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Landscape intervention in the Hospital for Covid-19 pandemic in Madrid

Cristina Jorge
Polytechnical School, University of Alicante, Spain

Abstract. From Design with Nature of Ian L. McHarg to The Origin of Eukaryotic Cells of Lynn Margulis, the role of the microorganisms in the cycle of life, health, and disease, and in climate change constitutes the life support system of the biosphere. The micro-parklands of the Emergency Hospital in Madrid create a natural system of prefabricated elements following the aim of rapid implementation, isolation, and protection taking as reference the simple integrated system of living microorganisms. These micro-enclosures provide circular areas where patients, visitors, or healthcare professionals can meet in secret places surrounded by trees and shrubs or long green islands where they can walk around. The landscape architecture project has a surface of 7,434 sqm and occupies a plot of 69,791 sqm located in the Hortaleza district of Madrid. Belonging to the previous City of Justice project on the north side of the Institute of Legal Medicine, the plot, which is trapezoidal with a drop of 4,5 meters, is destined for a public hospital constructed in four months during the Covid-19 pandemic. Due to dry climatic conditions, adapted species with low water demand have been selected reducing the risk of allergies or respiratory problems. The topography has been modified to conserve rainwater and direct it to green areas that act as sponges that reduce runoff, store water, remove sediment and pollutants and release it into other ecosystems. There is no separation between soft scape (planting) and hard scape (soil) in the intervention, both are soft and porous and have macro and micro living beings. Following the references of these books, creativity and destruction as real phenomena both have attributes such as fitness and unfitness in the evolutionary way or health and disease. The vital system of living organisms (creativity) and viruses (destruction) has guided the design and distribution of these external areas that intend to prevent infections in the open air, as part of the mutation and adaptation process.

Keywords: Landscape Architecture, Hospitals, Microorganisms, Sustainability, Covid-19

Introduction

In the book Design with Nature, L. McHarg said that there is no generally accepted definition of health, and the medical professions are entirely concerned of disease. But is health only the absence of disease? Initially, there is an attempt to identify the attributes of creation and destruction [7].

On the last day of the year 2019 the world change and in short time, an outbreak became an epidemic and after a pandemic. In the video The Hospital of the Future, OMA presents a tridimensional light structure of a greenhouse with a nurse, showing that it is important to think the hospital in terms of a process, recycling its own waste and producing its components as an organism [8].

The micro-parklands of the Emergencies Hospital in Madrid create a natural system of prefabricated elements following the aim of rapid implementation, isolation, and protection taking as reference the integrated system of living and non-living microorganisms. These micro-enclosures provide circular areas where patients, visitors or healthcare professionals can meet using the site furnishing that will be located following the social distancing, or long green islands where they can walk around.

The aim of the landscape architecture project is to support the hospital in the outdoor areas as part of the recovery program and to add waiting areas. It is intended to be a part of the machine to heal and to provide relief from the stress and emotional trauma of the Covid-19 hospital environment. Corten steel contours delimit spaces such as outdoor meeting rooms and they can serve to provide isolated enclosures for post-treatment or waiting rooms for the vaccination process. Additionally, the concentration of green infrastructure helps to give continuity with the surrounding parks such as Valdebebas Park and Juan Carlos I Park.

Vision Statement: Microorganisms_The System of Living

If we assume a man is a benefit and constructive agent in the world, as Ian L. McHarg talked about the viewpoints of man-nature, we could imagine the world as the green celestial fruit, as a great epidermis indeed, but we could consider the green film as cytoplasm and the black, brown, gray centers not as blemishes but as nuclei and plastids-directing, producing, storing and circulating material for the cytoplasm: the creative centers in the world life [7]. At that time, the Gaia hypothesis by James Lovelock and Lynn Margulis states that the planet Earth, including living beings, oceans, rocks, and atmosphere, works like a super-organism that

Fig. 1. Overview render of the north side of the Emergency Hospital landscape [drawing by Cristina Jorge]

Fig. 2. Meeting place of the Vaccination Pavilion [photo by Cristina Jorge]

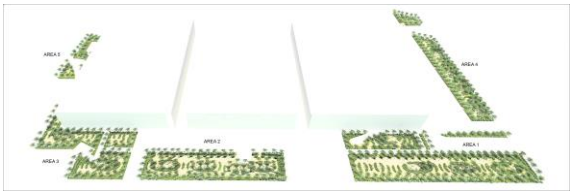

Fig. 3. Overall render of the Emergency Hospital landscape [drawing by Cristina Jorge]

modifies its internal composition dynamically, to assure its own survival [5].

