evolution in their homelands. As globalized trade and know-how offer them a wealth of possibilities to face the professional challenge of their time, they will also wish to return to their roots and they will discover valuable insights for the correct approach to timeless problems.

Balanced community organization, sustainable use of resources and effective environmental response are principal lessons to be learnt.

This book has been written in the context of antithesis to the traditional qualities described therein. In a time of such rapid and fundamental change that nobody can tell where it will lead, amidst great hopes and expectations, we find also disorientation, doubt and anxiety. The Arab Region contains many contradictions, but its common culture, sustained by faith and language, a shared environment and history, gives promise for a bright future.

May this book contribute to the deeper understanding of a great heritage.

»Time was when architecture was genuine construction, its effects noble because true to causes. The forms were sculpted from materials according to the nature of construction and the life of the time – decorated by indigenous carving and painting.

(It was) organic building (which) is natural building: construction proceeding harmoniously from the nature of a planned or organized inside outward to a consistent outside.«

Frank Lloyd Wright in *Genius and the Mobocracy*, 1949

»Every people that has produced architecture has evolved its own favourite forms, as peculiar to that people as its language, its dress, or its folklore. Until the collapse of cultural frontiers in the last century, there were all over the world distinctive local shapes and details in architecture, and the buildings of any locality were the beautiful children of a happy marriage between the imagination of the people and the demands of the countryside.«

Hassan Fathy, 1973

1. Introduction

To begin with, we should explain the title of this book.

Tradition

Deriving from the Latin word *tradire*, or passing on – still used in the English word *trading* – it means the passing-on of knowledge, from generation to generation, within the family and community, by example and the word of mouth, or by apprenticeship from master to disciple. It is based upon age-old practical experience, even elements of superstition, and conserved by isolation, which only recently was arrested by the force of globalization.

Other labels used are *native*, *indigenous* or *vernacular*, meaning »home born« or »derived from the locality«. These refer to the principal roots of tradition, but exclude the evolutionary way of doing things by absorbing external influences over a length of time.

In Europe the Age of Enlightenment challenged traditions by the scientific approach, culminating in our present-day system of research, testing, qualifying, quantifying, and continuous change. The result is an exaggerated reliance upon technology, mostly in the name of innovation and modernity. Along the way, much valuable knowledge on the traditional level was forgotten or put aside. Only recently, with the apparent loss of local traditions causing alarm, a renewed interest in traditional knowledge from a wide range of fields is on the rise. This book is part of that movement.

Domestic

The term *domestic* restricts the study to the accommodation of people, commonly called housing. Being one of the most basic needs of humanity, it reflects the aspirations and capabilities of a population. The homes of people mirror the values and economic conditions of a time better than palaces or places of worship. Buildings not directly related to housing have been excluded from the study.

Architecture

Meaning the »Mastery of Tectonics«, or the Art of Building, architecture is the combination of construction and design. As the Roman writer Vitruvius stated, a work of architecture should offer *commodity*, *firmness* and *delight*. In simple terms this means, the plan should serve the building's purpose, construction should be sound and lasting, and we should delight in its appearance – it should be beautiful.

Those are the requirements pertaining to any individual building, but architecture as a whole is subject to more profound influences. Architecture originates from man's need for permanent shelter. The temporary shelter of a tent will not result in architecture. Therefore, architecture starts with the settlement of man. The creation of shelter is our response to the environment and the context of our existence, which consists of a complex set of components.

The natural context

– Location: Is the site accessible or isolated? Is it flat or hilly?
– Climate: Is it predominantly hot and dry, or wet and cool?
– Materials: Are earth, stone or timber readily available?

These physical determinants are interdependent, in the pre-industrial world they constituted the constraints bearing upon architecture. They were so strong, that the builders could not possibly build in disharmony with their natural environment.

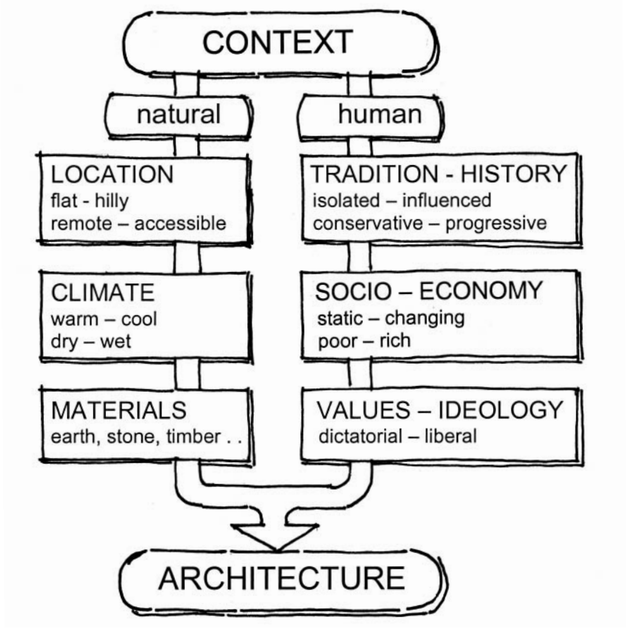
The human context

The moment our ancestors settled and lived in permanent communities, they created three sets of human factors that started to influence architecture:

Tradition – History: in isolated communities we may expect to find conservative traditions, while in settlements open to external influences more progressive attitudes will prevail.

Socio – Economy: deriving from associated factors and particular local conditions, the society may be static or changing, poor or rich.

Values – Ideology: depending on circumstances, society's values will be conservative, liberal or progressive. This will express itself in political and religious structures.



All the above factors manifest themselves in one way or another in any valid work of architecture. As the needs of each community and the approach towards satisfying them vary, architecture will evolve differently. It is the architect's task to respect and weigh all these factors in the search of a solution. In this way the architect is one of the few generalists in a time of ever increasing specialization.

Location, climate and history cannot be changed, but material limitations have been eliminated in today's global market. There is no better example than the Arab Gulf countries for drastic change in the economic situation, and the profound effect it has on society's values and ideology. No wonder, it is also reflected in the Gulf architecture of today.

Arab

This is not the place to discuss the question of who qualifies as Arab or not. Let us agree that the active use of Arabic language and script shall circumscribe the quality Arab.

Region

Since the excesses of nationalism and colonialism not long ago, a new interest in regionalism has set in. While nationalism was intent on centralized rule over whatever territory could be acquired by political or military means and while colonialism generally was ignorant of indigenous structures and dependencies, both carved up the world in spheres of influence. More often than not they imposed borders and divisions that violated existing natural and human interrelationships.

In contrast, regionalism thinks in terms of natural entities, in geographic units which may not be fully homogeneous, but in which the various parts complement each other to create a harmonious interdependency. In the process of Europe's unification we witness a constant decrease in the impact of national boundaries and a slow emergence of new prospering regions. Thus a region may be defined as a broad geographical area of sufficient natural and cultural homogeneity to distinguish it from another.

In chapter two we shall review the natural and human elements of context in detail and will discover that they perfectly define the Arab Region. In the following chapters we shall see how a common context generated an architecture with deep regional roots, being sustained by the accumulating wisdom of tradition. Chapter ten shows that even under circumstances which forced departures from the general pattern of architecture, certain common elements were preserved.

