



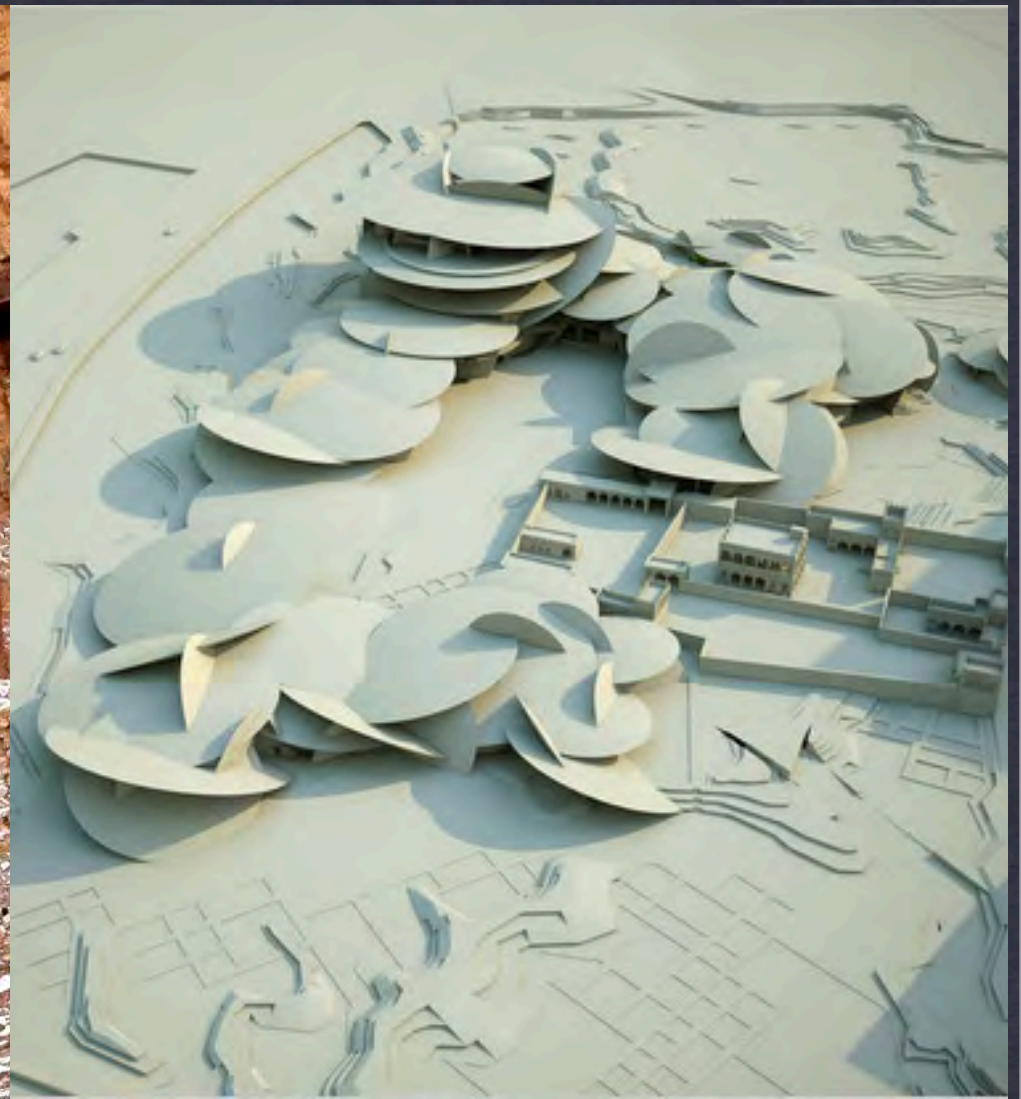
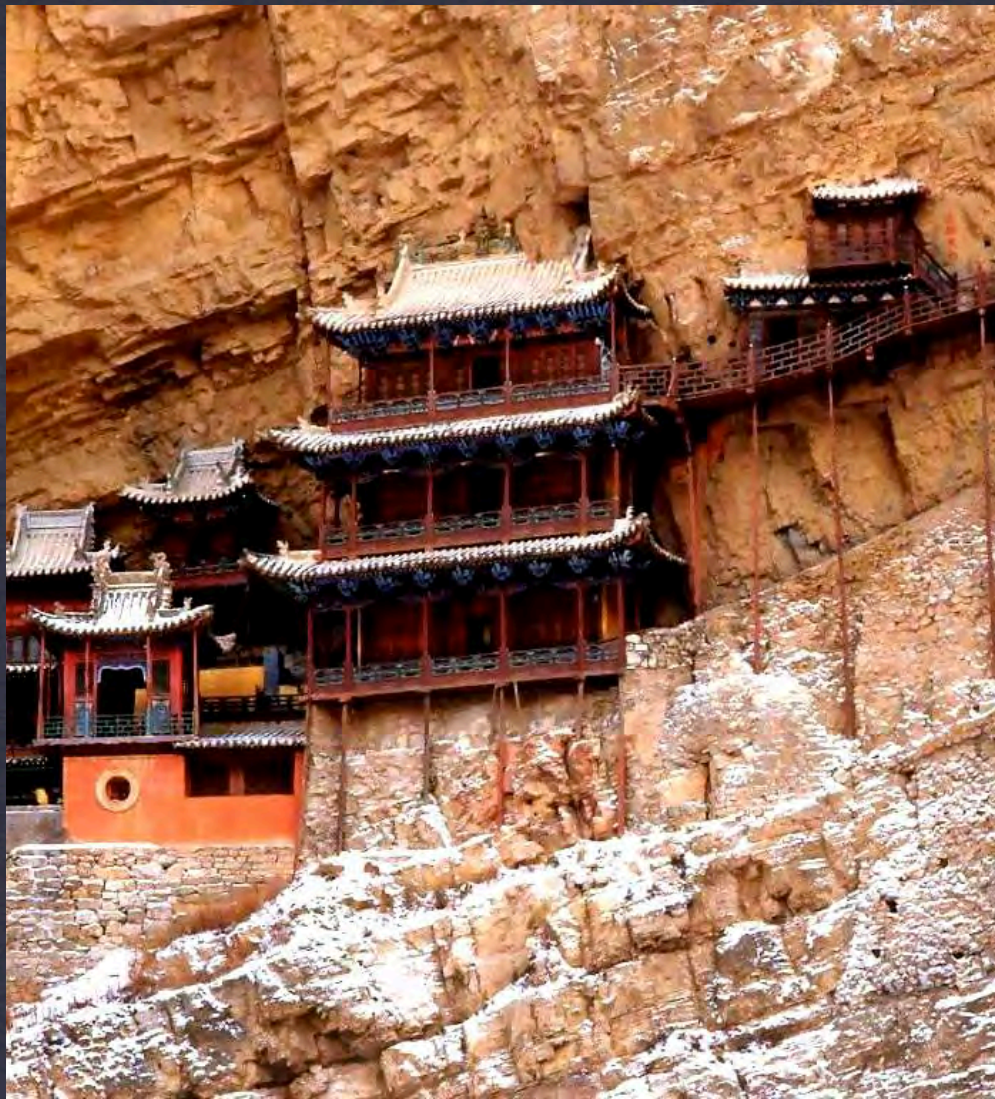


