LIGHTFAIR International 2020

Provider Number - Z136

The Building As Luminaire

Course Number:

Clifton Stanley Lemon

May 5,2020

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Course Description

Lighting has delivered dramatic energy reductions over the past 2o years, more than any other technology. We are reaching diminishing returns on effecting further reductions. California's lighting codes are quickly becoming too complex and difficult to implement, don't represent the interests of all stakeholders, and now must focus on adapting to the changing energy infrastructure and the rapid integration of information and data technology into the industry. The only way to achieve this is through a coalition of government, NGOs, manufacturers, contractors, specifiers, and owners. As the world's fifth largest economy, California has a unique opportunity to continue its tradition of successful energy and environmental regulation.

Learning Objectives

At the end of this course, participants will be able to:

1. Identify effective lighting strategies in architectural history before gas and electric lighting.

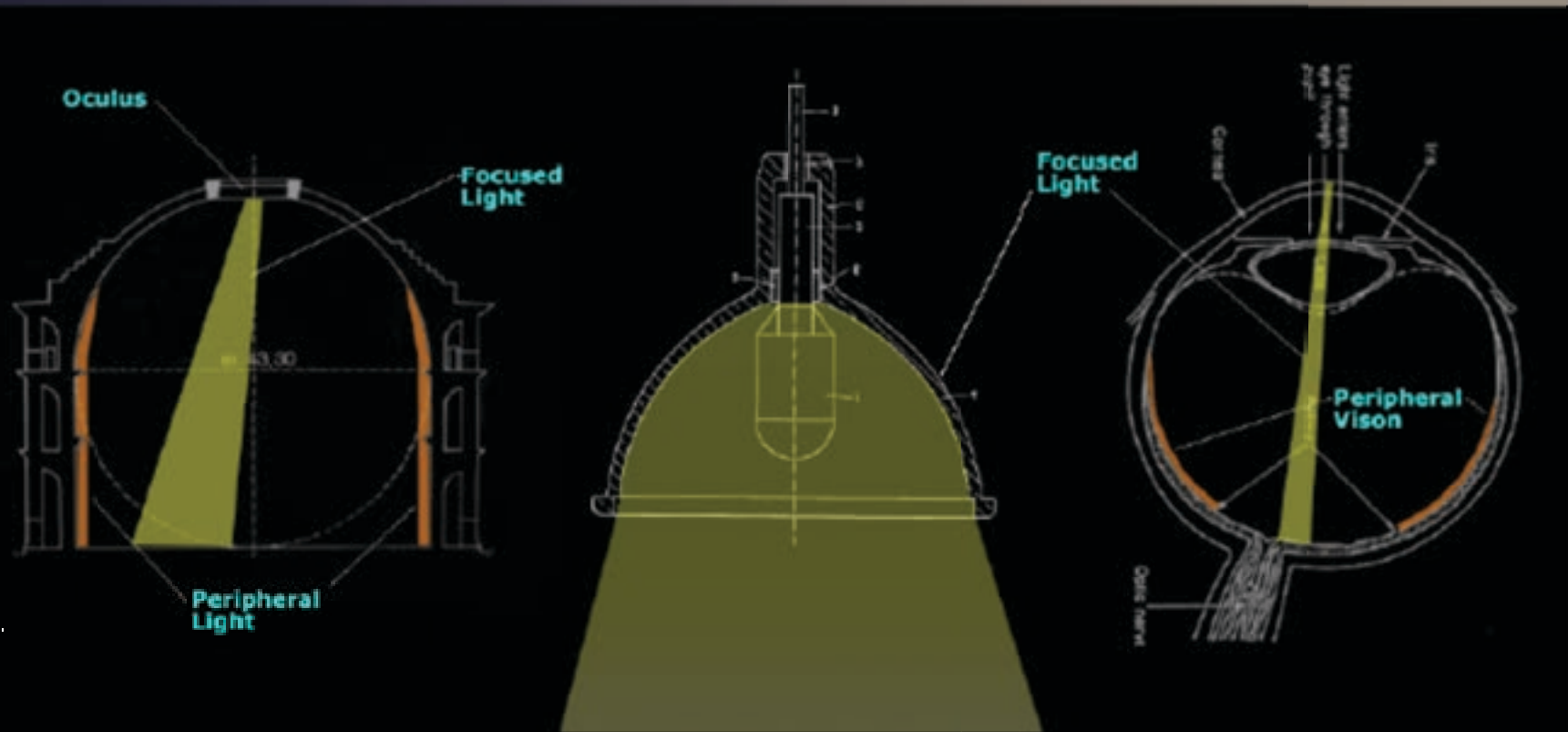
2. Articulate more effective roles for lighting designers in the early design phases of building projects when crucial decisions are made about siting, glazing, building orientation, and energy use.

3. Understand how traditional architectural design strategies for mitigating glare and providing proper light distribution and views are often preferable to relying on electric lighting and complex control.

4. Compare benefits of integrating successful historical strategies with new technology to current building practice.

The Building As Luminaire

Clifton Stanley Lemon



A house is a machine for living in.

Architecture is the masterly, correct and magnificent play of masses brought together in light.

- Le Corbusier

Chaos was the law of nature,
order was the dream of man.

- Henry Adams

We must become producers of ecosystem services.

- Janine Benyus

Almost any artificial light is basically dramatic. It is beyond nature, it is man made and under his control.

- Stanley McCandless

If it’s worth doing, it’s worth overdoing.

- Ayn Rand

Can a Building be a Luminaire?

Can Light drive Architecture?

How did we build before Electric Light?

How would Nature do it?

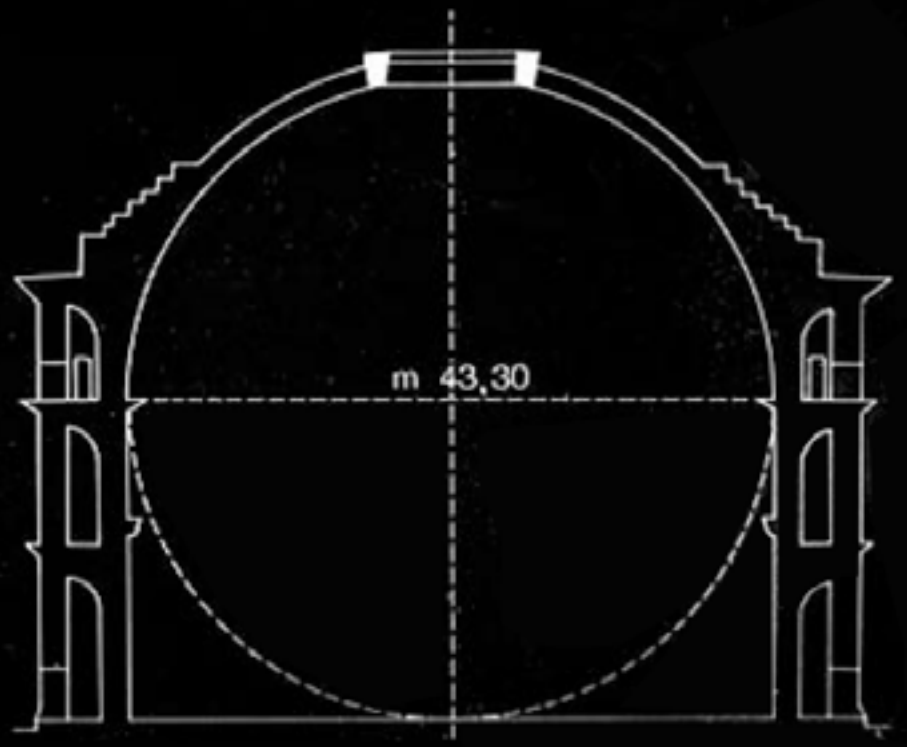
How can we build Sustainably with Light?

How can a Building be a Luminaire?