Numerous case studies are given in chapter eleven, to demonstrate the architectural unity from the Atlantic to the Gulf, and to serve as a reminder of sound practices to build in harmony with a given context.

Chapter twelve addresses the impact of western planning, design and technology on the recent evolution of architecture in the Arab Region and raises the question of how much regionalism is possible or appropriate under the auspices of globalization.

Vaulting

True vaulting, not to be confused with corbelling as previously described, consists of the repetitive arrangement of arches to cover a space.

Semi-circular vaulting

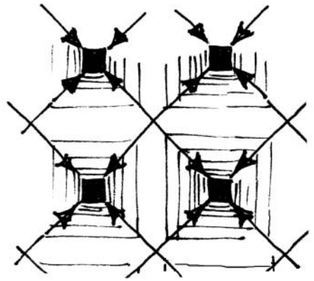
Large-scale vaulting was developed during Roman times and therefore based upon the semi-circle.

– Barrel or tunnel vault. If supported by walls it results in a tunnel-like space. Support walls must be heavy to assure buttressing. Illumination through the vault is difficult and is best achieved from the ends of the tunnel.

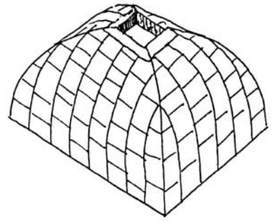
– Cross vault. If we intersect a tunnel vault with an identical vault at right angle to it, we obtain a cross vault. The *voussoirs* of the vaults meet in diagonal ellipses called the groins; the name »groined vault« is used to indicate that the intersecting stones belong to both barrels (in contrast to an independently built rib). This vault gives us two intersecting barrels, supported at the four corners only – resulting in a wide open, square space. By repetition of cross vaults, either along one or two axis, we can achieve large open spaces with arched openings. Most important: the thrusts of adjacent vaults will balance each other, the internal supports will be subjected to vertical loads only and can be greatly reduced in size. Principal drawback: the planning is restricted to the use of square bays.

– Stilted vault. This is a rectangular, semi-circular vault, where the smaller vault starts at a higher level (is stilted), to meet the larger vault at the same level.

– Cloister vault. Rarely used, it is also the result of two intersecting barrels, but rather a kind of dome construction, resting on the four sides of a rectangle. It frequently terminates in a skylight.

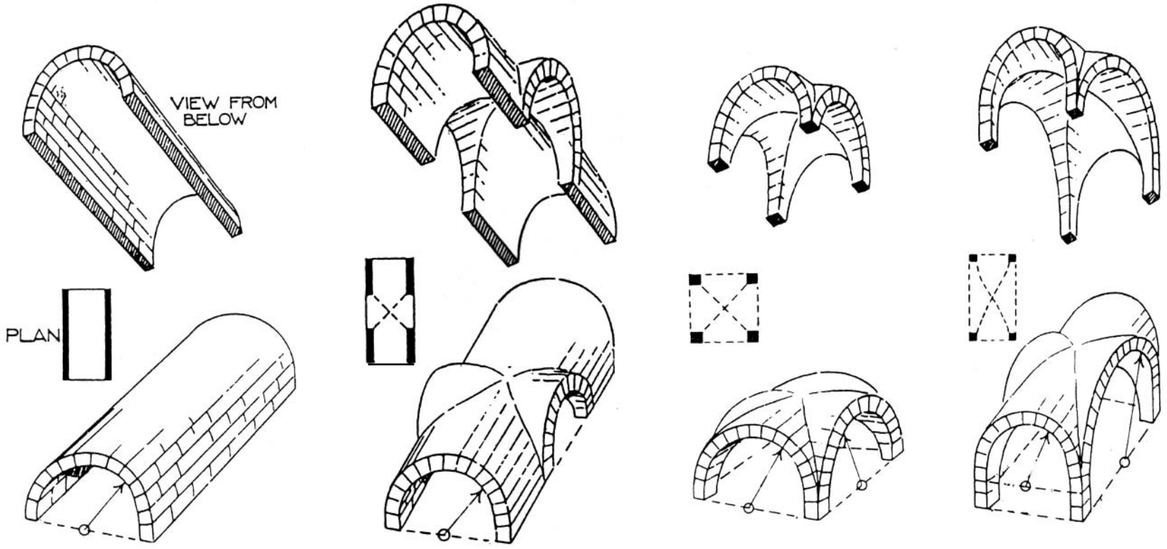


Balance of forces in a set of cross vaults



Cloister vault

Semi-circular vaulting [28]

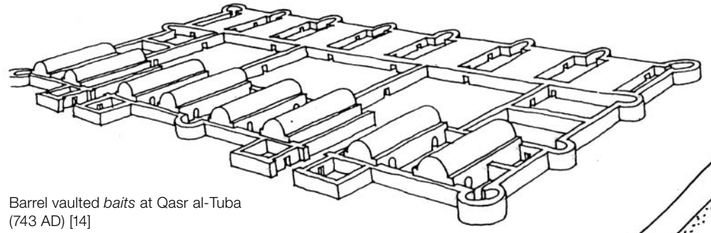


Barrel vault = tunnel space

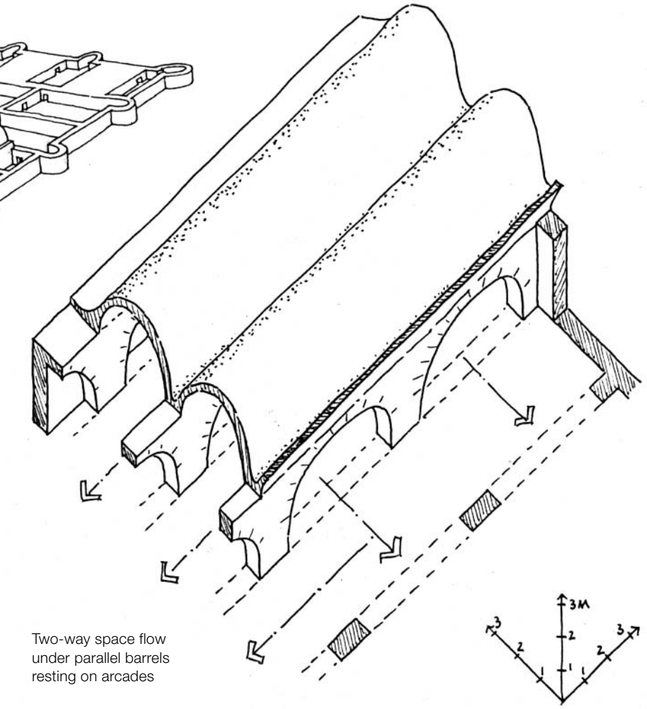
Barrel vault with intersecting vault = tunnel crossing

Cross vault = square bay

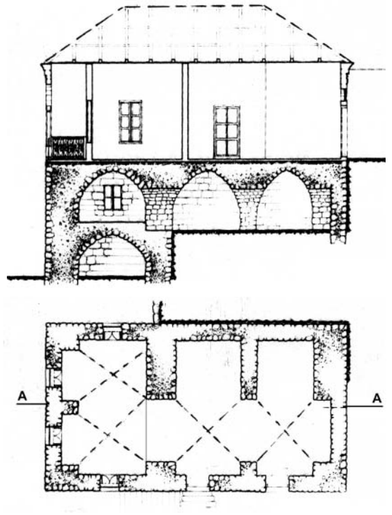
Stilted barrel intersecting normal vault = oblong bay