# arch 1100 + 1140

professor Montgomery

autumn 2010





SUBJECT

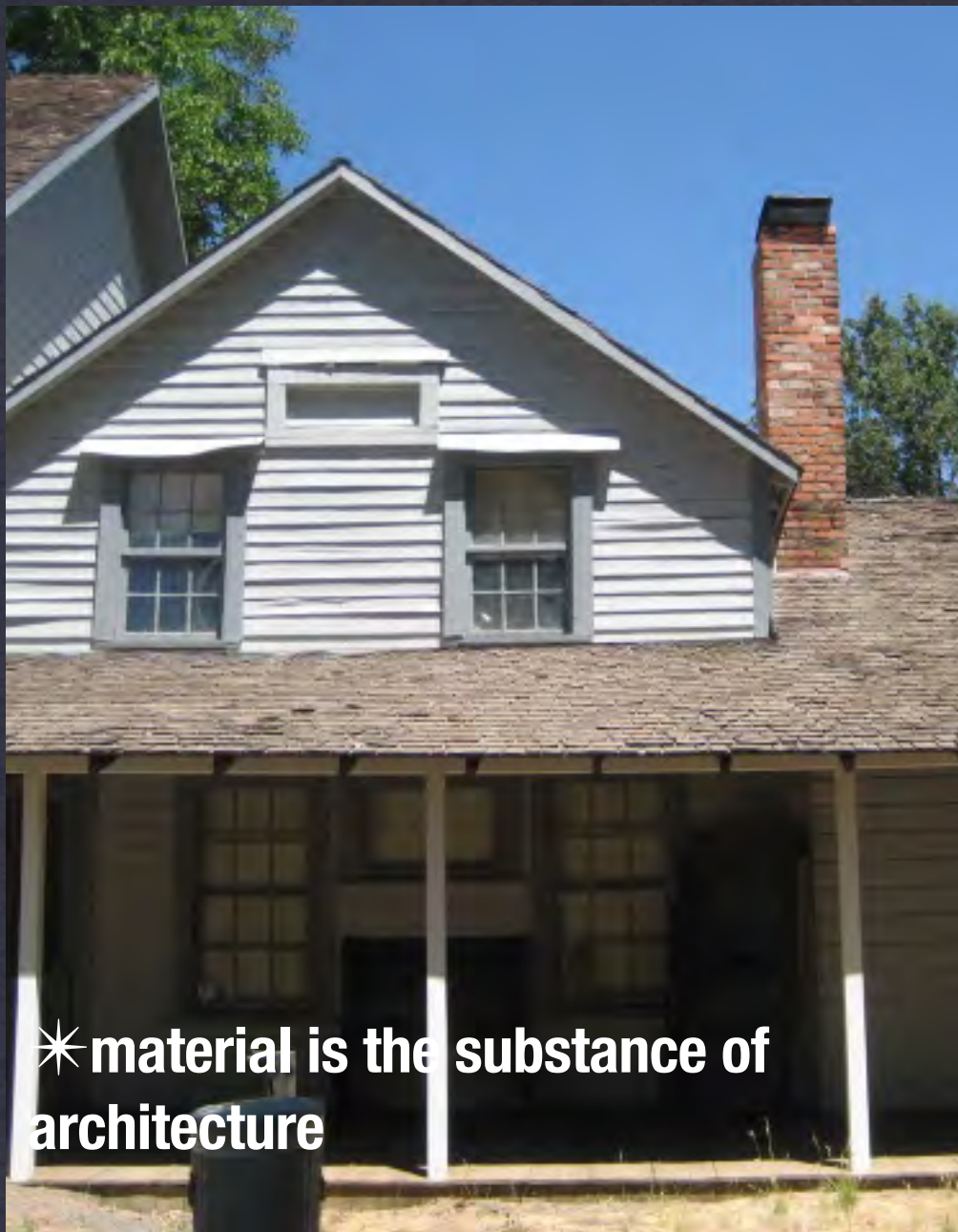
# MATERIALS in ARCHITECTURE

course overview

DATE **AUTUMN 2010**

PROFESSOR **MONTGOMERY**





\* material is the substance of architecture



\* technology is the manipulation and assembly of the material

## RELATION OF MATERIAL TO ARCHITECTURE

professor Montgomery

arch 1100 + 1140





\*tectonics: architecture is the poetic assembly and composition of materials