Thomas Kincaid,
“the Painter of Light”
Winter Scene

Philip Johnson, architect, Richard Kelly, lighting designer
Glass House

Marcus Agrippa
Panteone (Pantheon)
Rome 27 BCE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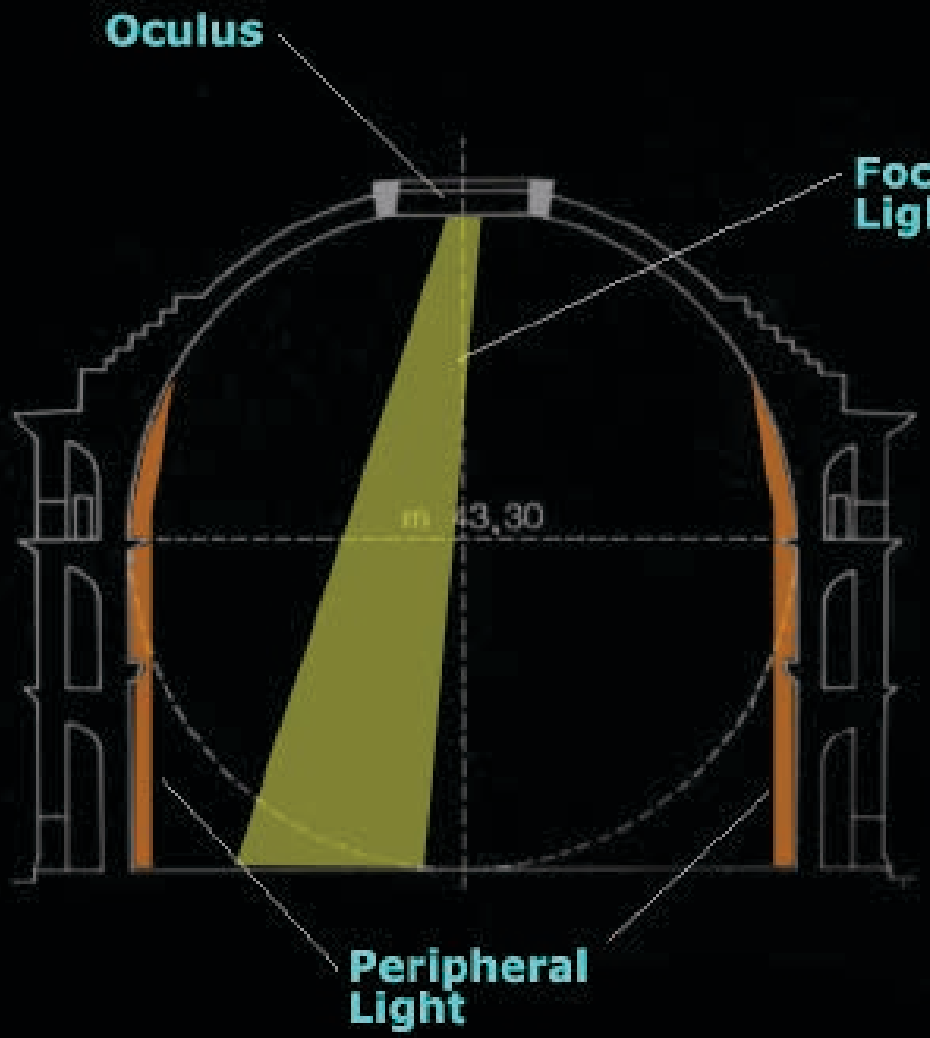
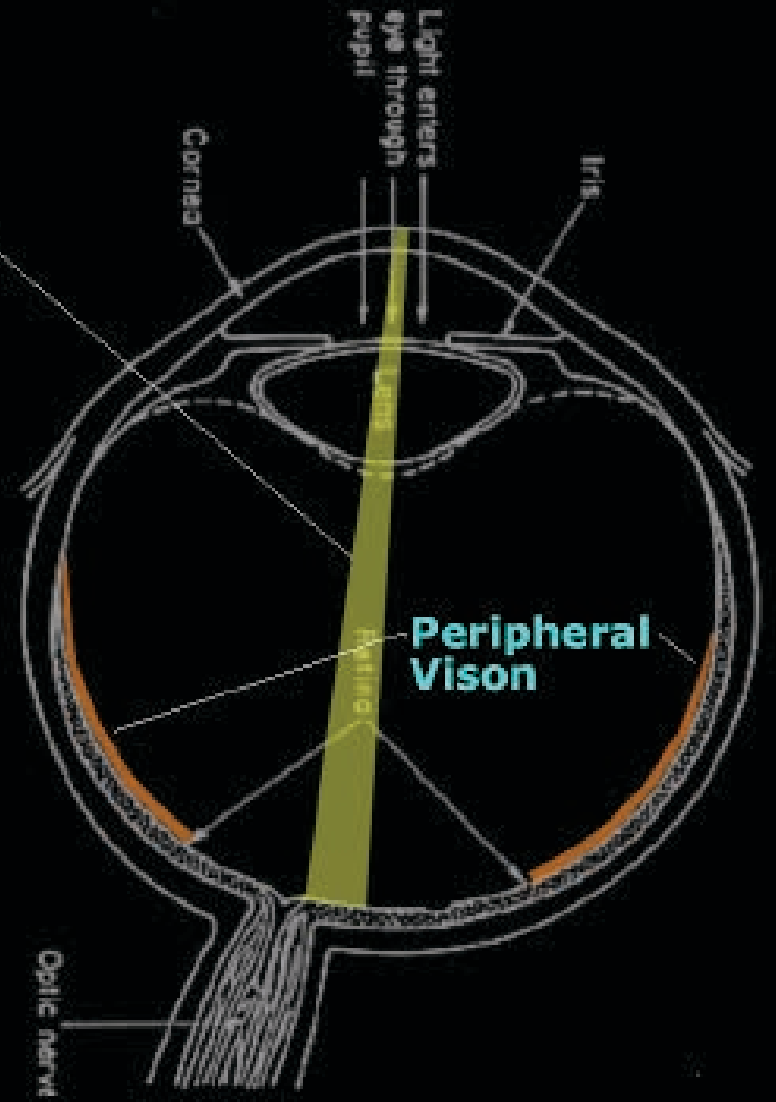
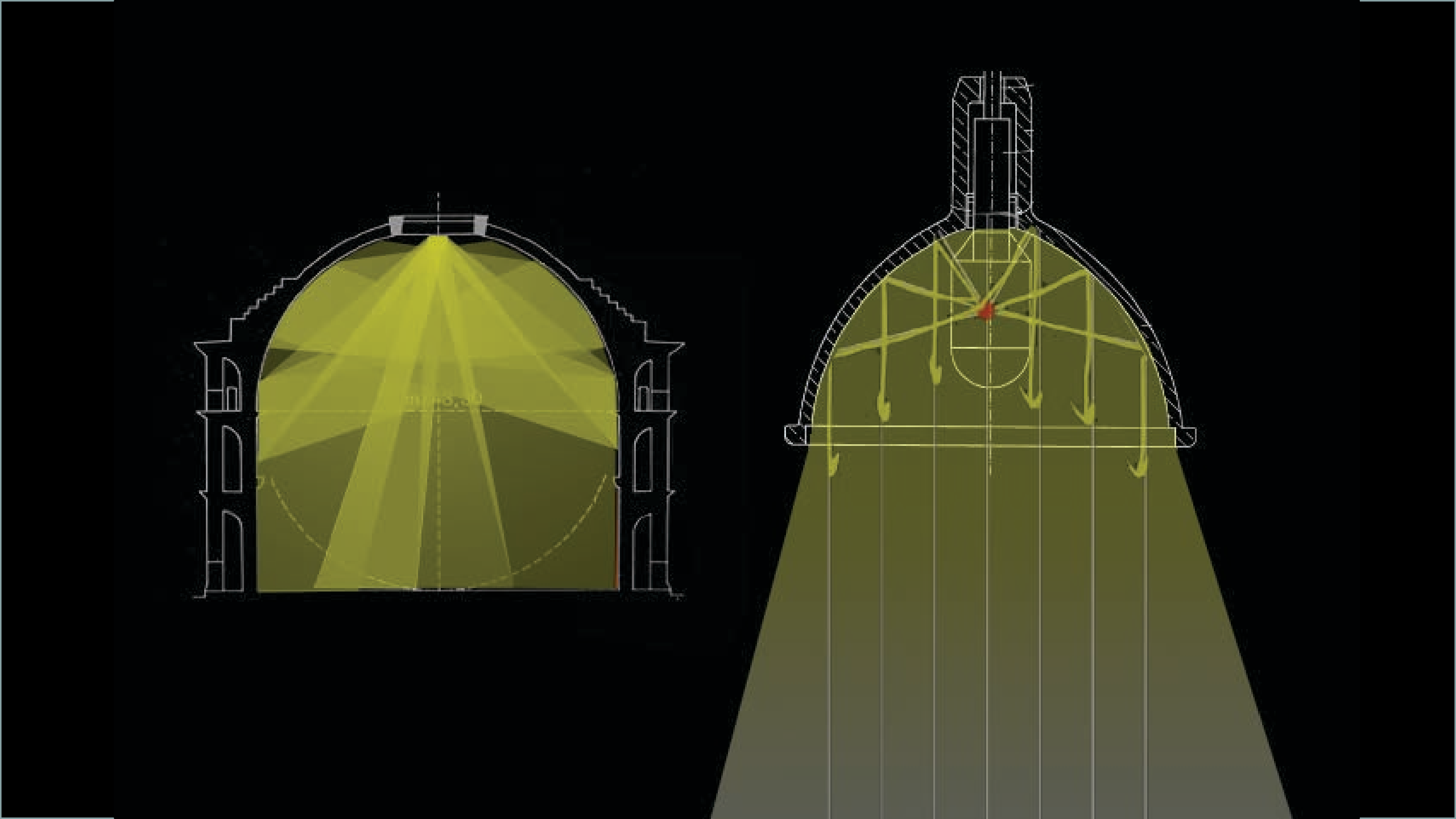

Oculus
Focused Light
Peripheral Light


Light enters eye through pupil
Cornea
Iris
Lens
Retina
Peripheral Vison
Optic nerve



