Natural history of architecture

The history of architecture and the city as we've been taught it has been written in the nineteenth century but more often than not been re-examined through the prisms of politics, society and culture, overlooking the physical, climatic and health grounds on which it is based, from city design to building forms.

How our homeothermic nature gave birth to architecture

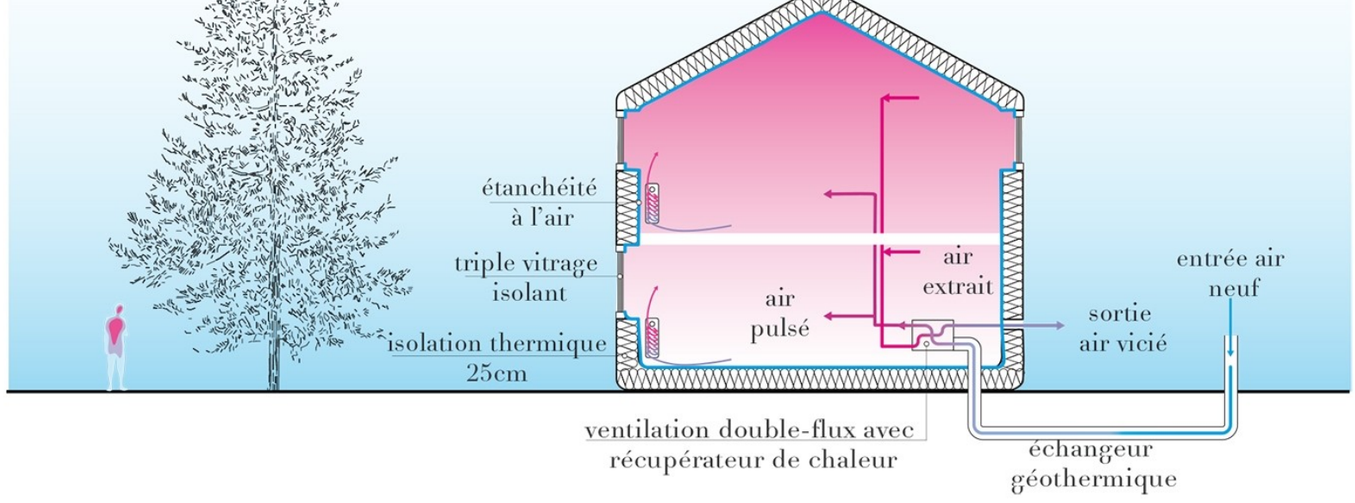
Thermal dissipation mechanisms: radiation, convection, evaporation, conduction. Diagram by Philippe Rahm, based on Olgyay's bioclimatic diagram, in Philippe Rahm, *Physiques modernes*, Paris, Éditions Carte Blanche, 2010.

To understand the origin of architecture, we must return to our homeothermic nature. Our body needs to maintain its internal temperature at 37°C, in order to do this, regardless of external conditions, the human being regulates its internal bodily functions related to thermoregulation (metabolism, respiration, blood circulation, perspiration, shivering) and external means, in particular, food, clothing, heating, regulation and, of course, architecture. In order to take shelter from the winds that cool the skin by convection, to avoid the sun's rays that heat the skin by radiation, to cool the body by conduction or to hide from the sun whose rays burn by radiation, humans erect roofs and walls.

How wheat gave rise to the city

Diagram of the Neolithic revolution, in Jared Diamond, *Guns, Germs and Steel*, London, Vintage, 1998, p. 108.

Since ancient times, the civilisations which were a sine qua non of the Neolithic, dating back 10,000 BC, have been based on farming and the cultivation of cereals. The first Sumerian cities, for example, were built on the banks of the fertile rivers, in particular the Euphrates and the Tigris, which made it possible to irrigate the land. The Egyptian civilisation developed along the Nile, the Indian one along the Indus, the Chinese one along the Yellow River and the Mesopotamian one between the Euphrates and the Tigris. The early first cities were born along with agriculture, at the birth of the Neolithic, dating back 10,000 BC. Since then, the Neolithic has been the most remarkable human gathering in history, with the sequence, in the Old Testament, of the Flood, the Tower of Babel, the Exodus and the Promised Land. The Neolithic revolution, which was a sine qua non of the birth of the first cities, was based on farming and the cultivation of cereals, in particular, wheat, barley, millet and rice



[THE IMPORTANCE OF THERMALLY INSULATING BUILDINGS] Low-energy house. Sources: Minergie-Suisse / Passivhaus-Allemagne © Philippe Rahm architectes, 2020.

The sector relating to sheltering of human activities, which can be encompassed under the term of architecture, globally emits 39% of global greenhouse gas emissions, mainly for heating or cooling. By contrast, the aviation industry amounts to only 2%. Architecture is therefore at the forefront in the fight against global warming, which is reflected in the implementation of thermal regulations, new standards and recommendations that as a first step seek to limit energy consumption, which is still 85% dependent on fossil fuels. A new architectural style is now appearing, where the meteorological parameters of space, air, light, heat, humidity, their behaviours and physical characteristics, such as convection, conduction, pressure, emissivity, effusivity and diffusivity, become the new tools of architectural and urban composition.

With the support of

AXA Investment Managers