## RELATION OF MATERIAL TO ARCHITECTURE

professor Montgomery

arch 1100 + 1140





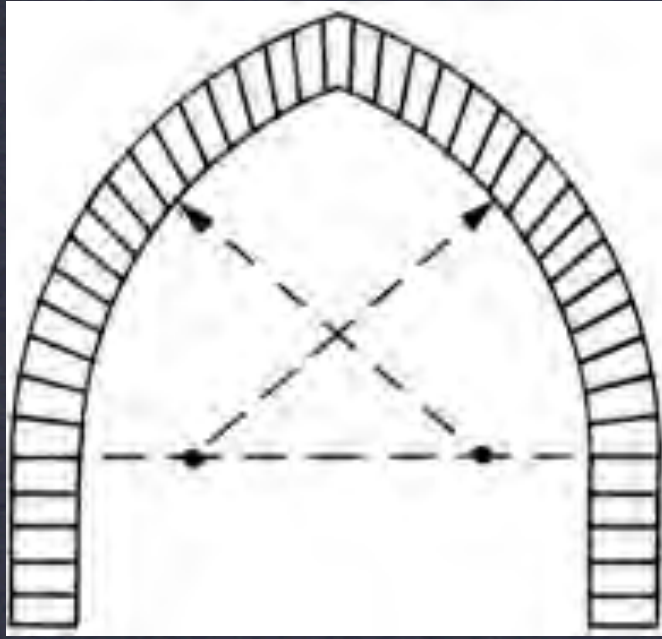
# ORIGINS OF ARCHITECTURE

professor Montgomery

# the primitive hut

arch 1100 + 1140





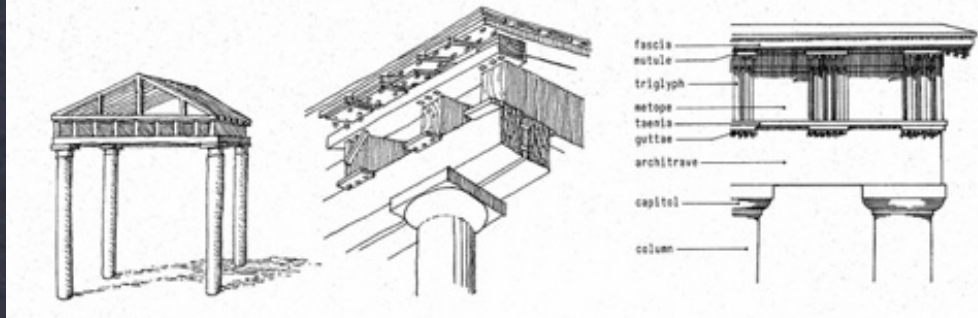
**ORIGINS OF ARCHITECTURE**

professor Montgomery

**transformation**

arch 1100 + 1140





\*tectonics: architecture is the poetic assembly and composition of materials

# RELATION OF MATERIAL TO ARCHITECTURE

professor Montgomery

arch 1100 + 1140





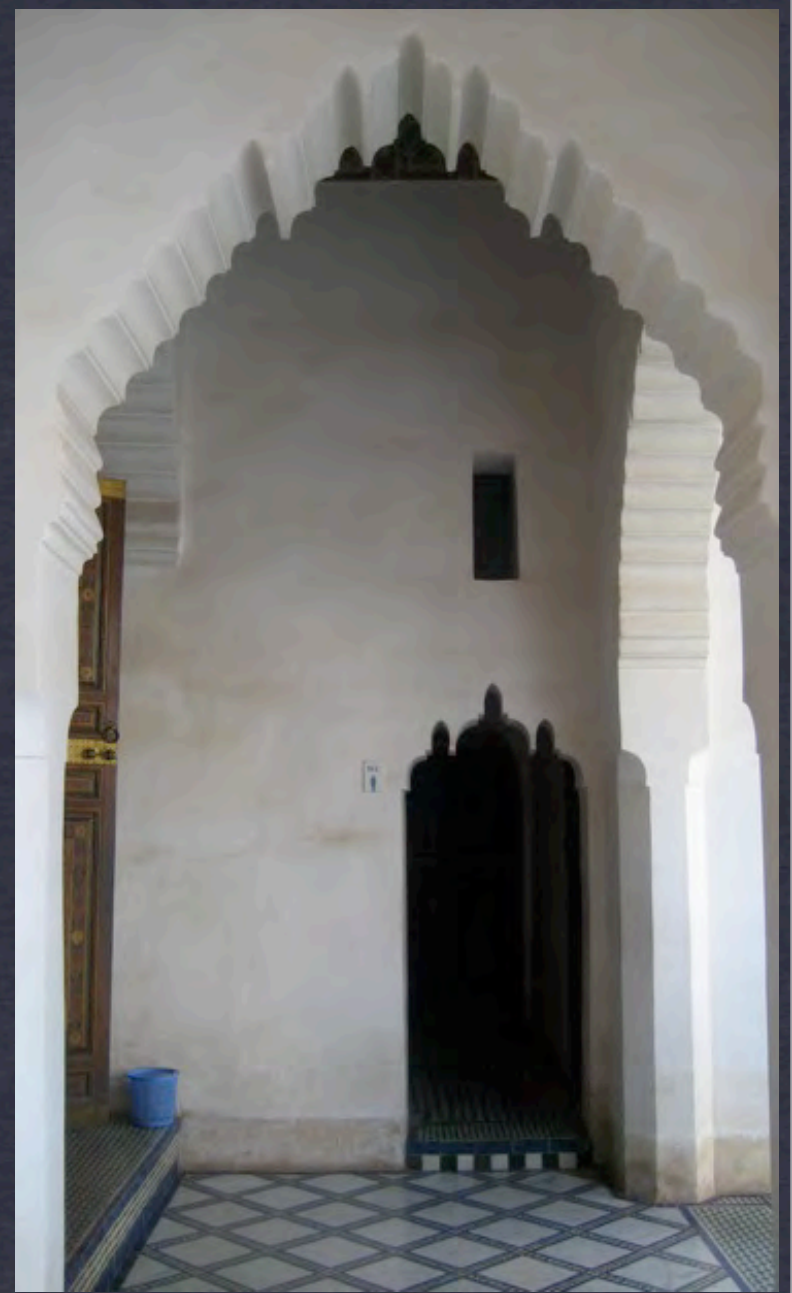
