
Third Skin: Building Biology

by *Alessandro Vassela*

In present discussions of ecological problems we seldom talk about the environment within our houses, where we spend over 90% of our time. There is evidence that the four walls surrounding us most of the time—especially in modern buildings of recent construction—are highly polluted in many respects and influence our health in a negative way.

What is Building Biology?

Building Biology or biological architecture can be defined as the teaching of the integral relationships between people and their built environment. Building Biology works on many levels. It deals with architecture, biology and medicine, ecology, philosophy, psychology, to name but a few. This fact makes the recognition of Building Biology as a “new science” difficult (as is the case with Permaculture) because it cannot be put into one category. Building Biology aims at a healthy living and working environment by preventive measures. According to the World Health Organisation health is a condition of complete physical, psychological and social well being.

Technology is not aiming at inner quality but in most cases at measurable quantity only. Building Biology tries to restore or re-establish the lost balance between technology, culture and biology. The three should play a role of equal importance in the building activity.

Looking at man in his whole evolution he still is a hunter-gatherer of the pre-agricultural period and has in fact not adapted himself to technology. We should try to adapt technology to the biological needs of man and nature in general and not nature to technology!

The Third Skin

In Building Biology we consider the building as an organism. The walls surrounding us can then be seen as the skin of which we expect many essential functions. We simply talk about the *third skin* (our clothing being the second skin).

Our skin is a very important organ. Some of its essential functions are breathing, evaporating, absorbing, protecting, insulating and regulating. There is a constant exchange between inside and outside and we talk about an open system.

If we translate these skin functions to our shelter we find that certain things we do in modern buildings are quite wrong and that we have transformed many buildings into almost closed systems. Take for instance the insulation euphoria of recent years which has had us all packing up our buildings

with insulating materials which usually have a damp-proof course on them. By doing so we especially fail to take advantage of the passive solar energy during the long spring and autumn periods of temperate climates. For instance, the sun heats up a brick wall during the day and this stored energy is transported into the building during the night and thereby prevents the rooms from cooling too fast. In an insulated building the walls have lost their heat storage possibility and in spite of the insulation the saved energy is quite often less than the lost energy. In addition we seal off all the cracks of windows and doors. Finally a building ‘treated’ in such a way cannot ‘breathe’ anymore.

But constant air renewal is essential for a comfortable and healthy climate. This is a severe problem in such buildings and may even result in an accumulation of wastes and poisons in the room air. Air conditioning needs to be mentioned in this context. It solves only the quantitative part of the problem. We can remove dust particles by filters, add water for the necessary humidity and heat or cool the air. But by the time the conditioned air reaches the rooms its quality is lost. The friction in the air ducts creates an imbalance between positive and negative oxygen ions (the optimal ratio is 40:60). In addition the ‘conditioning’ of the air results in the accumulation of large ions.

Modern Building Effects: Environment and Health

Many former natural materials from renewable resources have been substituted or denatured by artificial or synthetic products. These processes often make these materials unrecyclable. For instance the real fire danger in modern buildings is the toxic gas from synthetics (paints, varnishes, textiles, furniture) and not so much the fire itself. Usually a new material gets approved by an official material control laboratory. The problem is that the testing is restricted to the physical (measurable) or quantitative part of the material like strength, heat resistance, insulation capacity, and so on. What is rarely analysed is the influence of such a material on the health of the inhabitants of a house. I mean the biological quality (e.g. its radioactivity, release of toxic gases, or the filtering capacity).

The raw components of a building material are a vital factor for its biological quality. Big differences of radioactivity for instance are found in cement, bricks, and plaster. Usually the radioactivity is high if the components come from a blast-furnace (slag) or from aluminum production (red mud). All the synthetic resins as they are used in chipboard, etc. leak formaldehyde (a very toxic gas) in small quantities but over a long stretch of time. The degrading part of many plastic materials is invisible but often toxic. That’s why many plastics get brittle with age because they have lost a component usually in the form of an invisible but undesirable gas. Asbestos (in asbestos cement used as a heat-resistant material)

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or slate and granite may have a high level of radioactivity. The use of lead for pipes is nowadays prohibited because of its poisonous effects on the human body which were recognized only after a long period of use.

What are the Hidden Costs?

The modern building industry is unecological in many other ways. The irreplaceable top soil is frequently lost and buildings sited on prime productive land. The removal of soil from the site for understoreys, the polluting and energy consumptive transport of materials over long distances (e.g. in the pre-fabrication business), and a high energy input from non-renewable resources in general give a picture of what I mean. For 'economic' reasons we have replaced manpower by all kinds of machines and now we wonder about increasing unemployment rates over much of the world.