Isidore of Miletus & Anthemius of Tralles
Hagia Sofiia
Istanbul, Turkey 539 CE

Reed and Stem
Grand Central Terminal
NYC, New York 1913

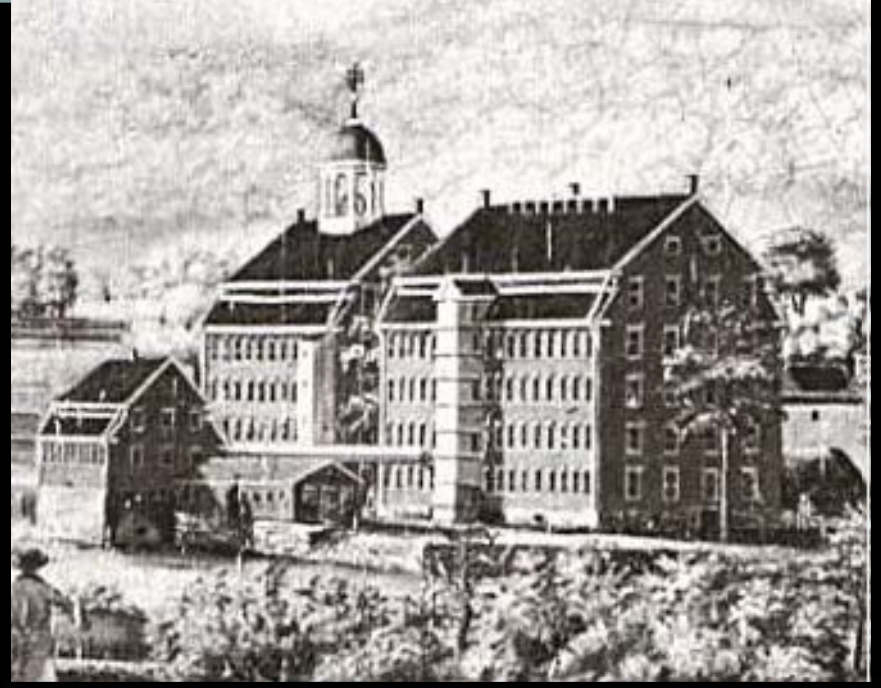
Arabic Decorative Lamps

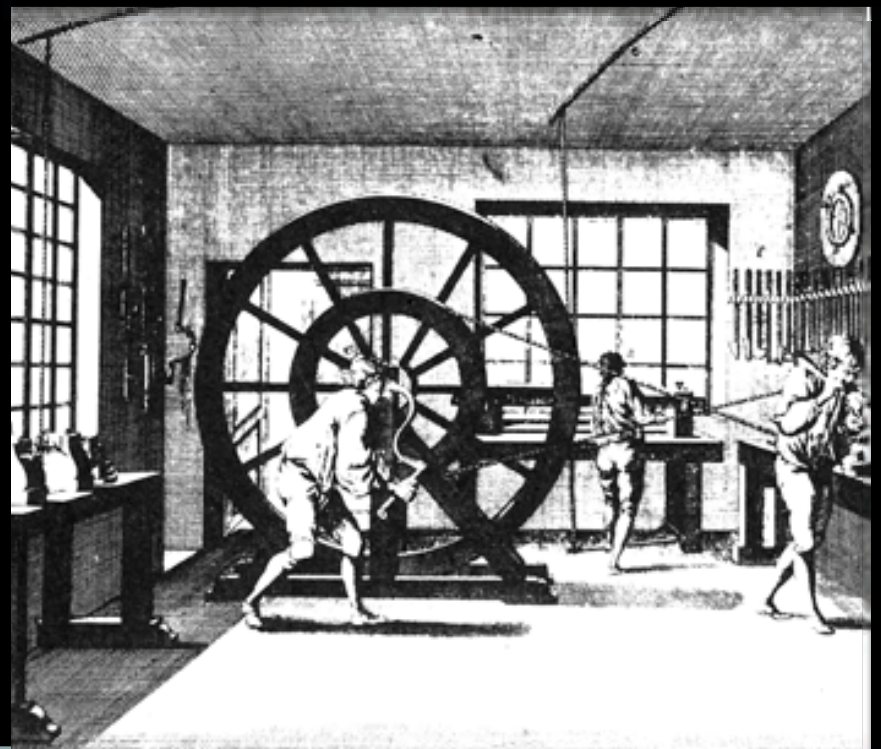
Henri Labrouste
Bibliothèque Sainte-Geneviève
Paris, 1850

Takeshi Hosaka Architects
Natural Light House,
Yokohama 2011

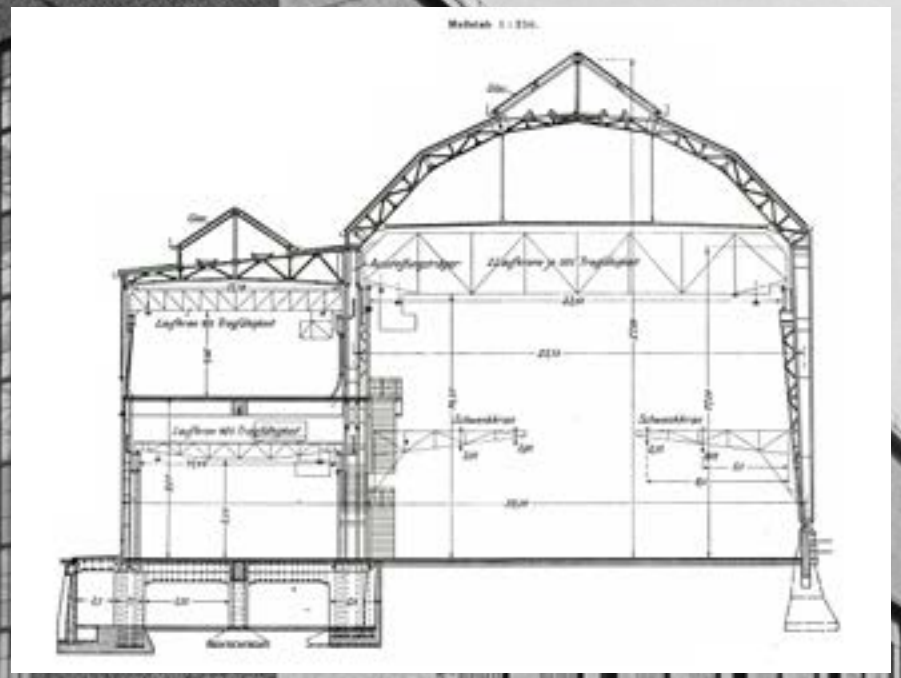
Can Light Drive Architecture?

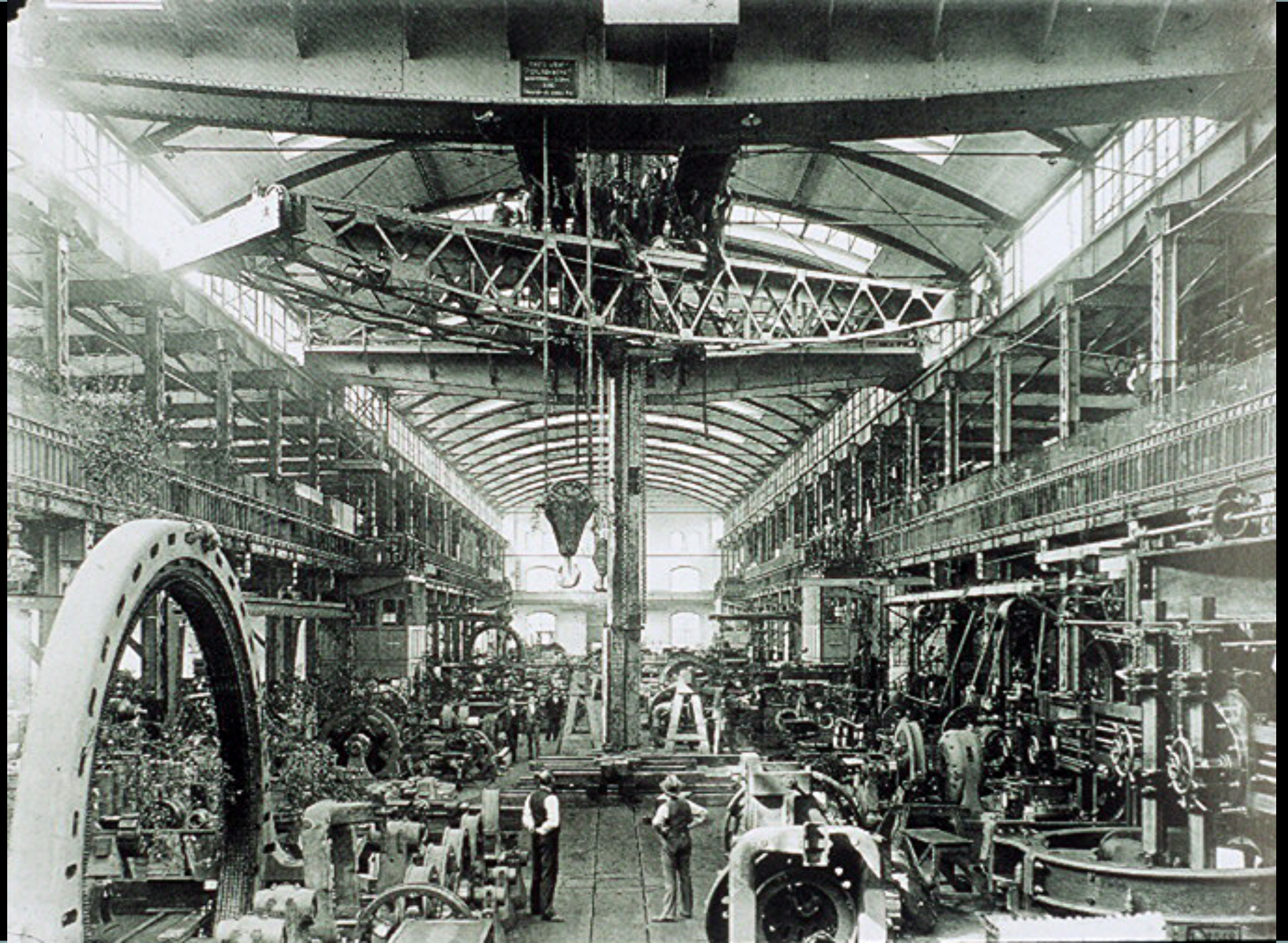
Early Industrial Factories
1800's to 1900's