# TRANSFORMATION AND ADAPTATION

professor Montgomery

post and beam

arch 1100 + 1140





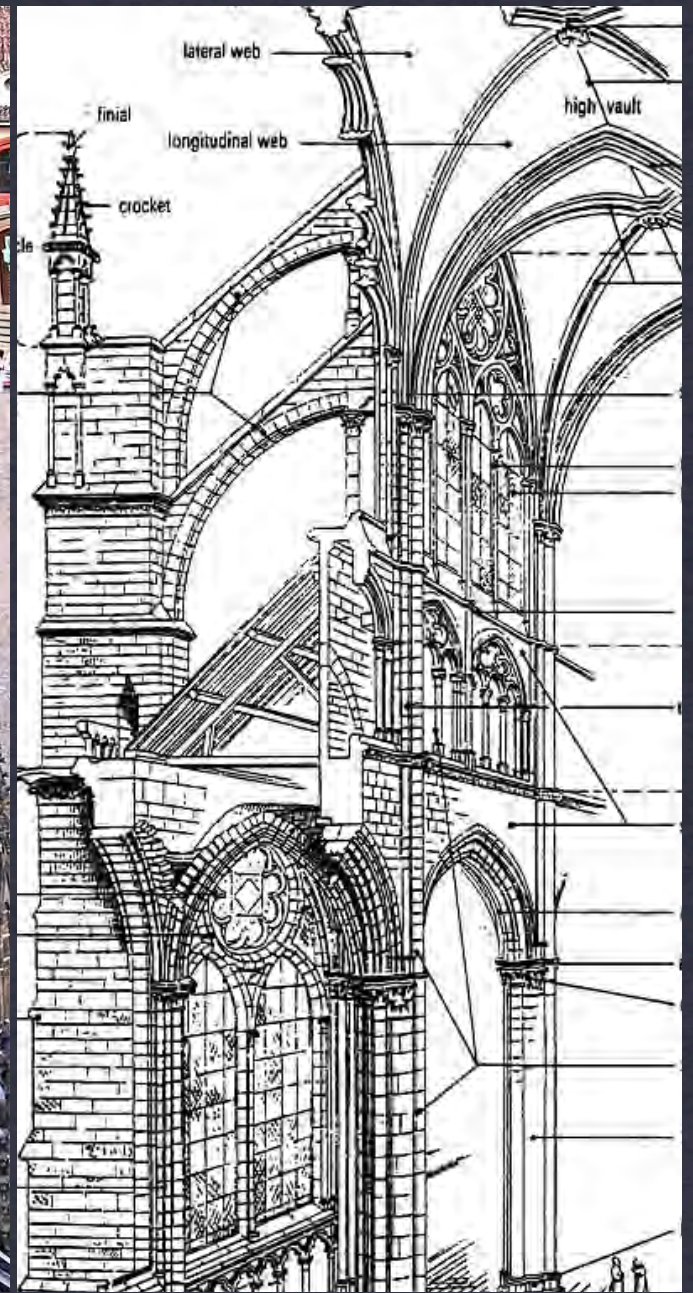
# TECTONICS

professor Montgomery

# the arch as icon

arch 1100 + 1140





# TECTONICS

professor Montgomery

tracing the line of forces

arch 1100 + 1140





**TECTONICS**

professor Montgomery

**bold structural innovation**

arch 1100 + 1140





# TECTONICS

professor Montgomery

wood transformed to soaring structure

arch 1100 + 1140