Barrel vaulted *baits* at Qasr al-Tuba (743 AD) [14]



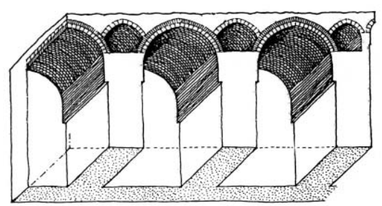
Two-way space flow under parallel barrels resting on arcades



Hillside house in Lebanon [78]: vaulted lower floors, bearing wall top floor, pitched roof (wood + tiles)

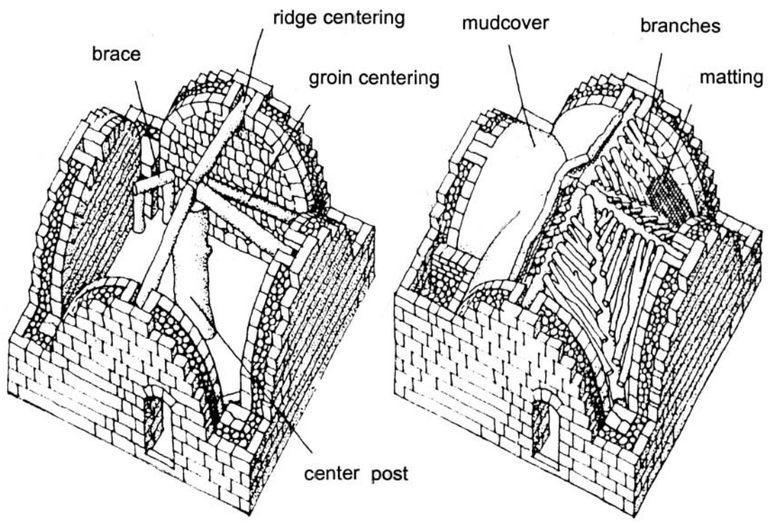
Vaulting was adopted either because of a severe shortage of wood, or for the sake of permanence, particularly in below-ground construction where excellent abutment was given and moisture-proof strength required. The traditional narrow spaces were easily covered by barrel vaults, which were limited to a 3 m span. For larger halls series of barrels could be placed upon arches and piers. Their space could be developed parallel or at right angle to the barrels. Such structures are found mainly in South Arabia or North Africa.

In all cases the horizontal roof was lost. If an upper floor was desired, a great mass of earth had to be placed to cover the vaults. Sometimes hidden voids were added to reduce the dead weight of the covering. In the Levant, where stone, timber and mud were equally available, vaulting was preferred for the ground floor, while the upper part received a roof of wood and mud.



Flat roof over principal and secondary barrel vaults (Ukhaidir, 7th C. AD) [14]

In Palestine we find a unique system of masonry cross vaults with mud cover constructed over center-supported wood formwork. It generates characteristic domical square spaces. More often such groin vaults were executed in stone, slightly parabolic in section. They provided the standard unit of construction in Palestine. In other parts of the Arab Region vaulting was reserved either for important spaces, such as reception halls in palaces, parts of mosques, tombs, or for basements and storage rooms.

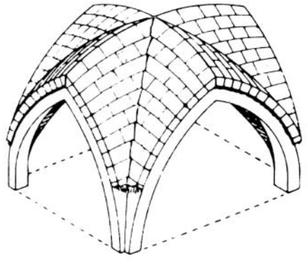


Cross-vault construction in Palestine [1]

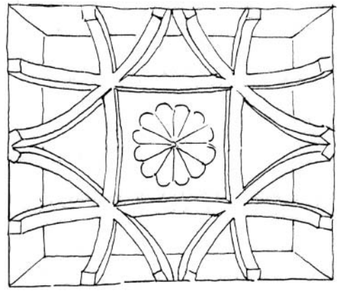
Pointed and ribbed vaulting

As the pointed arch has a flexible span-rise ratio, pointed vaulting allows the combination of spaces with variable width but the same height. The limitation to square bays was removed and planning facilitated. In Europe it was developed into rib construction, which divided the building process into two stages: the precisely cut system of principal supporting arches (= ribs) and buttresses, defining bays and groin lines; then the infilling of vault panels, resting on the ribs. The vault panels can be of rough masonry with lots of mortar, or of brick. Usually, they are plastered, stressing the distinction between structural frame and infill.

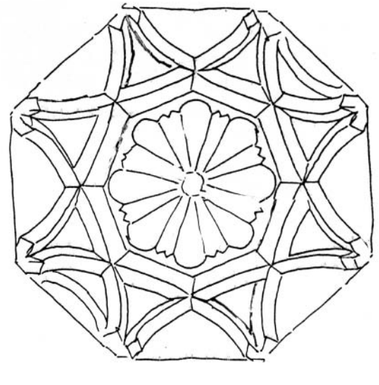
The Arabs rarely used true rib construction. The design of overlapping arches, which have a rib function, was rather done for decorative effect. Neither were ribs and panels clearly distinguished, often everything was covered indiscriminately with plaster.

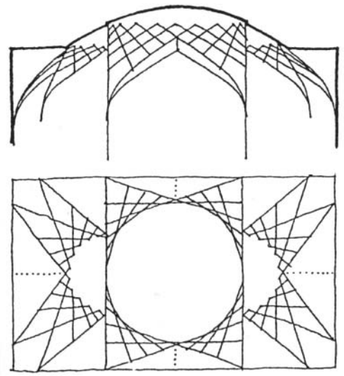


Pointed cross-vault with bulging panels [28]



Ribbed vaulting with overlapping arches (Cordoba)



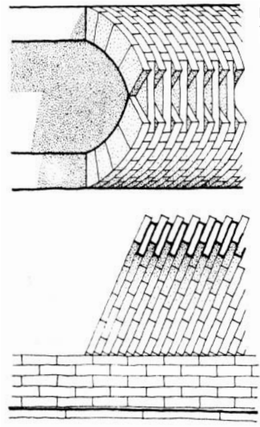


Saniyah vaulting in a Baghdad basement [14]

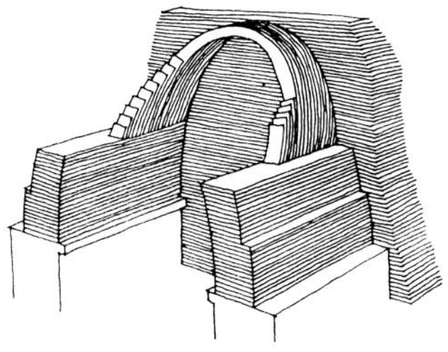
Highly developed rib construction, both for easier execution and decorative effect, is native to Iran. From there it spilled over to Iraq and in Baghdad we find it in basement construction. Typical is the *saniyah* vaulting: crossbracing ribs are run up from the surrounding walls, like generators of a curved surface, leaving a dishlike opening (*saniyah*), which is filled without scaffolding by concentric rings of masonry. The ribs were sometimes precast in reed reinforced gypsum and finished from below with brick.