The landscape architecture project has a surface of 7,434 sqm and occupies a plot of 69,781 sqm located in the Hortaleza district of Madrid. This plot, belonging to the previous City of Justice project on the north side of the Institute of Legal Medicine, is destinated to a public hospital constructed in 100 days during the Covid-19 pandemic. The plot is trapezoidal and has a drop of 4.5 meters. Due to dry climatic conditions, adapted species with low water demand have been selected reducing the risk of allergies or respiratory problems. The topography has been modified to conserve rainwater and direct it to green areas that act as sponges that reduce runoff, store water, remove sediment and pollutants and release it into other ecosystems.

Open Space Concept: Microorganisms

Microorganisms live in all environments on earth which are occupied by macroscopic organisms, and they are the sole life forms in other environments, such as the deep subsurface and extreme environment. Their immense diversity and varied responses to environmental change make determining their role in the ecosystem challenges. Microorganisms are crucial in regulating climate change. Lynn Margulis supported the theory about symbiosis in evolution as the theory that cell organelles such as mitochondria and chloroplast were once independent bacteria; in other words, the theory that eukaryotic cell is a symbiotic union of primitive prokaryotic cells. She opposed competition-oriented views of evolution, stressing the importance of symbiotic or cooperative relationships between species. Margulis also postulated that eukaryotic cilia were also originally spirochetes and that cytoplasm evolved from a symbiotic relationship between eubacteria and archaebacteria. She articulates a five-kingdom system of classifying life on earth-animals, plants, bacteria (prokaryotes) fungi and protoctists (most unicellular organisms and multicellular algae) [6].

The system depends upon the sun, the net production of photosynthesis after respiration, upon the water and upon the cycling and recycling of the materials in the system of decomposers. The process requires that the substances of waste, the output of one creature, are the imports or inputs to the others. The oxygen wastes of the plant were input to the man, the carbon dioxide of the man input to the plant; the substance of the plant input to the man, the wastes of the man input to the plant; the wastes of man and plant input to the decomposers; the waste of these input to the plant: and the water went round and round and round. This is the way the world works in essential terms of Design with Nature [7].

Drought tolerant plants, or native plants, had been used in the intervention which require less water than a lawn. They are more adapted to the environment and are also born with natural defenses meaning less fertilizers and fewer pesticides are required for them to thrive.

The wild species of the building plot had been altered by human activity, so there are no species included in the Catalogue of Endangered Species. There were monoecious trees which are less allergenic than others. This is because not all pollen is created equal. The worst pollen for allergy sufferers is the type that has a fine texture. Coarser pollen tends to stick closer to home, rather than traveling around and launching attacks on the poor allergy-sufferer.

Following the classification system of microorganisms, such as five major kingdoms have been described and include prokaryote (archaea and bacteria), protoctista (most unicellular organisms and algae), fungi, plantae, and earth-animals, the soft

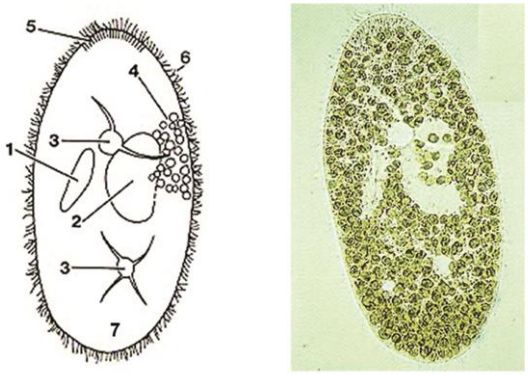

Fig. 4. Microorganisms' Elements: 1. Cytopharinge_ 2. Macronucleus 3. Contractile Vacuoles_ 4. Food Vacuoles_5. Trichocyst _ 6. Cilia [material from Cristina Jorge private archive]