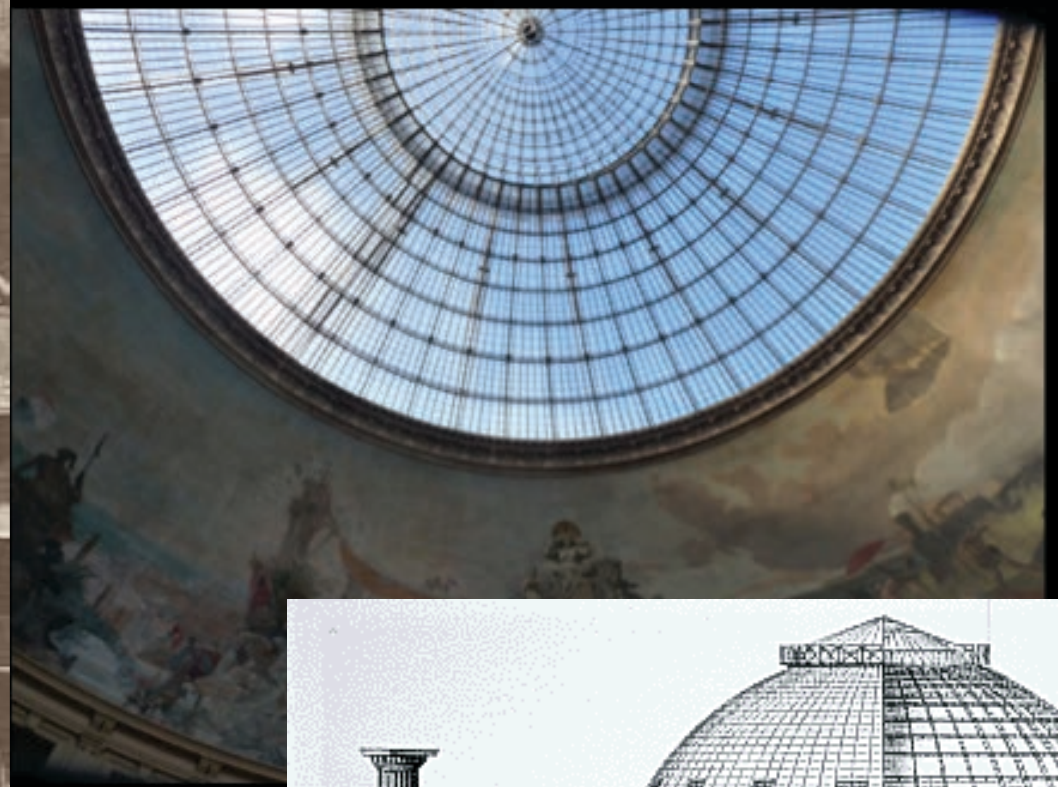


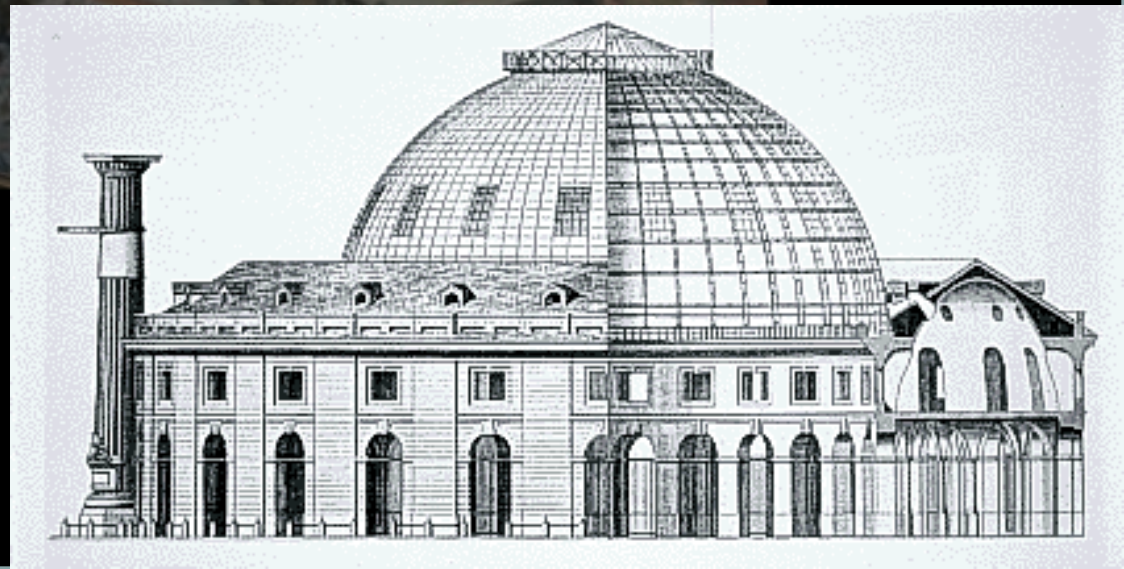
Peter Behrens
AEG Turbine Factory
Berlin 1908



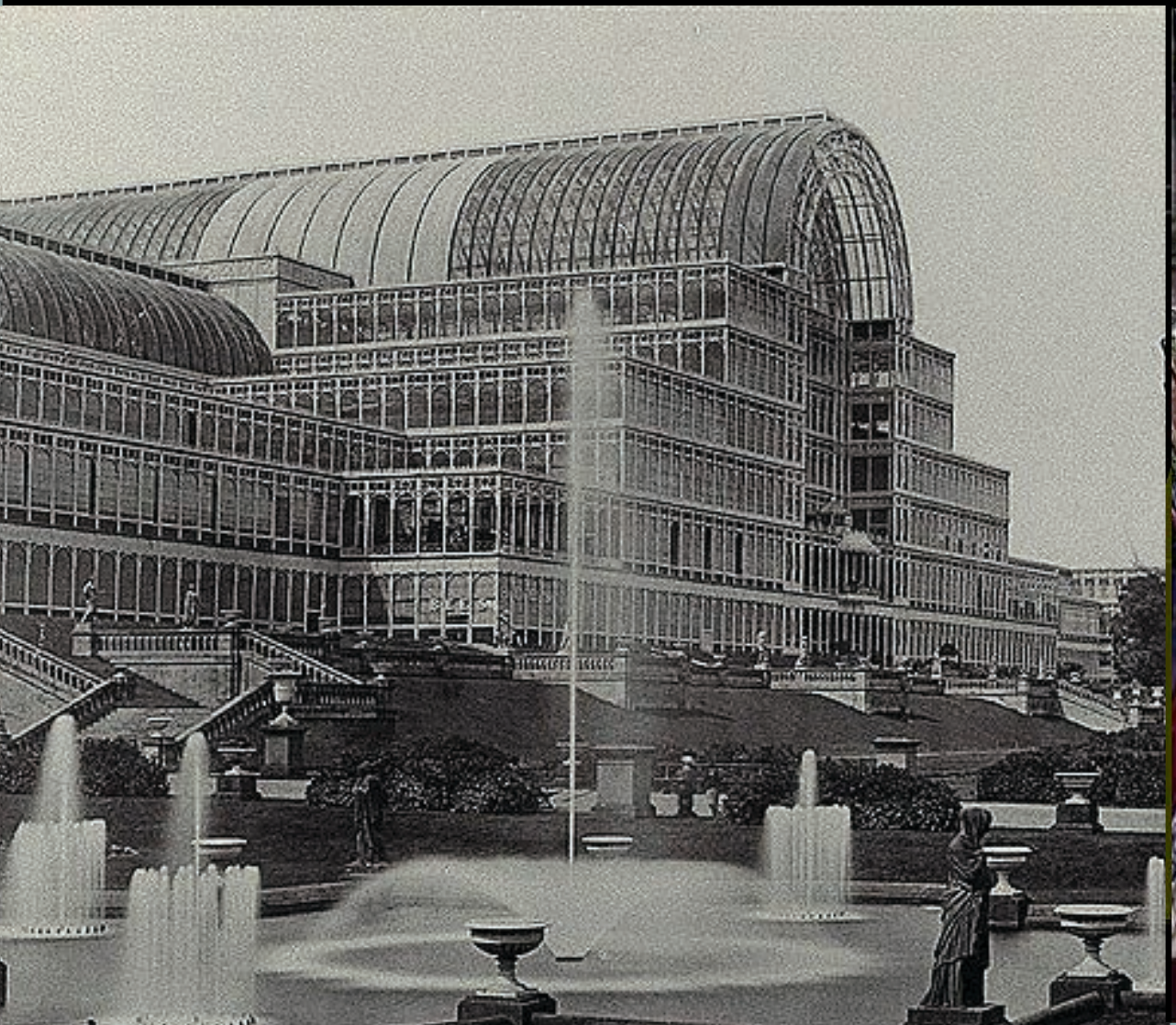


Jacques-Guillaume Legrand
& Jacques Molinos
Halle aux Blés (Corn Exchange)
Paris 1782





Joseph Paxton, Owen Jones
Crystal Palace
London 1851



Willoughby J. Edbrooke
Old Post Office
Washington, DC 1899

How did we build before
Electric Light?

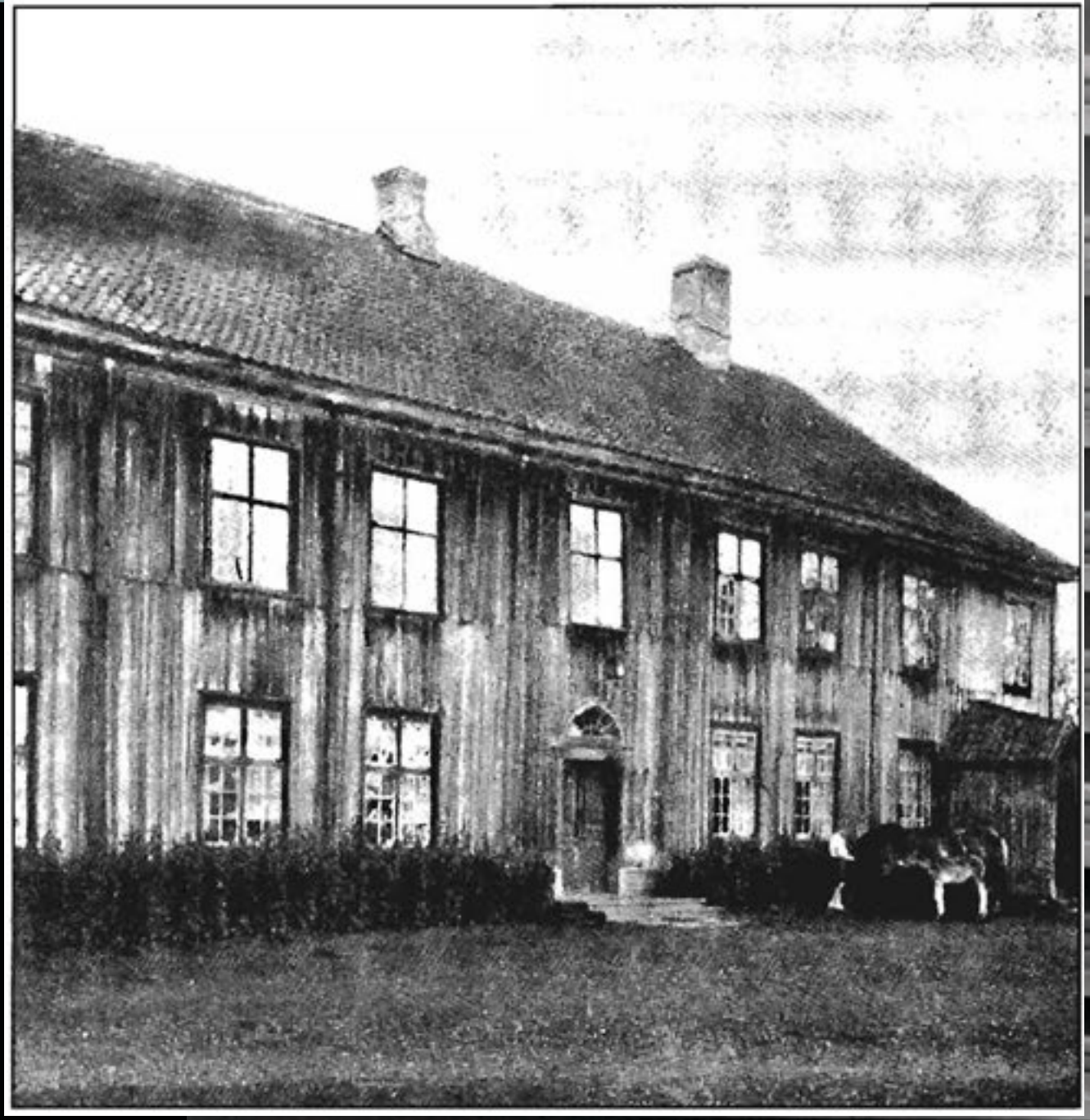
“The Universe is not made of "things," but of patterns - of complex, interactive geometries. Furthermore, this way of understanding the world can unlock marvelous secrets of nature, and perhaps even make possible a renaissance of human-scale design and technology. ”