People seem to know what they want. Why for instance do many prefer flats in old buildings? Certainly it is not only the bigger room heights or the nostalgic aspect. There are certain unnamed reasons which I think are unconscious feelings that something is wrong with modern buildings. Is it the density, the discomfort, the ugliness? Why do we say that it stinks or smells bad from fresh paint? Isn't there paint which has a good, pleasant odor? If we look closely at the contents of these products they often are poisonous and can affect the health of people. But the money involved in the building industry does not allow a 'quarantine' period before people move into a new flat. Usually there is only a check on the humidity before a new building is given over to the users. The fact that concrete for instance needs three to five years till it is dried out is generously overlooked.

And no one ever asks about the existence of toxic gases or radioactivity. For this I give the following example: In 1971 the State Laboratory for the control and inspection of food stuffs in Geneva was given a new functional building with all the necessary technical and sophisticated installations. As work started in the new building all the examinations showed toxic levels above tolerance. When control measurements were made in the old place the toxic levels found were back to 'normal.' Finally it was found that the modern 'high-quality' materials in the new building were the cause of the high toxic levels measured in the food stuffs (and that after a short storing time only!) Toxic gases were leaking from paints, plastic materials, varnishes, flooring and furniture materials and so were poisoning the room air and food stuffs to be examined. The scandal was soon forgotten and there was no change in the building regulations or the approval rules for building materials.

If we build our houses of natural materials no harmful excessive positive oxygen-ions are formed. The inner surface of wood for instance is so large (unmatched by any artificial

product) that it is able to absorb dust particles and neutralize bad odors. It also regulates the content of humidity in the room air. This is the reason why wood should be left as natural as possible and only be protected with a thin layer of linseed varnish or bees wax.

Brick walls are also excellent if they are built and plastered with a lime mortar in place of cement. (Cement mortar is a poor insulator and absorbs moisture.) When using bricks we must not forget that the initial energy to kiln dry them is very high. That is one reason why I consider the mud brick as one of the most ecological building materials. It is made from the soil on which the house is to be built. There is no energy wasted for the burning process or for transport. The material is fully recyclable. We also should not forget the healing effect of earth. Mud brick walls create a very healthy living climate. Mud fulfills most of the skin functions. It has an excellent heat storing capacity but is a bad insulator and has to be protected from humidity. For its production it has a very low input of energy but asks for more manpower. That could add on the other hand to its attraction in our present employment crisis!

The 'Building Diseases'

It was in the fifties that the German doctor Hubert Palm found evidence that the cause for many of the ailments of modern man is found in buildings. That is why we simply talk about the following 'building diseases.'

• CHEMICAL DISEASES

Synthetic materials for insulation, flooring, furnishing, and finishing (including all kinds of plastics, chipboards, paints, etc.) usually set free all kind of toxic gases which can cause headache, vomiting, loss of concentration, etc.

• ELECTRICAL DISEASES

Electrical appliances and wires create electromagnetic fields with constant 50 Hz frequencies within the house, often interfering with 16 2/3 Hz from nearby railways or high voltage overhead lines and can cause nervousness or so called 'electrostress,' etc. These artificial frequencies are in contrast to the 10 Hz frequency of the earth and the human organism. Another phenomenon often observed in connection with synthetic materials is the electrostatic charge. The atmosphere is full of technical waves (radio, TV, radar, etc.) which interfere with the natural spheric radiation. We know that all biological processes work with the help of minute electrical impulses. Electrobiolgy is revealing new findings about the enormous influence of electricity to our body and health. One very effective solution to this problem is a central switch preventing automatically any current in the wires as long as there is no user. This is especially important during the night, when the sleeping organism regenerates and is more sensitive.

• CAGE DISEASES

Concrete or steel buildings usually form a Faraday Cage

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within which life is dying out in the third generation. The loss of reproductivity which was found in laboratory tests with rats stems from the lack of the natural radiation from the earth and the atmosphere within the Faraday Cage. These natural waves which make life possible are sealed off or disturbed by reinforced concrete, steel pipes and the friction of running water within pipes, electromagnetic fields along electrical wires, etc.

• DISEASE OF LOCATION

Underground currents or dislocations can be the cause of various chronic diseases like rheumatism, disturbed sleep, and even cancer. In earlier times the check on a new building site by dowsing before construction was quite common. One can imagine that new construction sites are on disturbed or unhealthy areas which were omitted by our ancestors for known reasons.

Since Building Biology is interdisciplinary or better co-disciplinary it deals not only with building materials and their influence on the human body but also with the environment in general, and with the climate of living which is determined by:

- installations and furnishings
- noise, acoustics

- light, lighting, colours
- radiation, avoiding disturbed areas (dowsing)
- radioactivity
- space, form, and proportion
- physiology of living and working
- psychology of living and working
- city planning, including its biological, ecological, and sociological aspects
- research methods

Building Biology tries to cover all aspects of living in connection with shelter, a step forward in harmony and balance with nature!

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On March 19-22, Max Lindegger will lead a biological architecture workshop in Santa Fe, New Mexico. See "Calendar" on page 21 for more information.