Laminated vaulting

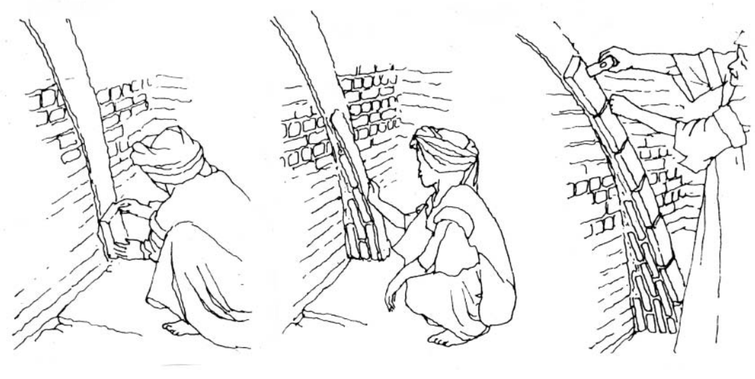
An effective way to avoid the need for centering is the combination of highly adhesive mortar, flat brick *voussoirs*, inclined arches and pointed or parabolic shapes. This technique is already in evidence in Khorsabad, 700 BC and it has been revived by Hassan Fathy in Egypt. The vault is started leaning against a buttressing wall. Brick are laid flat for maximum bonding against the preceding arch. Most famous are the remains of the Palace of Ctesiphon in Iraq, which feature a laminated parabolic vault 36 m high and 25 m across.



Drainage channel, Khorsabad, 720 BC [14]

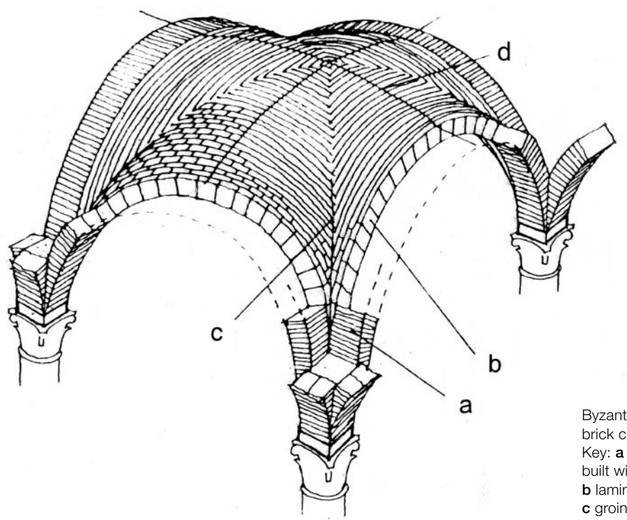


Laminated brick vault Ctesiphon, 6th C. AD [14]

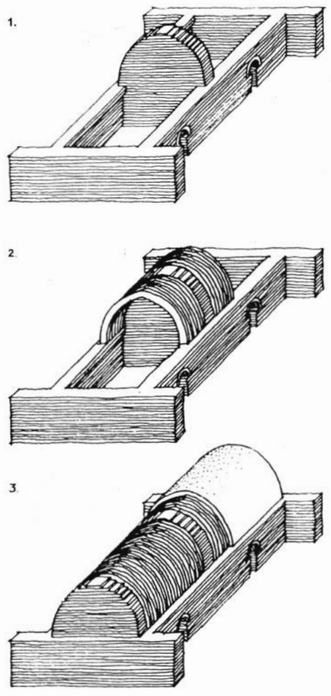


Laminated vault construction in Nubia [14]

An efficient solution is to start with a wall across the middle of the room against which two laminated vaults are leaning. They balance each other, resulting in symmetrical spaces that can be joined by doors. Sometimes transverse arches were built with centering, acting as ribs, against which vertical arches were laminated. Byzantine and Iranian work features cross vaults which were laminated with gypsum mortar simultaneously from all four sides.



Byzantine laminated brick cross-vault [14]. Key: **a** transverse arch built with centering, **b** laminated vaulting, **c** groind, **d** bulge.



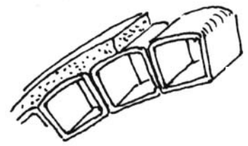
Laminated barrel vault leaning against middle wall [14]

Hollow-cell vaulting

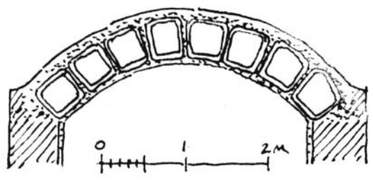
On the Tunesian island Djerba the Roman technique of hollow-cell vaulting has been preserved. The potteries of Guellalah produce wedge-shaped clay cells which form an arch when placed upon a centering. The convex top of the cells will support a person, particularly after the mortar topping has been applied. Cell sizes vary and the span and rise of vaulting can be modified within useful limits. For dome construction the square plan is changed into an octagon by means of squinches, open sides receive a supporting arch. Clay cells are stacked into crossing arches, left over spaces are filled with debris and mortar.

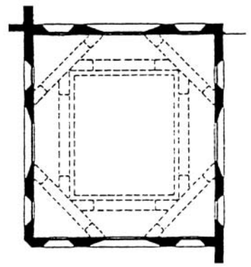
The advantages are many:

– light-weight construction and economy of material,
– speed of construction over movable centering,
– high thermal insulation due to the voids

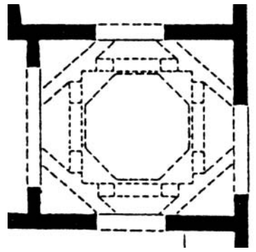


Detail of hollow-cell vaulting

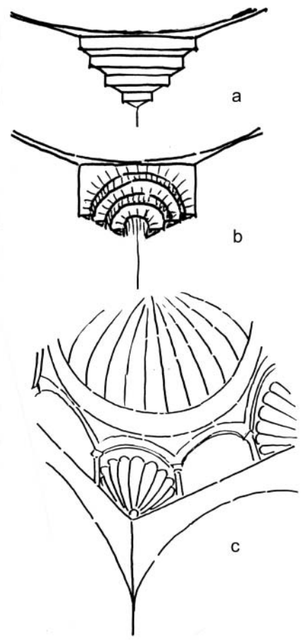




»Cutting corners« (Morocco, **17**)



Transition from square to octagon (Morocco, **17**)

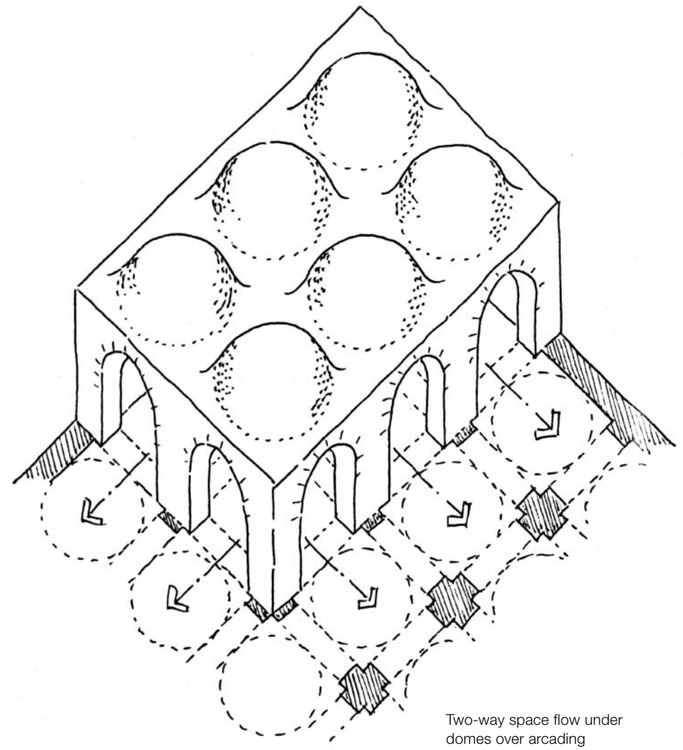


Squinches. Key: **a** stepped corbels or beams. **b** stepped arches, **c** scalloped squinches.