- Christopher Alexander

Patterns of Light

South Facing Outdoors
Wings of Light
Long thin house
Indoor Sunlight
Tapestry of Light and Dark
Light on Two Sides of every room
Sun place
Window Place
Windows overlooking Life

Interior Windows
Sunny Counter
Natural Doors and Windows
Dormer Windows
Frames as Thickened Edges
Filtered Light
Small Panes
Windows That Open Wide
Pools of Light

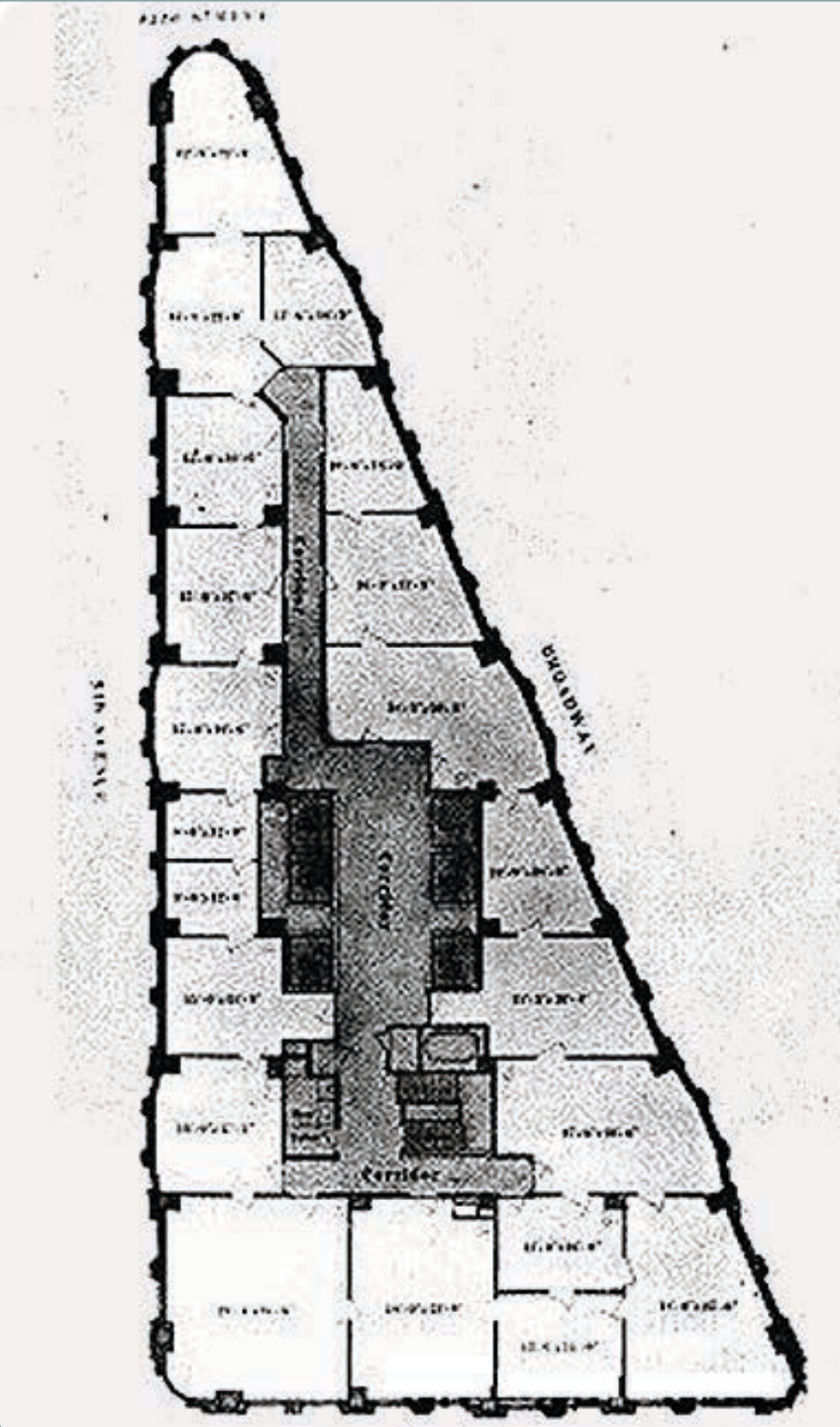


PATTERN NO 107
WINGS OF LIGHT

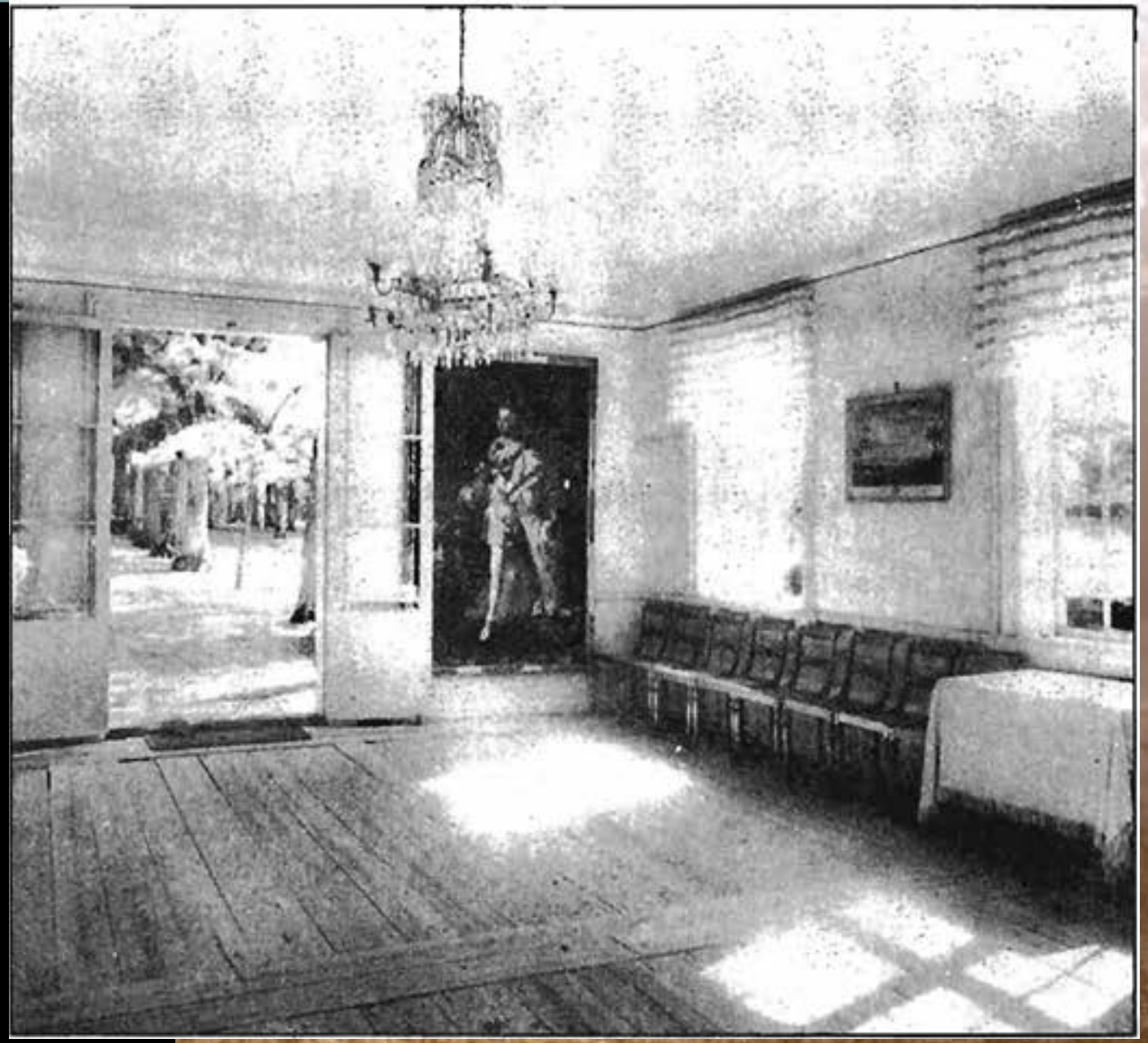
Modern buildings are often shaped with no concern for the natural light - they depend almost entirely on artificial light. But buildings which displace natural light as the major source of illumination are not fit places to spend the day.

Arrange each building so that it breaks down into wings which correspond, approximately to the most important natural social groups within the building. Make each wing long and narrow as you can- never more than 25 feet wide.