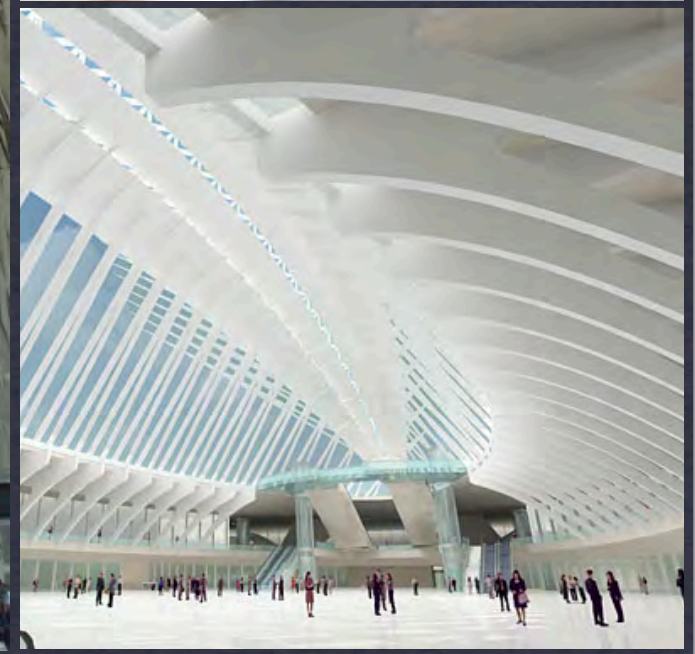
# TECTONICS

professor Montgomery

pushing the limits inside out

arch 1100 + 1140





**TECTONICS**

professor Montgomery

**contemporary organic gothic**

arch 1100 + 1140



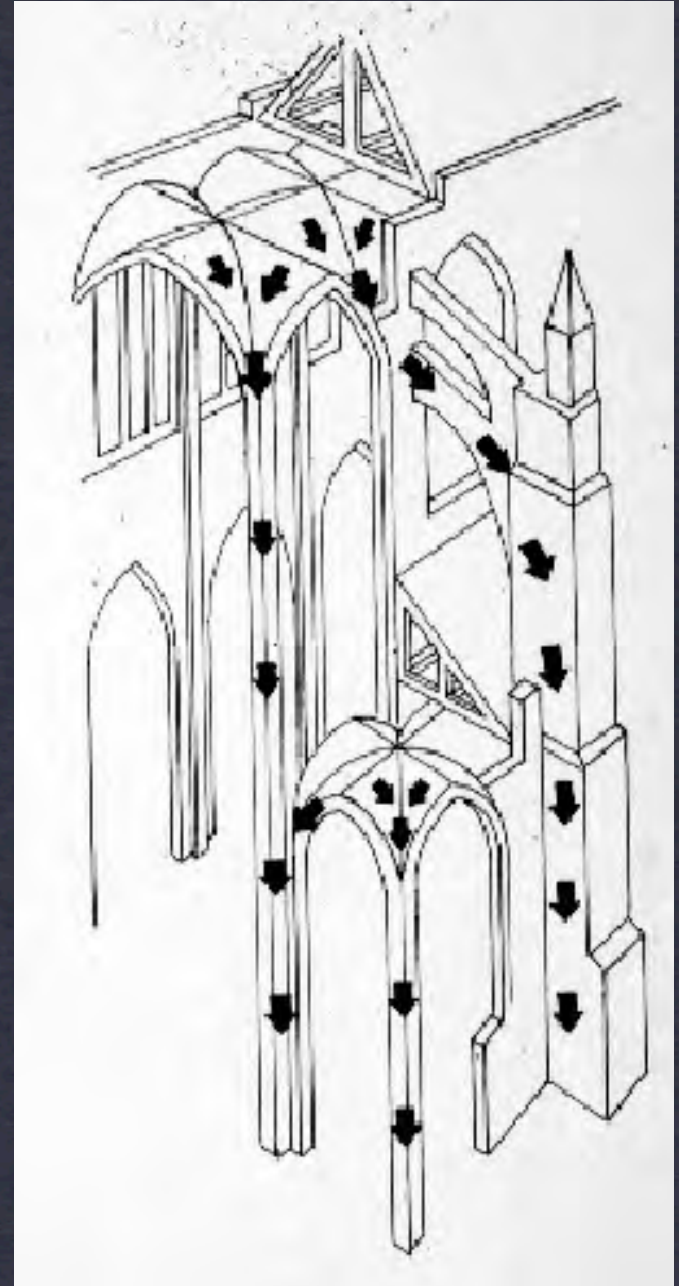


# MATERIALS

professor Montgomery

arch 1100 + 1140



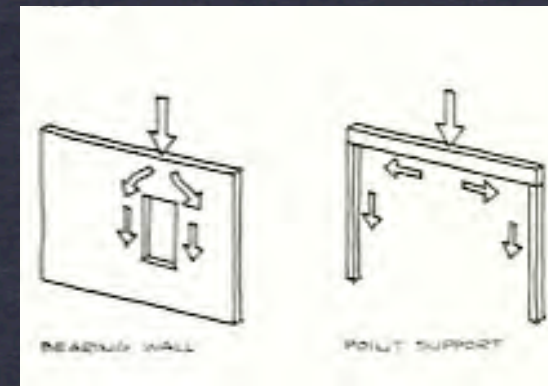
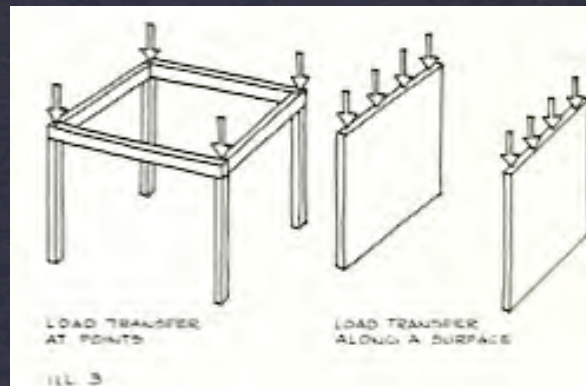
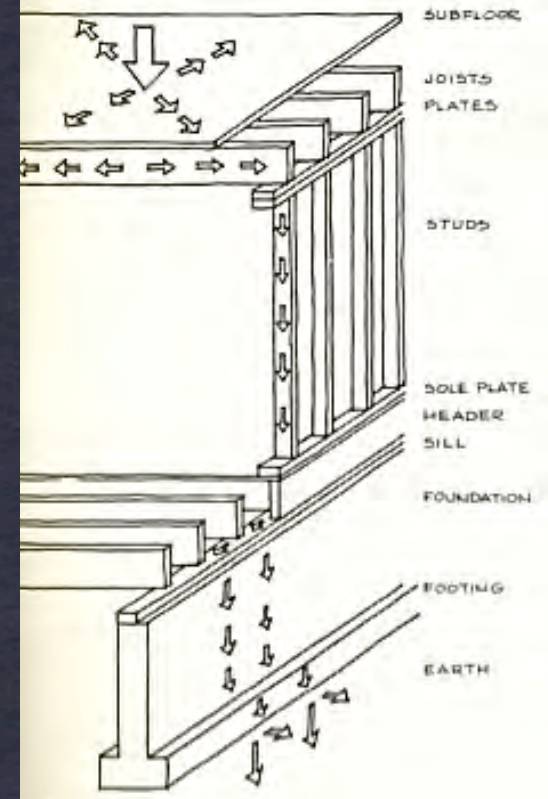
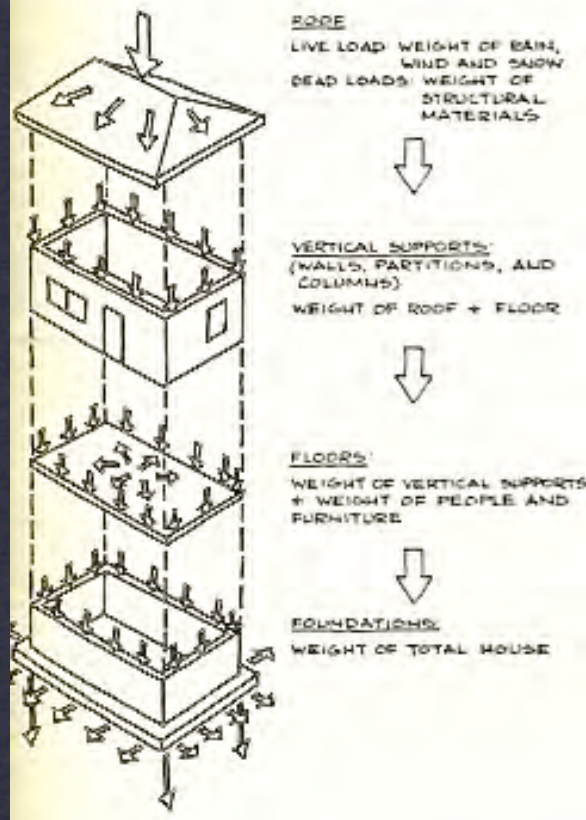
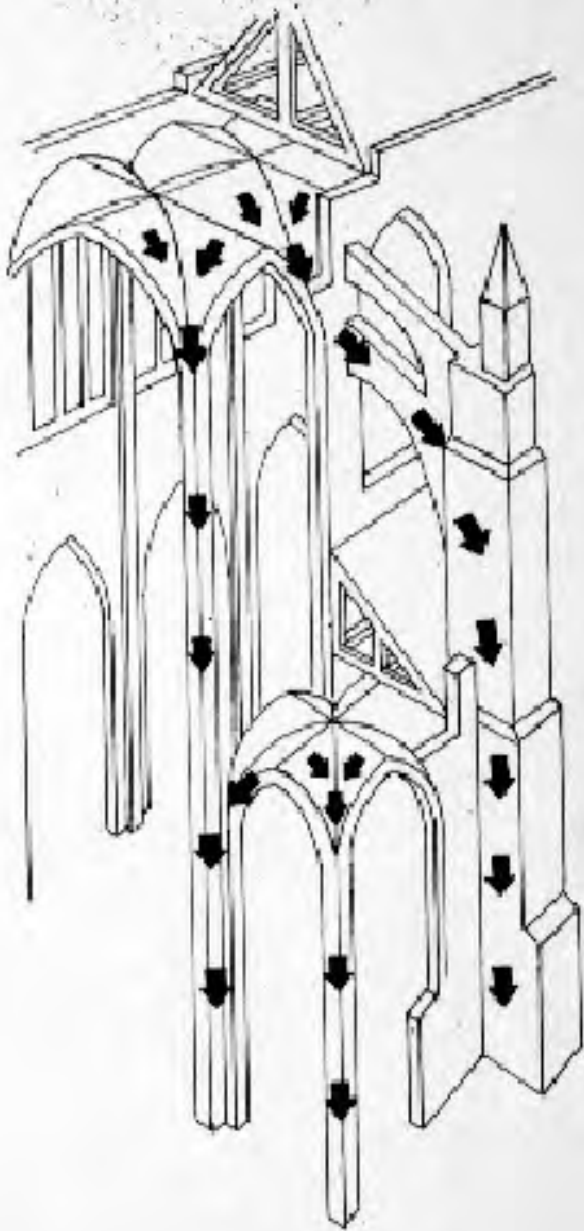