Domes

The tradition of corbelling over circular plans created dome-like roofs, which were very appropriate for tombs or other special functions. The Romans built domes on the semi-circular principle, in concentric circles, but with joints radiating from the center, each voussoir being a truncated pyramid with a spherical base (to facilitate this work, domes were built with roughly dressed stones and the exact spherical interior was dressed on the finished structure). The Arabs have adopted the sacred quality of domes, and there were times, when dome construction was reserved for tombs, or the space in front of the *mihrab*.

The principal drawback of the dome is its circular base, which results in a single cylindrical space. How to merge it with a normal rectangular plan or the squares of cross vaulting? In small domestic buildings 2.5 m diameter domes were sufficient and the half meter distance to the supporting square was filled without difficulty. Multiple dome structures over arches provided flexibility and were used in South Arabia and North Africa.



Two-way space flow under domes over arcading

When the dimensions were larger, more formal solutions had to be found. While the Romans arrived at the perfect geometric solution by way of pendentives, the Arabs started with the transition from square to octagon, literally by cutting corners.

– Transition of square to octagon. It can be achieved by placing beams at 45° across the corners. If this is repeated, the whole ceiling can be filled in. The indirect way of support – resulting in a reduction of beam length and an interesting pattern of inscribed squares – matched Arab preferences.

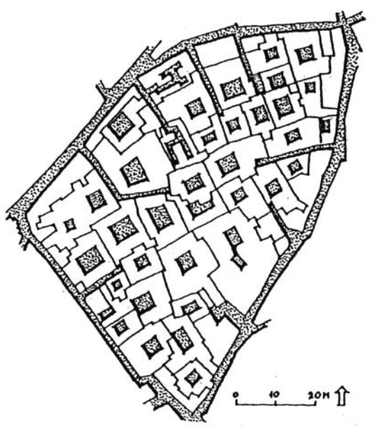
– Dome on squinches. An octagon can be reached by means of squinches, either by corbelling, by stepped cross-beams, or by stepped cross arches. It will allow the placing of a circular dome with some minor adjustments. This became the preferred Arab solution, which was further enhanced by stalactite decoration (*muqarnas*).

Marrakesh [13]

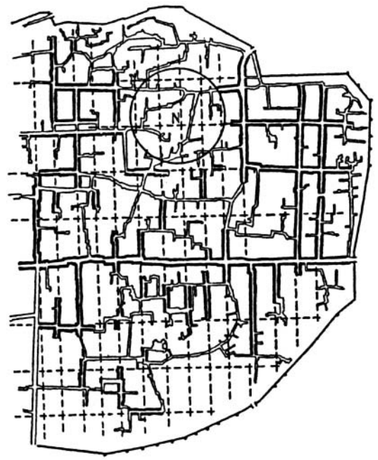
Traditional towns

The traditional Arab town is the result of a dense grouping of courtyard houses. Courtyard houses derive light and air from their own internal open spaces and allow wall-to-wall construction of adjacent buildings. This in turn eliminates wasted space between buildings, external heat gain or loss, but above all, preserves the privacy of each family and avoids disputes with neighbors. Like each house, the town grows in an organic fashion by agglutination, that is adding one unit to another without a preconceived plan. The similarity to a living organism is obvious: like a system of blood vessels, streets branch out from a central square (*maidan*) to become lanes and narrow alleys and finally come to a dead end. As each house has a central space, which unites the family by being a neutral zone of contact, groups of houses have some common open space and are organized by clan relationship, or along ethnic or religious lines, creating a quarter (*hara*).

In this semi-public zone people know each other, outsiders will be recognized and asked about their intentions. Through-streets form the boundaries and a buffer between quarters, leading to public spaces serving the whole community. In times of trouble each unit can close itself off. Even a modern town like Beirut broke up into such parts during the civil war.



Tunis, part of the *medina* (old town) [13]

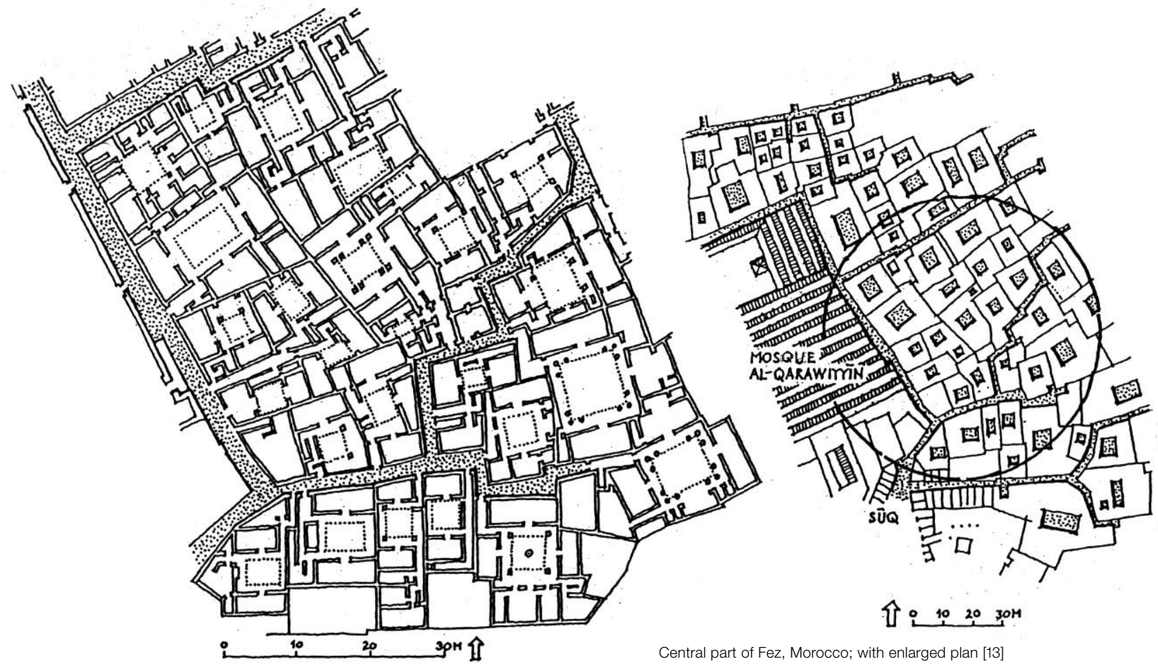


Old town of Damascus with parts of Roman street grid [107]

The irregular shape of houses determines the haphazard pattern of lanes. Infill dwellings are built around a rectangular courtyard and the surrounding rooms absorb the irregularities. The whole town is a pedestrian zone. Since the Arabs used porters and beasts of burden to transport goods, streets could be narrow and crooked. Today, mini-pickups, scooters and bikes serve such quarters. Only cities taken over from pre-Islamic times may have remains of a regular grid based upon *Cardo* and *Decumanus*. But even there we can see how irregular growth replaced the original pattern. The few newly established Arab-Islamic towns were generally fortified palaces, with an axis from the principal gateway to the ruler's quarters, surrounded by more or less regular *buyut*.