Daniel Burnham,
Frederick P. Dinkelberg
Flat Iron Building
New York, 1902

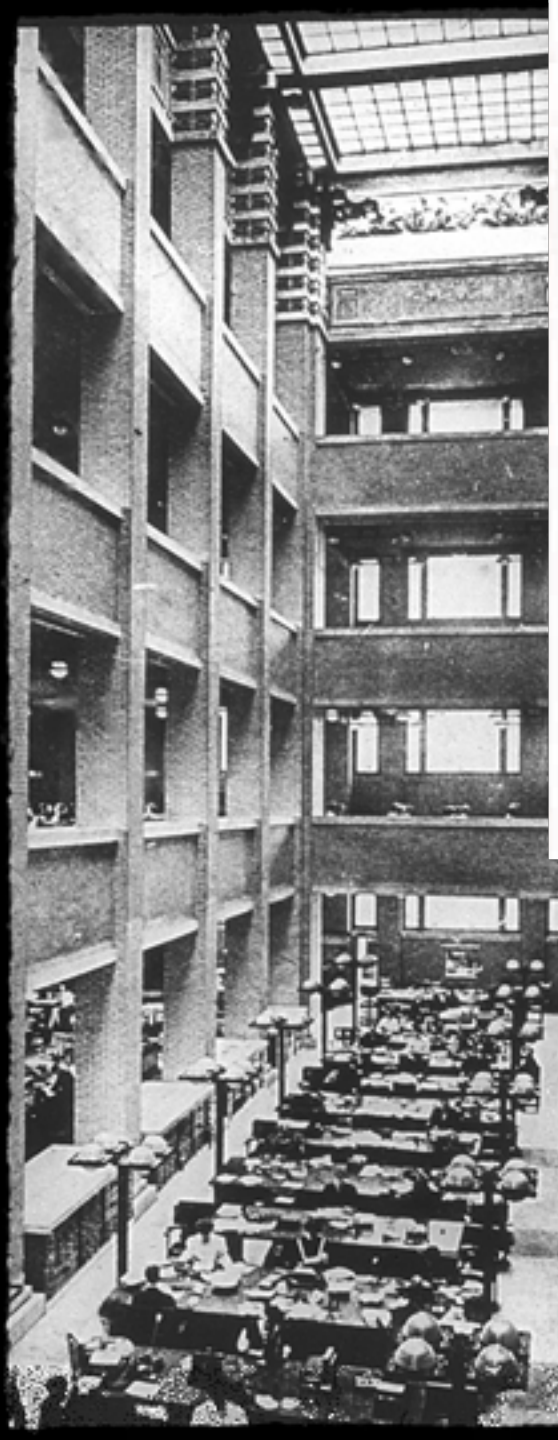


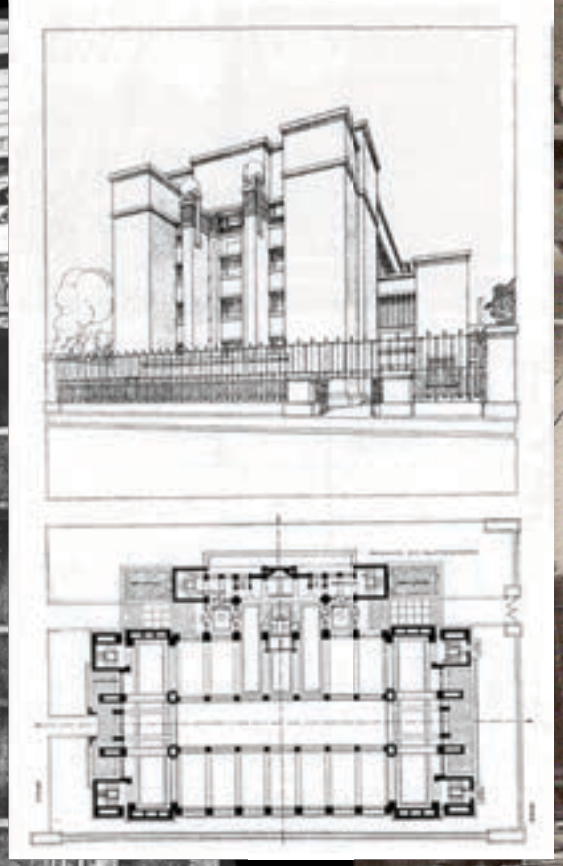
Louis Sullivan
Wainwright Building
St. Louis, Missouri 1891



PATTERN NO 159
LIGHT ON TWO SIDES OF EVERY ROOM

When they have a choice , people will always gravitate to those rooms which have light on two sides and leave the rooms which are lit only form one side unused and empty. Rooms lit on two sides, with natural light, create less glare around people and objects thus lets us see things more intricately.





Frank Lloyd Wright
Larkin Building
Buffalo, New York. 1904

PATTERN NO 135- TAPESTRY OF LIGHT AND DARK

The places which make effective settings are defined by light.

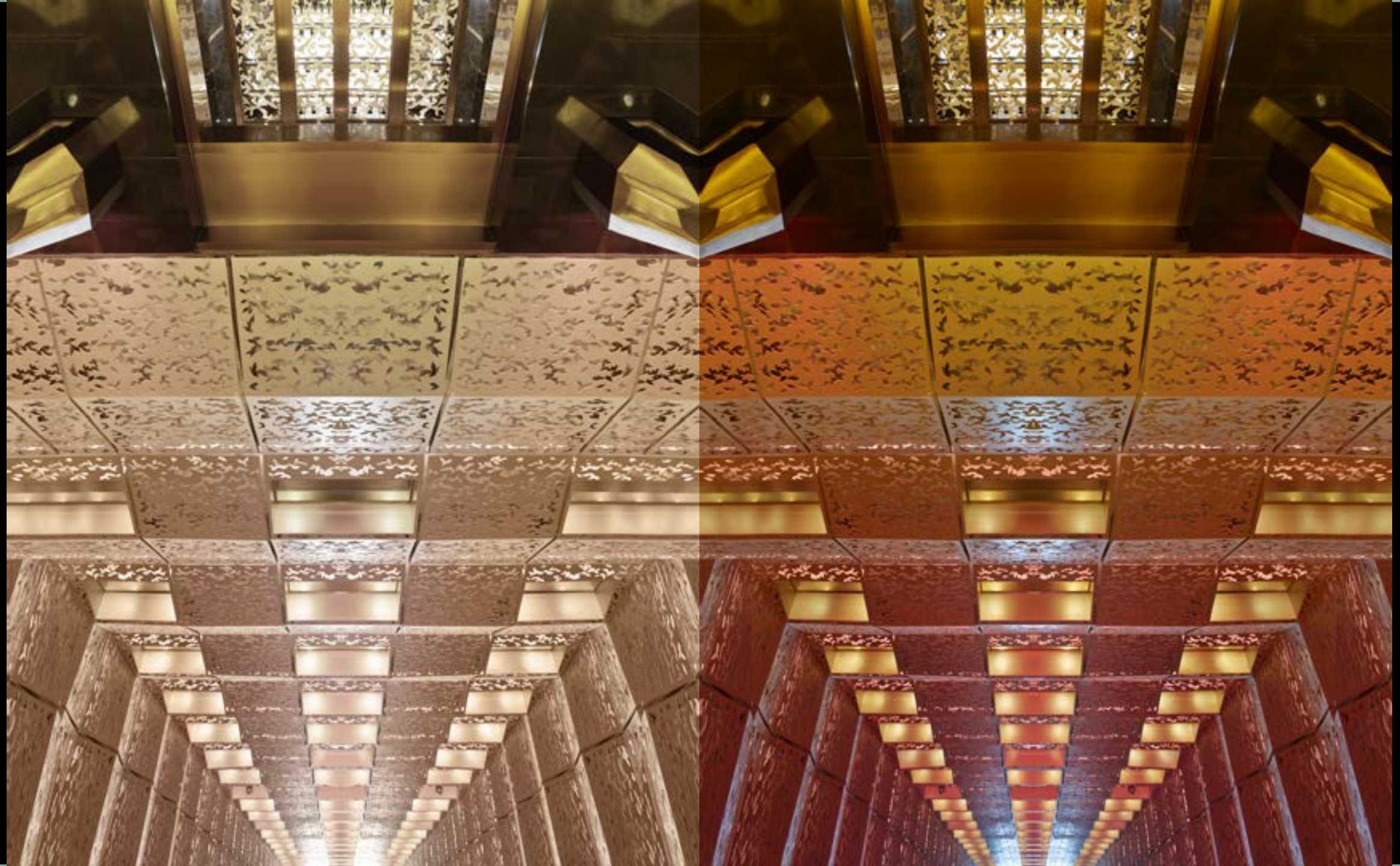
People naturally move toward the light. The much loved and used places in buildings where most things happen are places like window seats, verandas, fireside corners, trellised arbors; all of them defined by non-uniformities in light, and by allowing people to orient themselves toward the light.

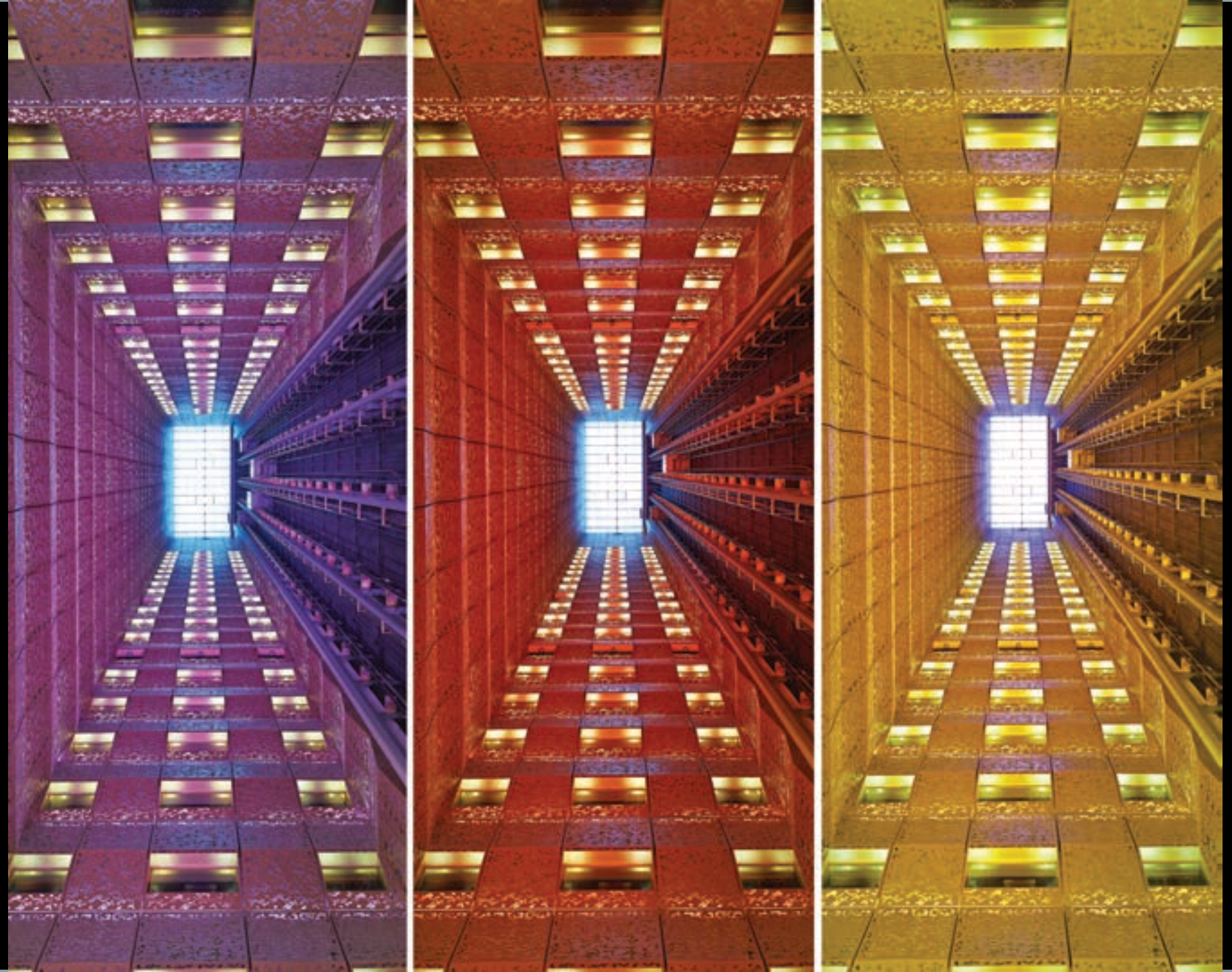
Any entrance , or key point of circulation system, must be systematically lighter than its surroundings so that its intensity becomes a natural target.