# FORCES ON BUILDINGS transferring dead loads to the earth

professor Montgomery

arch 1100 + 1140





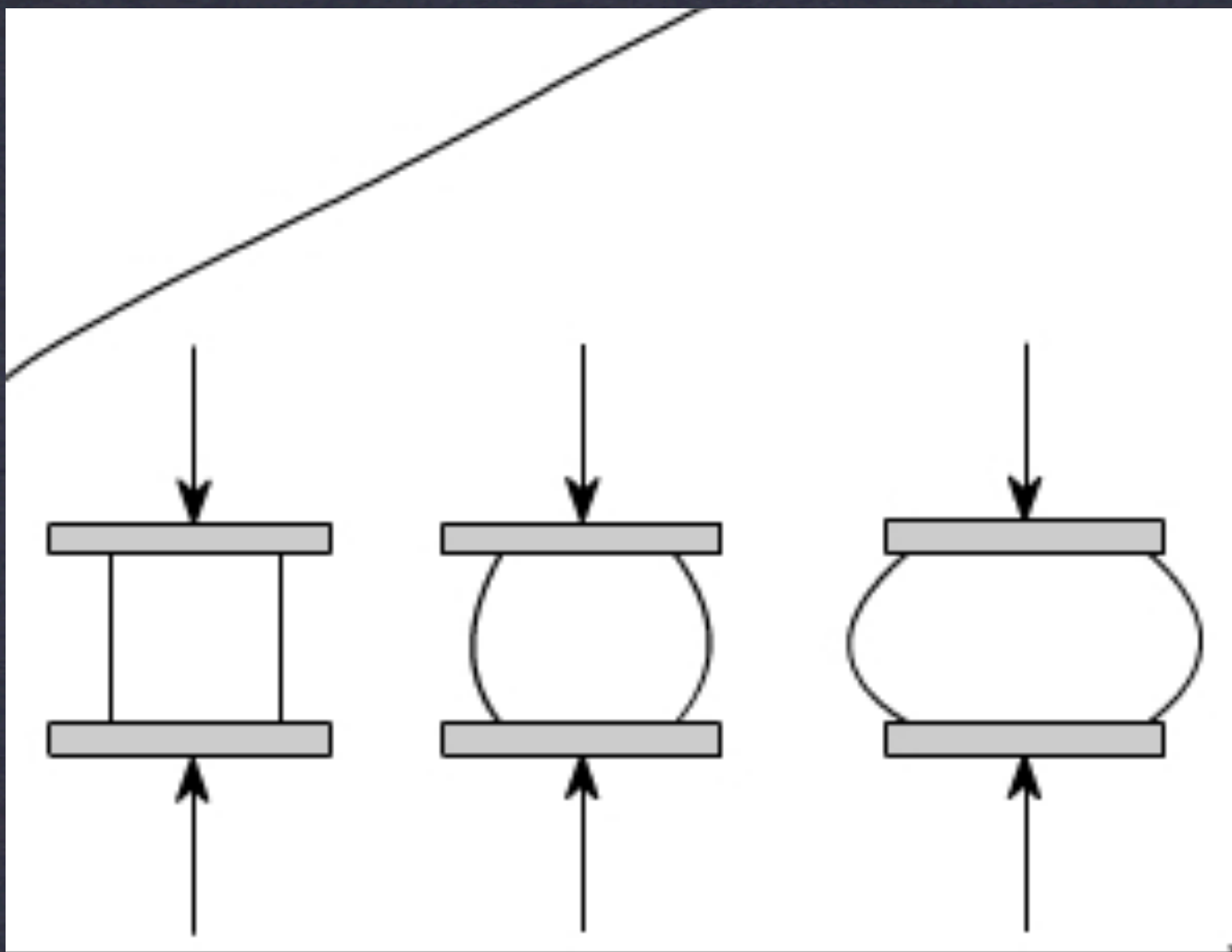
# FORCES ON BUILDINGS

professor Montgomery

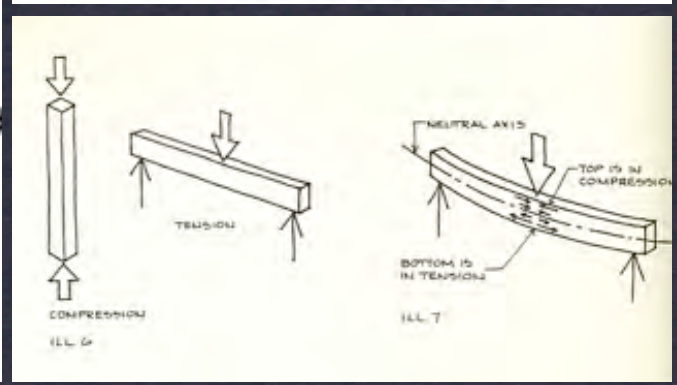
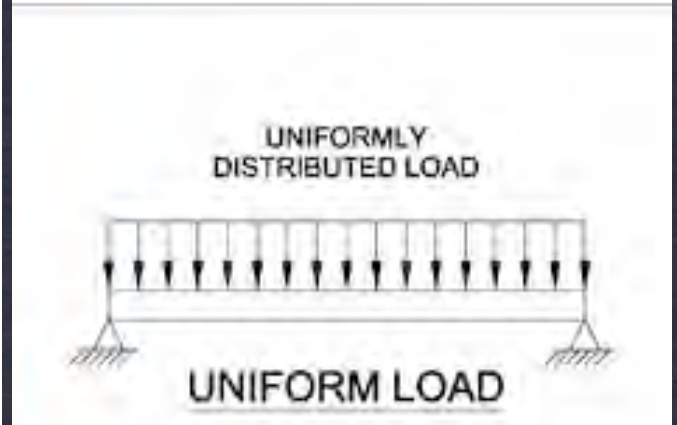
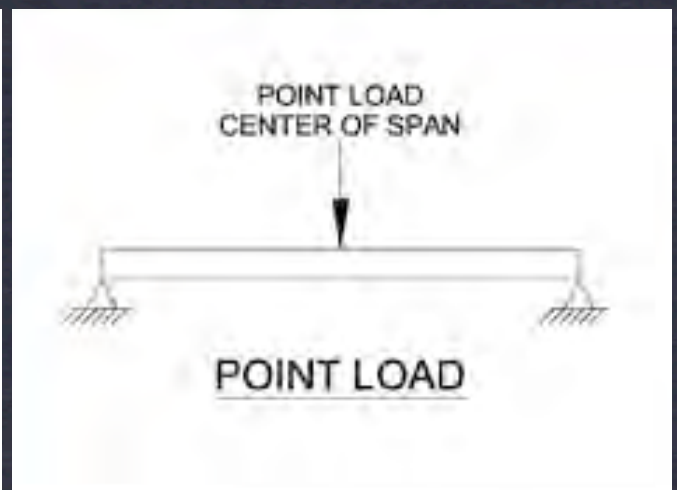
path of loads from roof to foundation

arch 1100 + 1140





→ plastic deformation  
 → compression (or strain)