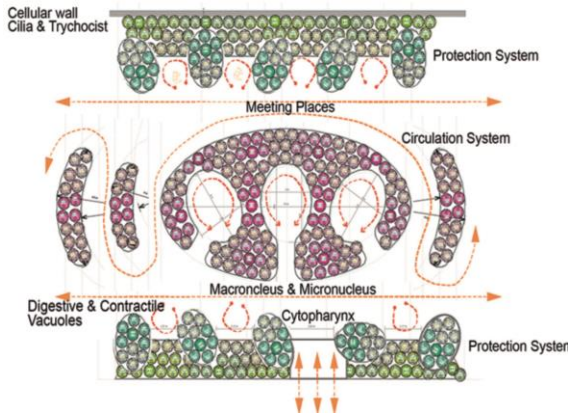

Fig. 5. Diagram of landscape elements [drawing by Cristina Jorge]

planning palette has been developed. A kingdom is further split into phylum or division, class, order, family, genus, and species, which is the smallest group [2].

The ways of approaching the living system of the microorganisms use to design the landscape intervention are synthesized in: Cell wall (cilia and trichocyte), Nuclei (macro-nucleo and micro-nucleo) and Vacuoles/Plastids (contractive & food vacuoles).

These are ways of approaching the living system of the microorganisms:

Protection system or Cell wall

The green bands parallel to the three pavilions of the hospital complex lead to the closing of the landscape intervention where the presence of rows of trees, aromatic shrubs, and colorful groundcovers make up a highly sensitive natural environment. The scheme of clean roads parallel to the street that joins the three pavilions follows the straight lines that characterize the hospital corridors. The parallel green bands to the main road meet the objective of border and protection taking as reference the planting palette of the Sierra Norte layer.

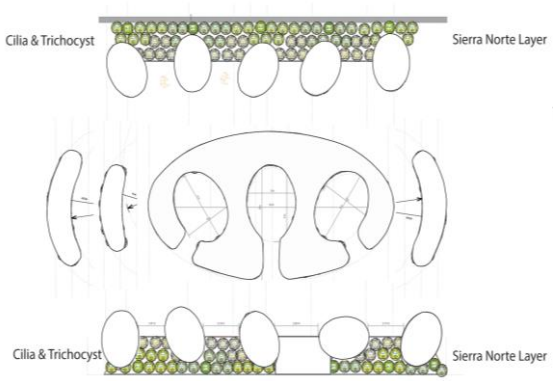

Fig. 6. Diagram of the Protection system_Cell wall of the Emergency Hospital landscape in Madrid [drawing by Cristina Jorge]

Fig. 7. Image of the Protection system_Cell wall of the Emergency Hospital landscape in Madrid [photo by Cristina Jorge]

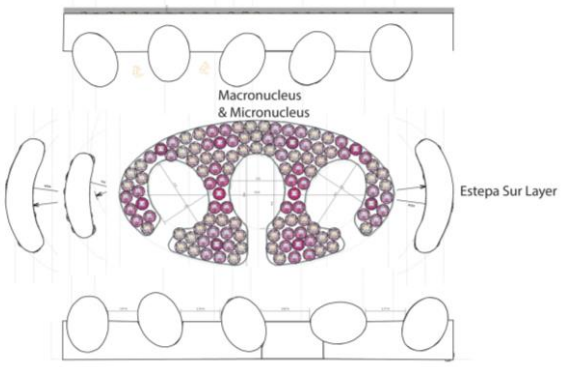

Fig. 8. Diagram of the Meeting place_Nuclei DNA of the Emergency Hospital landscape in Madrid [drawing by Cristina Jorge]

Cell wall: Cilia & Trichocyst

The entire body microorganism is covered with cilia appearing in rows, approximately longitudinally disposed, over its surface. Trichocyst as an organelle with shape like harpoon is a structure in the cortex of certain ciliate and flagellate protozoans consisting of a cavity and long, thin threads that can be ejected in response to certain stimuli [10].