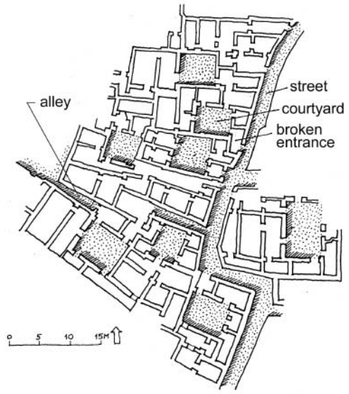
Islam reinforces the delicate balance between segregation and togetherness of diverse ethnic and religious groups. Similar to each house the town also has public, semi-public and private zones. The Arab town has no formal town-square in the western sense. The largest open space is the yard (*sahn*) of the Friday mosque (*masjid i-jum'a*). Other than the many small neighborhood mosques, the Friday mosque is intended to serve several quarters or the whole town on Fridays and feasts. All men assemble in and outside the mosque for prayer. After prayers and sermon public announcements are made and people exchange news.

Directly adjacent, on one of the many branch streets, are the school (*madrasa*), infirmary (*maristan*), public offices and the central bazaar (*suq*). Trading takes place in the narrow streets, often protected by movable canvas shades or permanent roofing. Different trades occupy specialized streets and sounds of wood- or metalworking, or smells of spices or tanneries guide the visitor. Right behind each shop are stores and workshops, often with dwellings on the upper floors. Within the area are caravansarais (*khan*, *funduq*), supplying raw materials and carrying off local wares. These functions make up the public zone open to everybody without distinction, with the exception of some male-female segregation in the mosque or in coffee- and teahouses.

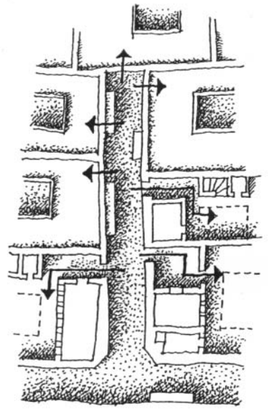


Central part of Fez, Morocco; with enlarged plan [13]

Central part of Baghdad with neighborhood squares [13]



Neighborhood in Ur, 2000 BC



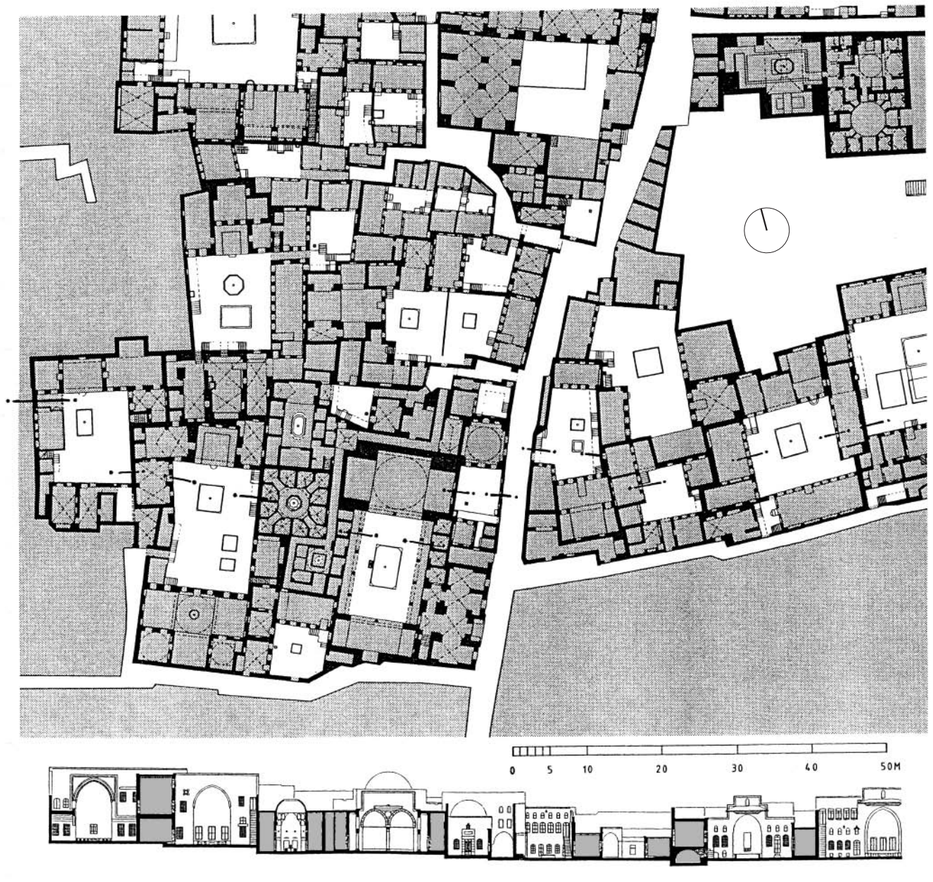
The principle of staggered entrances [13]

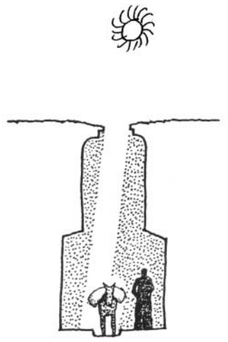
Once we enter a distinct *hara*, we better take heed of particular customs and sensitivities. There are more open and more restrictive communities and it is essential to be well acquainted with the peculiarities of each. Some main-streets of a *hara* may still be public, but side alleys already have a semi-public character. They are only to be entered by community members and friends, or the mobile peddlers who bring daily necessities such as drinking water, milk and vegetables.

The lanes leading to individual houses really are the left-over space between family clusters. Their irregularity adds visual barriers and reinforces the desired seclusion. Even entrances facing each other are avoided. The narrow passages provide shade, their irregularity blocks excessive air movement, carrying sand and dust. The width of the lane has to be sufficient for the passing of two loaded animals. Often the lanes have a depressed rough middle strip for the animals and their droppings, while people walk on smooth pavement right and left. Corners are routinely cut at 45° up to shoulder height, changing to right angles above by corbelling.