David Adjaye
London Design Pavilion
London 2008

Yukiharu Suzuki & Associates
Barn Home
Hamamatsu City, 2011

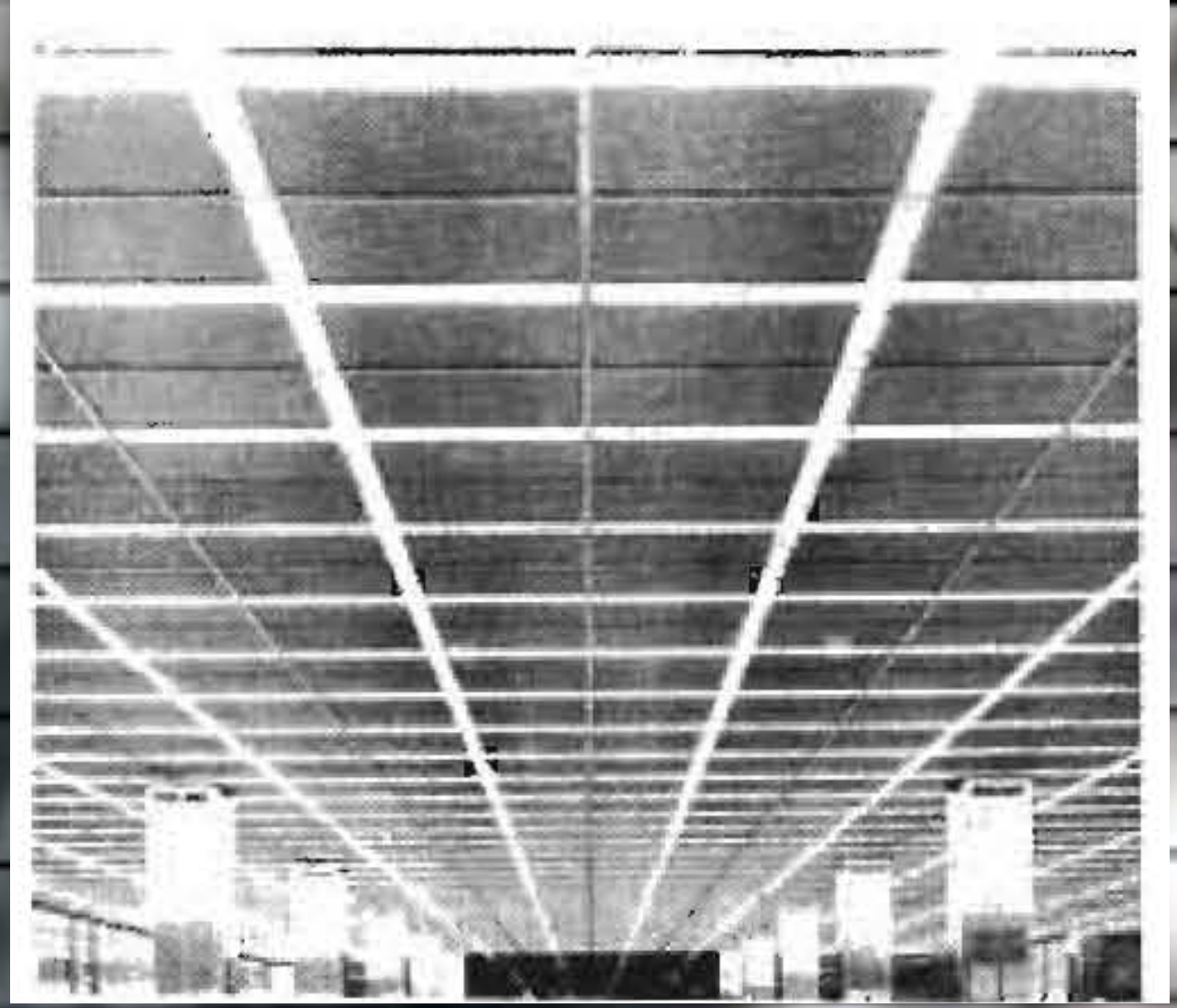
BraytonHughes Design Studios
Fairmont Nanjing
Nanjing, China





PATTERN NO 223
DEEP REVEALS

Windows with a sharp edge where the frame meets the wall create harsh blinding glare, and make the rooms they serve uncomfortable. Just so a window is much brighter than an interior wall and the walls tend to be darkest nearest to the window's edge. The difference in brightness between the bright window and the dark wall around it also causes glare. To solve the problem , the edges of the window must be splayed , by making a real between the edges of the window and the wall.

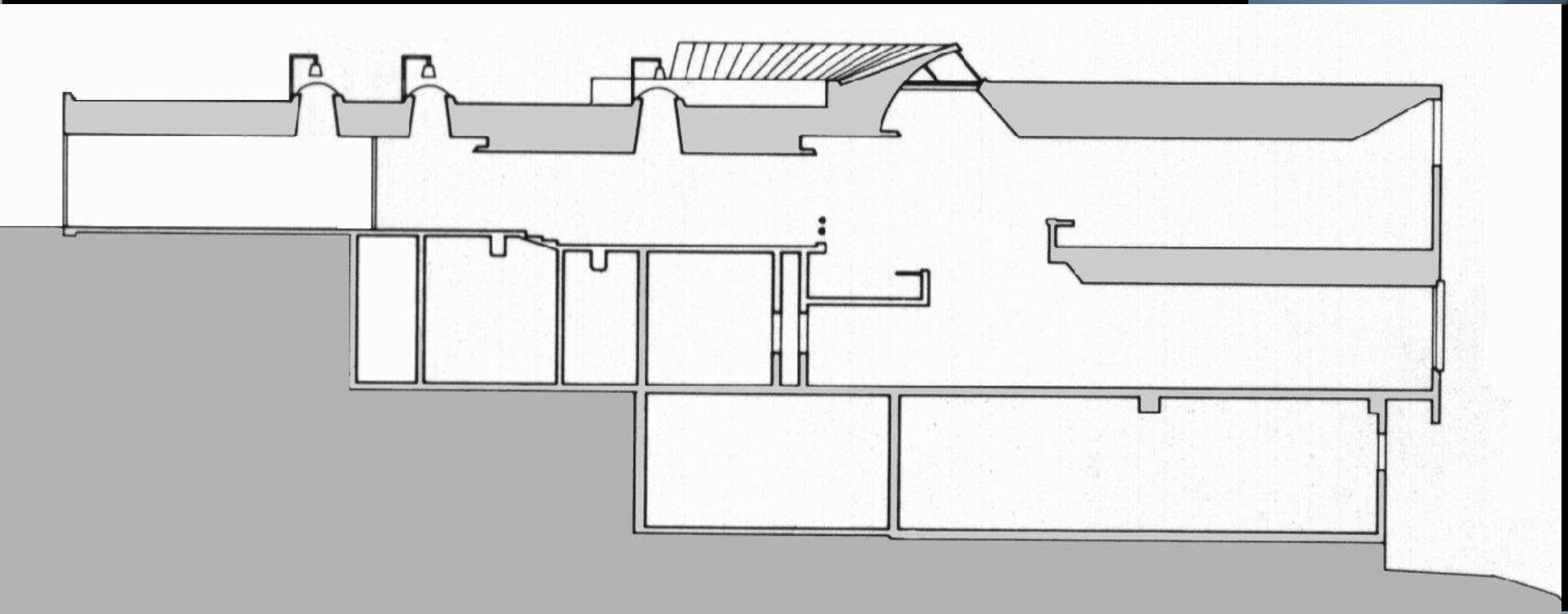


PATTERN NO 252
POOLS OF LIGHT

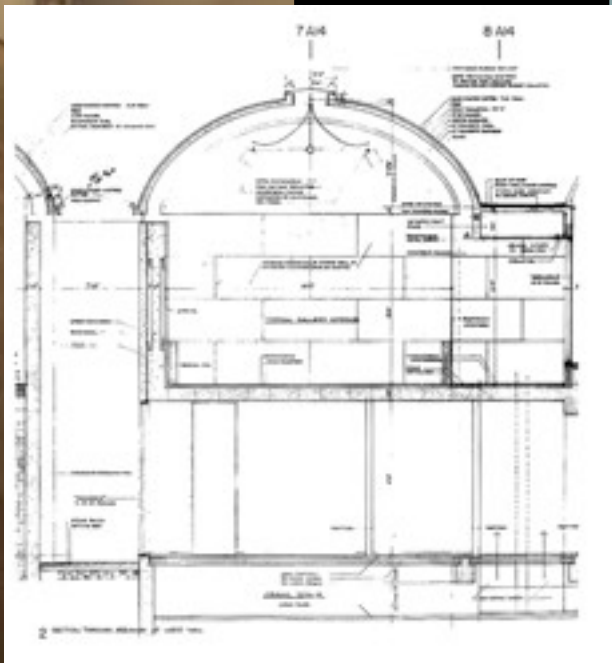
Uniform Illumination,- the sweetheart of the lighting engineers- serves no useful purpose whatsoever. In fact it destroys the social nature of the space, and makes people feel disoriented and unbounded.

One possible explanation is suggested by the experiments of Hopkinson and Longmore who showed that small bright light sources detract the attention less than the large areas which are less bright. The authors conclude that local lighting over a work table allows the worker to pay more attention to his work than uniform background lighting does.