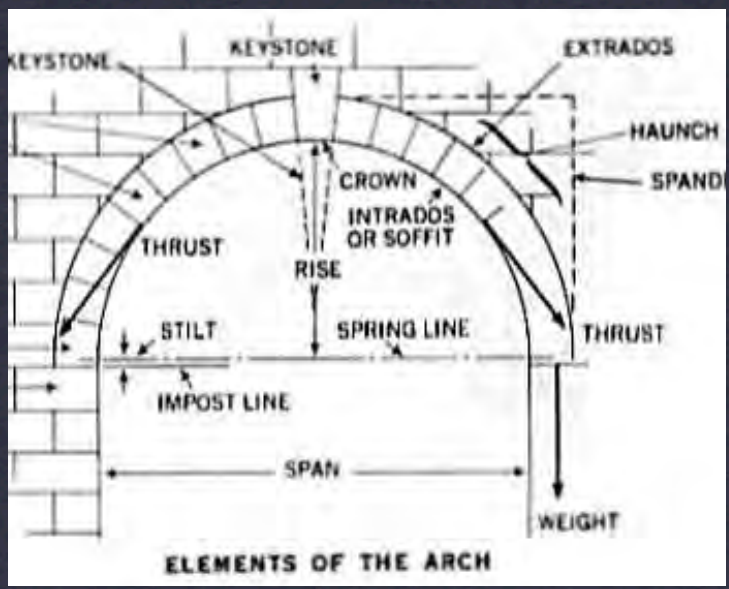
# FORCES ON BUILDINGS

professor Montgomery

# loads + stresses

arch 1100 + 1140





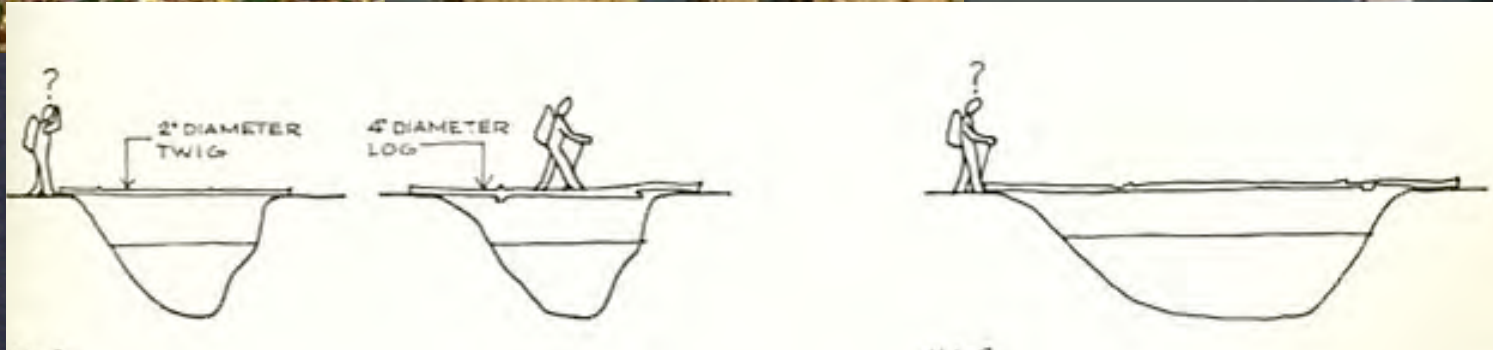
# FORCES ON BUILDINGS

professor Montgomery

# loads + stresses

arch 1100 + 1140





# FORCES ON BUILDINGS

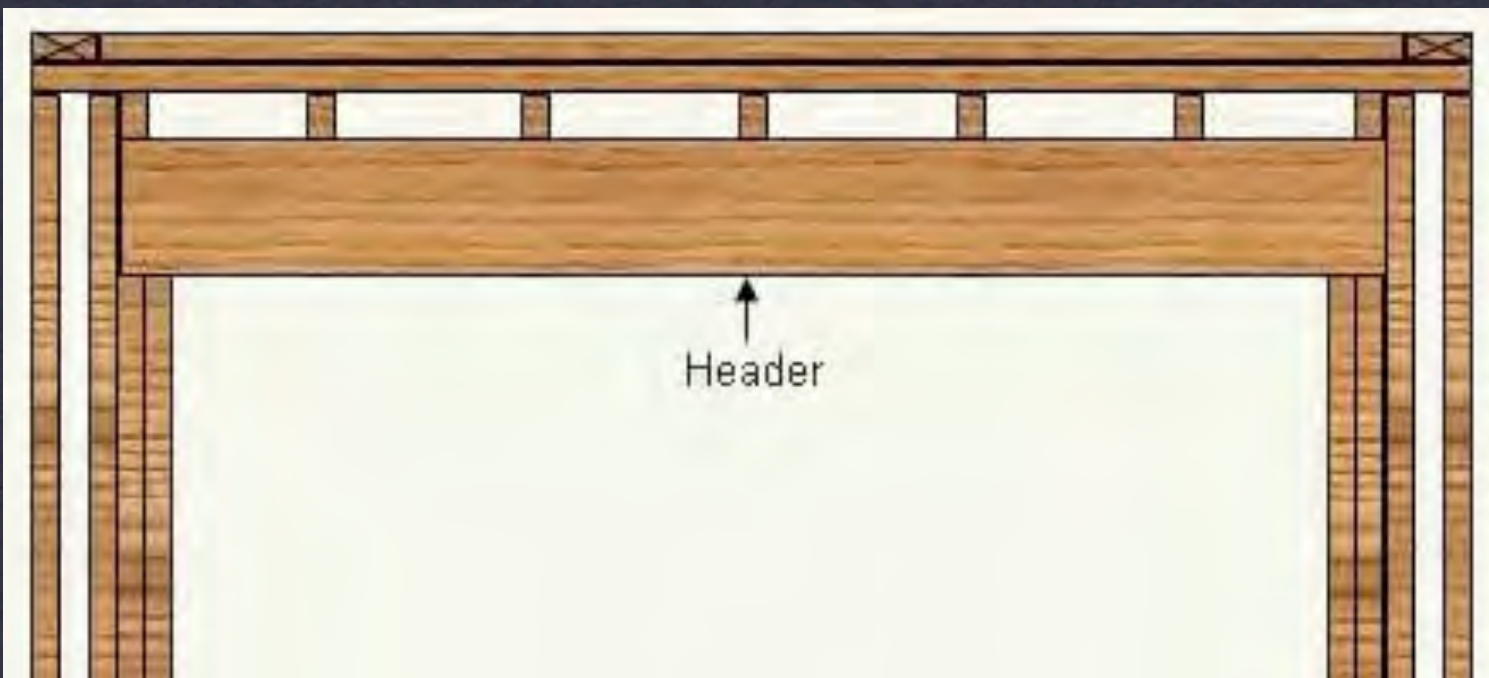
professor Montgomery

# loads + stresses

arch 1100 + 1140



Section:	Moment of Inertia:
	$\frac{a^4}{12}$
	$\frac{a^4 - a_1^4}{12}$
	$\frac{bh^3}{12}$
	$\frac{bh^3 - b_1h_1^3}{12}$
	$\frac{\pi d^4}{64}$
	$\frac{\pi (d^4 - d_1^4)}{64}$



# FORCES ON BUILDINGS

professor Montgomery

# material's shape and proportion

arch 1100 + 1140





**STRONG IN TENSION  
GOOD IN COMPRESSION**



**STRONG IN  
COMPRESSION  
NOT GREAT IN TENSION**



**STRONG IN  
COMPRESSION  
NOT GREAT IN TENSION**



**STRONG IN TENSION  
GOOD IN COMPRESSION**



**STRONG IN  
COMPRESSION  
STRONG IN TENSION  
(WHEN REINFORCED)**



# SUMMARY of PROPERTIES

professor Montgomery

arch 1100 + 1140



# wrap up

**FUNDAMENTAL TO THE PRACTICE OF ARCHITECTURE IS THE IMMERSION IN AND MASTERING OF THE POTENTIAL OF MATERIALS**



professor Montgomery

- \* form governed by required resistance of stresses
- \* choosing materials for their structural advantages and their aesthetic qualities
- \* innovation is often rooted in an evolving knowledge and sophisticated manipulation of materials