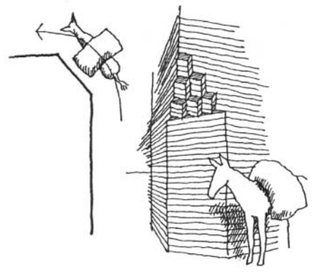
As much as the seclusion of the dwelling is desired, curiosity to see and hear what is going on in the lane generates the use of bay windows on the first floor (*musharabiya*, *sanajil*, *rawshan*). Elaborate screening affords ventilation and view, yet protects the observer. Much trading is conducted by lowering a basket from a shuttered window. Each *hara* houses rich and poor alike. A difference in economic or social status can hardly be discerned from the outside. The uniform height of buildings assures privacy and equal ventilation for every house. Most documented quarrels concern problems of view from neighboring buildings.

Old quarter of Aleppo, Syria. Plan and section. Internal volumes are shaded gray. [107]

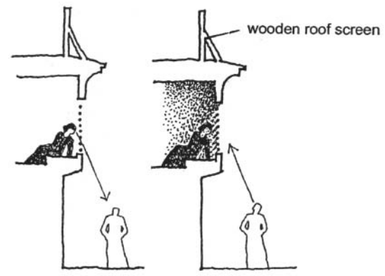




Street shading [13]

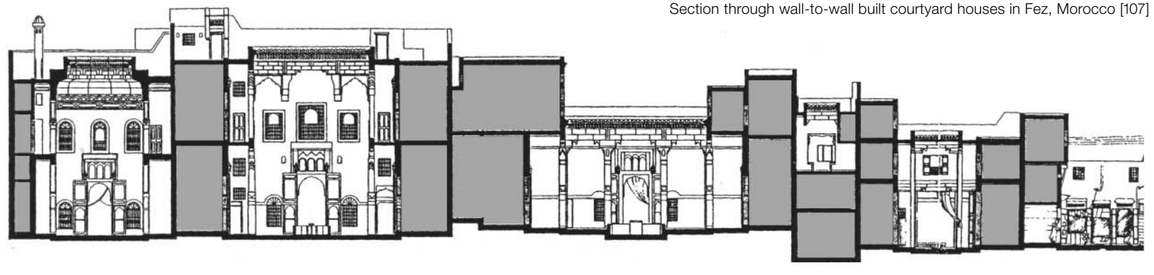


Corner cutting [13]



Open and closed vision [13]

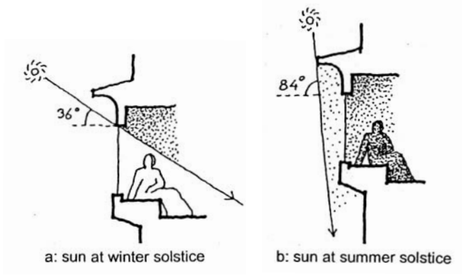
Section through wall-to-wall built courtyard houses in Fez, Morocco [107]



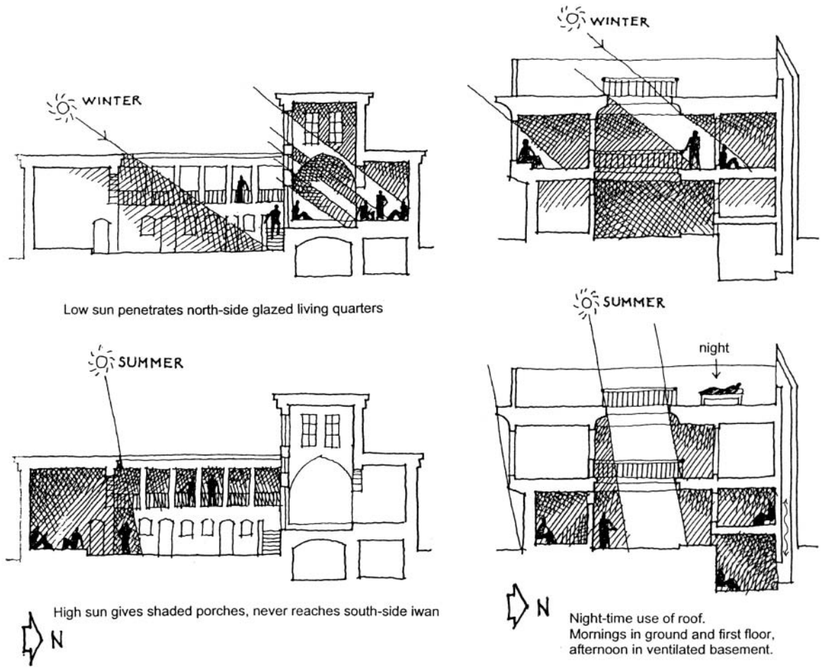
Shading

The further north or south from the equator, the bigger the difference of sun angles between winter and summer solstice. Together with shorter and longer days this yearly insolation cycle is responsible for the seasons. Luckily, winter sun penetrates more deeply south-oriented rooms at a time when warmth is needed. From April till October however, shading against direct sun is desired in most parts of the Arab Region. Already the tent is primarily a shading device and tent-like structures serve today as effective shades. Colonnaded or arcaded porches and peristyles give shade to passages and walls.

Since buildings are predominantly closed to the outside, shading elements on the façades play a minor role and visual screens act also as shades. During the first stage of westernization, which opened buildings to the outside, shading devices such as sun-breakers (bris soleil) became primary design features. Today, these are replaced by heat-reflecting glass.

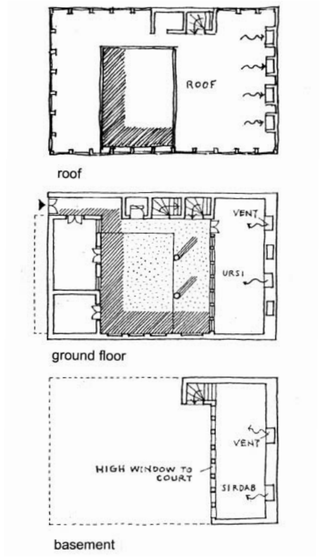


South-looking alcove at noon [13]

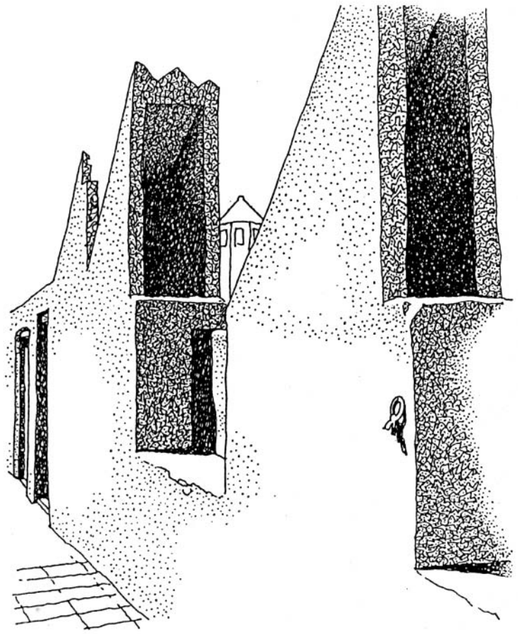


Horizontal nomadism [13]

Vertical nomadism [13]



Wind-scoop ventilation of a house in Baghdad [13]



Wind-scoops parallel to building wall [13]

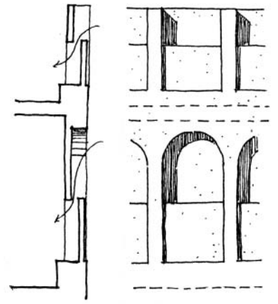
Ventilation

The prevalence of the courtyard house is a ubiquitous response to a hostile climate. The interior courtyard is an excellent modifier of hot and dry climates, being an air-well collecting dense, cool air at night. Since protected from the morning sun, all surrounding spaces stay cool till well into the day. Once the sun reaches the court, the air heats up and rises, creating convection currents and cross-ventilation, particularly when the surrounding spaces have secondary ventilation openings from adjacent narrow and cool alleys.