Alvar Aalto
Mount Angel Library
Mt. Angel, Oregon 1970



Louis I. Kahn
Kimbell Art Museum
Fort Worth, Texas 1972



Tadao Ando
Church of the Light
Ibaraki Osaka Prefecture, Japan 1989


Arthur Ross
Reading Room

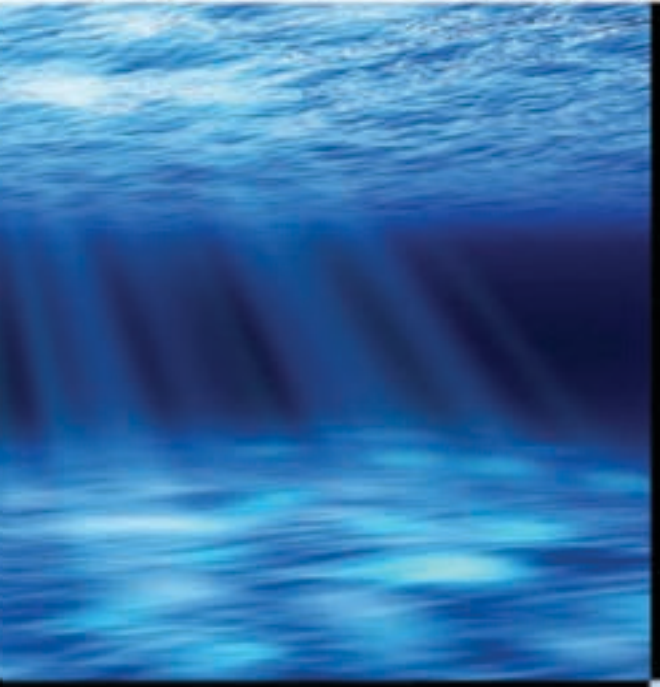
How would Nature do it?

Biomimetic Design

Imitating models, systems, and elements of nature for the purpose of solving complex human problems.

Frank Lloyd Wright
Johnson Wax Headquarters
Racine, Wisconsin 1950

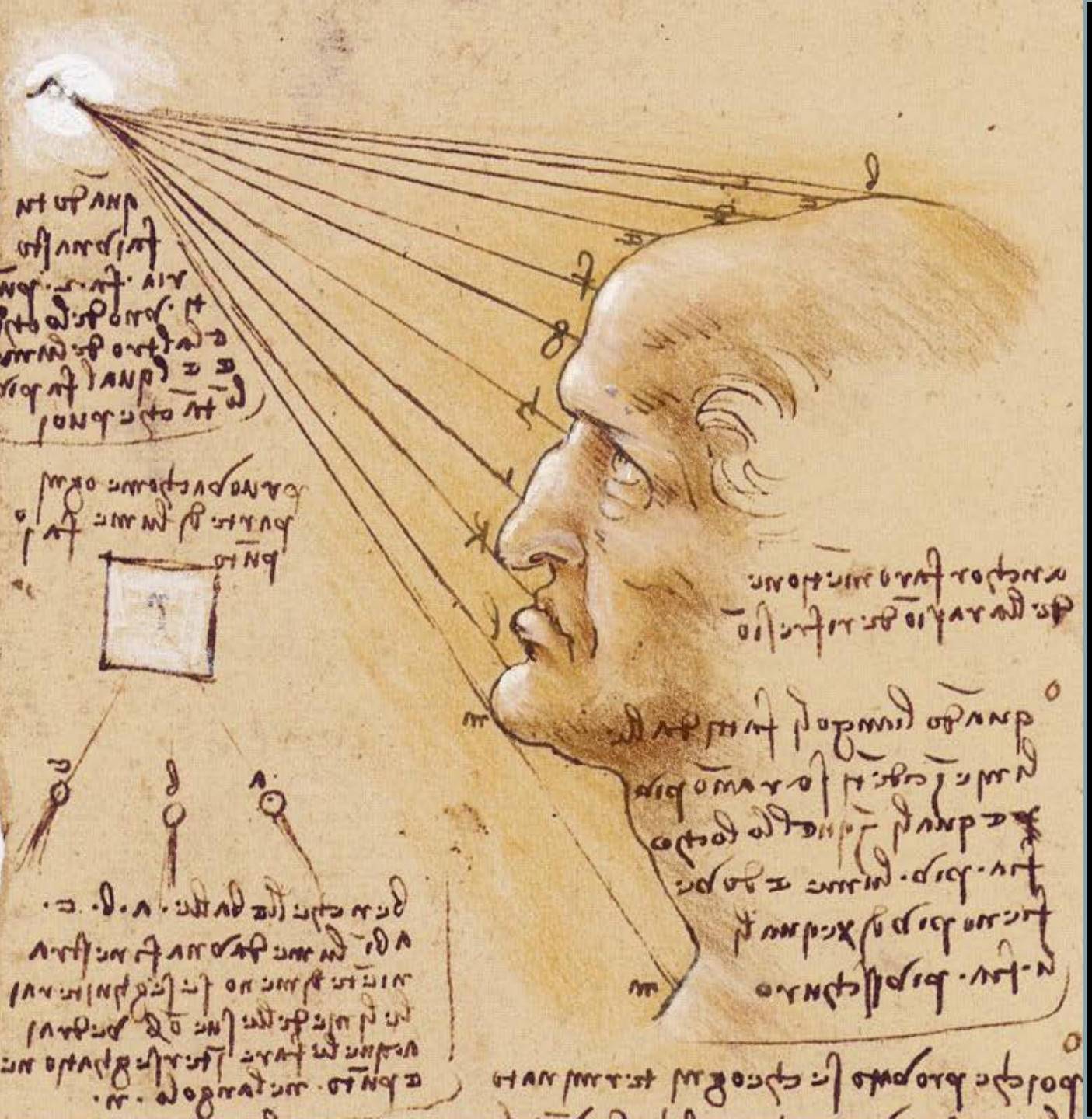

Michael Pawlyn
Biomimetic Building



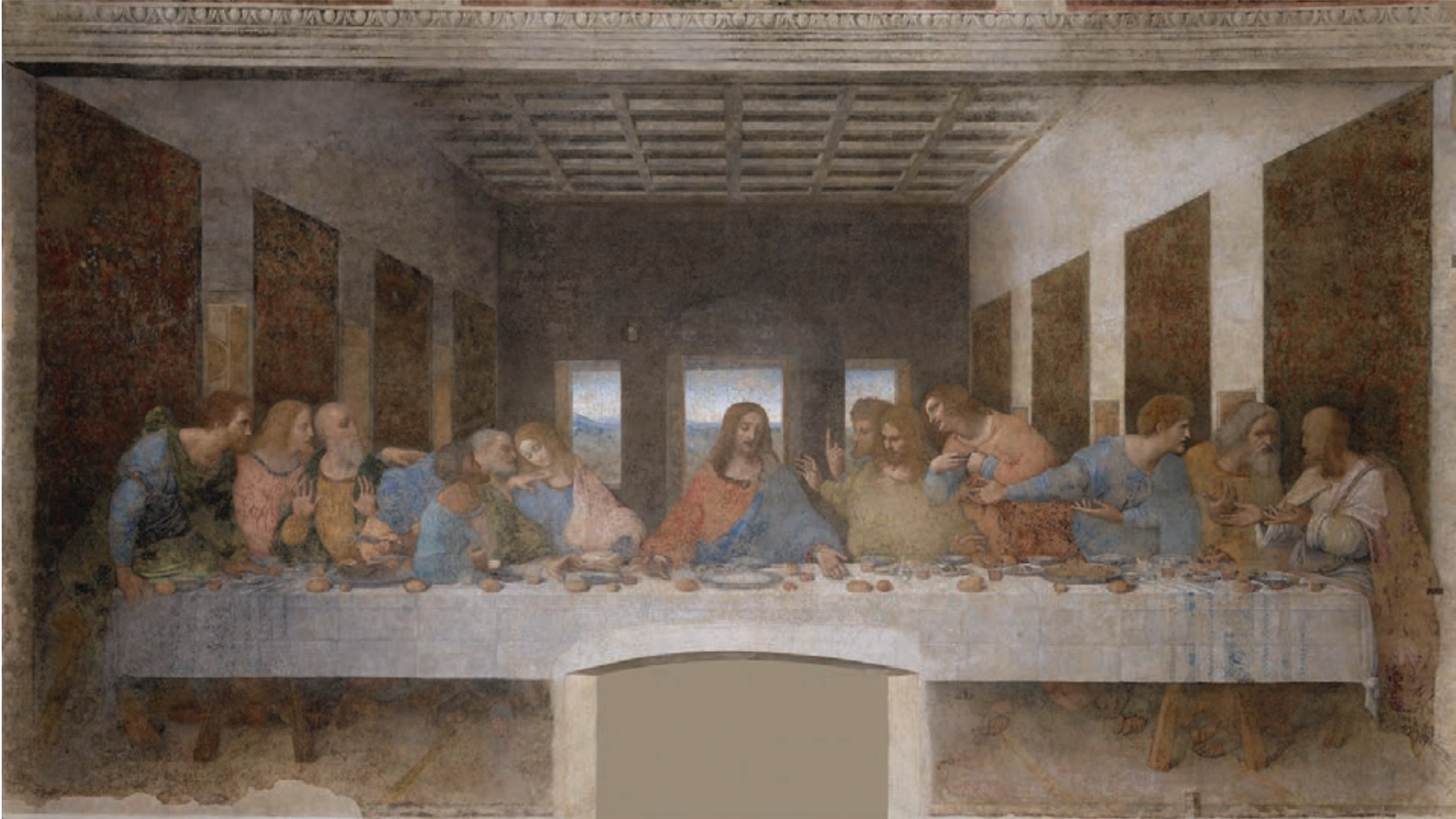
How can we build Sustainably with Light?

- Use available site resources first (energy, light, ventilation, heating & cooling, views
- Envelope before systems
- Use interactive effects of efficiencies
- Design for adaptability, resilience, & longevity
- Give users control
- Design for delight, health, and well being- Light the Human

Hopkins Architects- Atelier Ten
WWF- UK Living Planet Center
Woking ,England 2013



All bodies, in proportion as they are nearer to, or farther from, the source of light, will produce longer or shorter derived shadows.



Summary

- Light and architecture are inextricably connected and always have been
- Start the lighting design with available daylight
- Ask How would Nature do it?
- Shapes that amplify and modulate daylight also work with artificial light at many different scales
- Light the Human Being!

Thank You

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