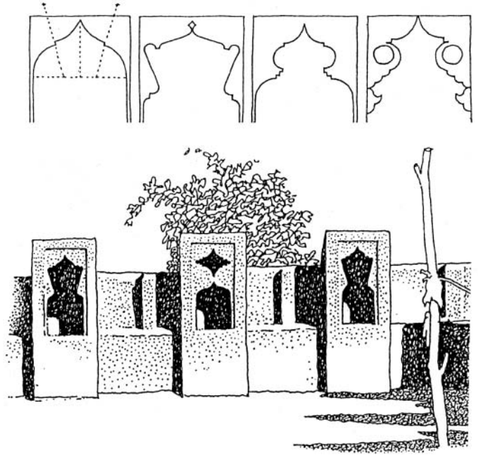
Ventilation is most important in humid coastal situations with little drop of temperature during the night. The higher up, the more breezes can be enjoyed: from the sea during the day, from the land during the night. Upper floor rooms have large screened openings down to the floor equipped with inner shutters, to close the room against daytime heat. The roof itself looks like another story, being screened to the outside.

The most remarkable ventilation devices are wind-scoops (*malqaf*) and wind-towers (*badgir*). Wind-scoops are ventilation flues carried above the roof to catch cool and clean air. They are facing the prevailing wind direction and divert air to the rooms below in a reversed chimney action. Through the rooms the air passes into the courtyard, feeding the convection cycle. In Baghdad, different floors receive independent wind-scoops which are decorated when they open to the roof terrace. When the prevailing wind is parallel to the wall they have tall, narrow intakes.

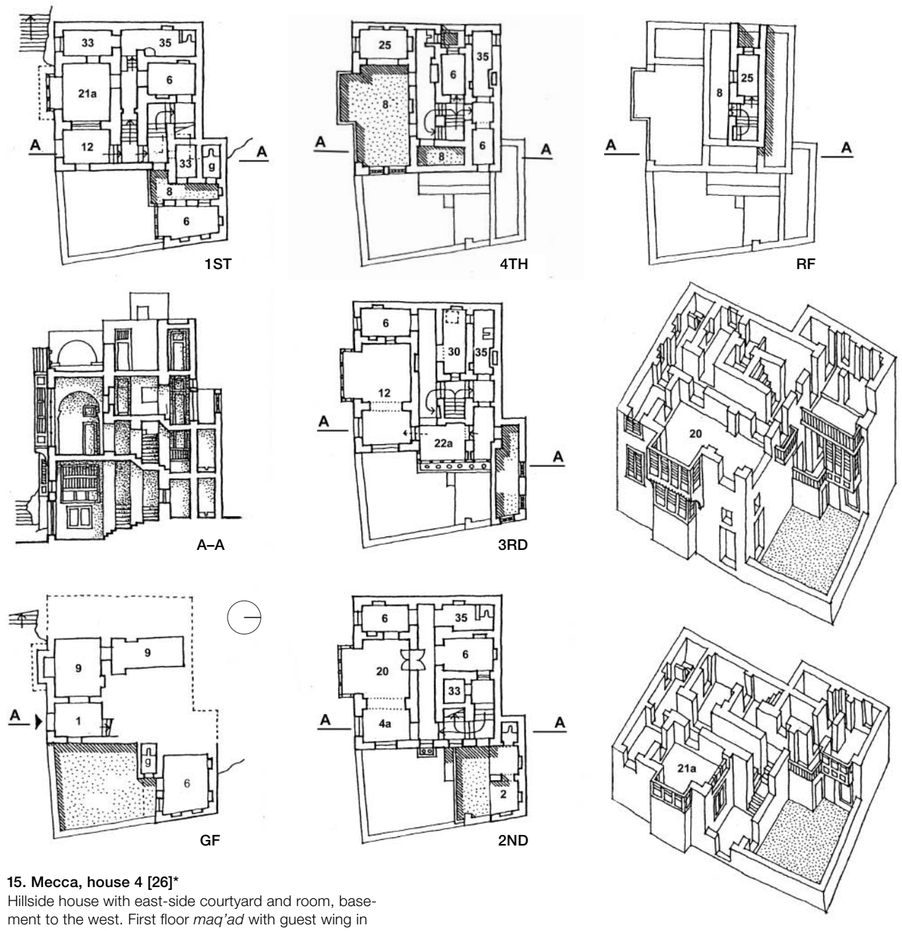
In the Gulf, whole parapet walls along the roof are turned into wind-scoops by making them double-walled, to direct the air to the screened lower part of the roof, or the room below. In Cairo, large wind-catchers ventilate principal living rooms or *qa'as*.



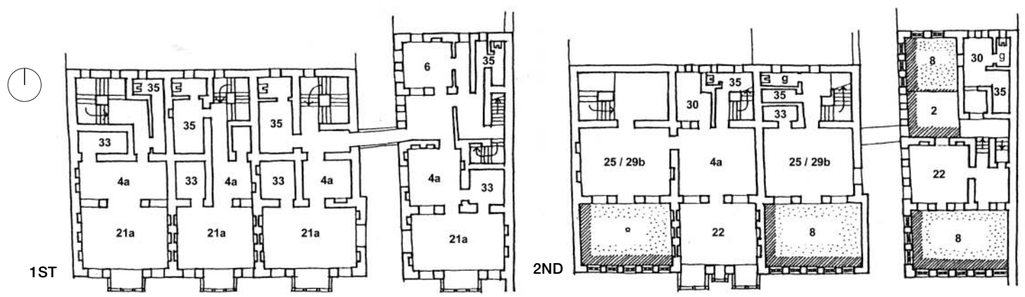
Wall-ventilation details from a house in Bahrain



Decorated wind-scoops in Baghdad [13]



15. Mecca, house 4 [26]*
Hillside house with east-side courtyard and room, basement to the west. First floor *maq'ad* with guest wing in back, second floor double volume *majlis* with third floor observation room for family. Fourth and fifth floors have rooms and terraces. Typical *maq'ad-majlis* superposition with stepped *musharabiya* affect towards street.
Scale 1:400



16. Jidda, house [48]
Two-family block with connecting bridge over a street, consisting of standard units, each with stair and toilet, allows adaptation to changing needs.
Scale 1:400

17. Mecca, town houses [101]
They all have a corridor to the stairway in back, large *maq'ads* in front and *majlis* with interior air shafts or rear windows. Elevations present three zones: fairly closed ground floor with arched doorways and raised bay windows, projecting fully screened main floors and brick shielded roof terraces. Noteworthy are the three sets of tie beams per floor.
Scale 1:250 (plan), c.1:200 (front elevation)