Fig. 9. Image of the Meeting point_Nuclei DNA of the Emergency Hospital landscape in Madrid [photo by Cristina Jorge]

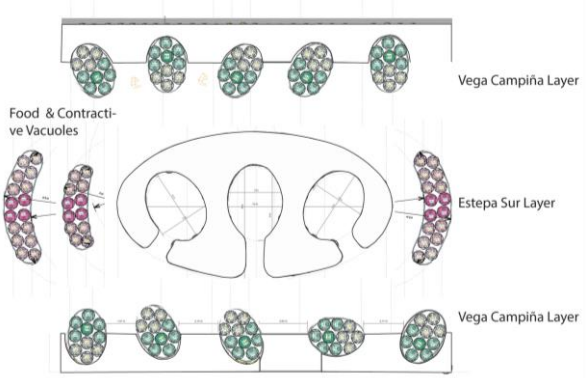

Fig. 10. Diagram of the Circulation system_Vacuoles of the Emergency Hospital landscape in Madrid [drawing by Cristina Jorge]

Fig. 11. Image of the Circulation system_Vacuoles of the Emergency Hospital landscape in Madrid [photo by Cristina Jorge]

Meeting place or Nuclei DNA

Surrounded by fruit trees, aromatic shrubs, and groundcovers that do not cause respiratory problems or allergies, family units can be brought together into these outdoor waiting rooms that will house benches, chairs, and support tables in the future. These micro-spaces are opened to multiple uses of all ages such as playing, teleworking, and resting. The soft landscape takes as reference the planting palette of the Estepa Sur layer.

Macronuclei & Micronuclei

The nuclear complex is peculiar in that it is not differentiated into micro-and macro-nuclei but are very similar to the nucleus of Ameba proteus. The macronuclei control metabolic and developmental functions; the micronuclei are necessary for reproduction. The nucleus does not occupy a fixed position but is moved around by the streaming of the protoplasm [11].

Circulation system or Vacuoles/Plastids

The landscape design made of elliptical and longitudinal green areas leaves controlled enclosures between them and opened views over parks around. These "parentheses" enclose the core areas and lead to safe walkways. The recovery of Covid-19 patients can leave side effects such as the formation of thrombosis in the leg veins by increasing blood flow. Doctors recommend daily exercise and long walks during recovery. These green areas take as reference the planting palette of the Vega Campiña layer.

Food Vacuoles & Contractile Vacuoles / Plastids

Food vacuoles are numerous and vary in number and color with the amount of food ingested and the stage of digestion of this food. Just after ingestion of food the vacuoles are brown or dark green due to the color of the Oscilkitoria, but as digestion proceeds, they are changed to a shade of purple, then pink, and finally faint straw color. The contractile vacuole is stationary and is the point toward which the streaming of the protoplasm is directed. As metabolism ensues minute vacuoles of clear fluid are formed throughout the protoplasm. With the streaming of the protoplasm, these vacuoles are brought into close contact with the point at which the contractile vacuole is formed. As storage sacs for solid or liquid contents, they are small in animal cell (vacuoles) and large in plant cell (plastids) [10].

Microorganisms:
Soil_Earth Oxigenation_Hardscape Palette

To talk about soil, humus, matter it is important to pay attention how parasites, pathogens and age make incursions within their host while environment and predators attack it from without. The agents of disease proceed towards death as a process, in which the carrion eaters, scavengers, insects and their larvae, worms, fungi and bacteria reduce the matter into reusable forms. Decomposers are described by McHargh as the return stroke of matter in the cycles of life. The water acts on land surfaces and through erosion and sedimentation changes their surfaces towards equilibrium, a condition of repose in which matter moves from a condition of greater to lesser randomness. In terms of energy, while entropy or degraded energy in any system must increase, in life systems and the orderings that they accomplish, there is evidence, not of degradation, but upgrading, the countertendency [7].

Fig. 12. Site photo of previous state of the Emergency Hospital in Madrid [material from Cristina Jorge archive]

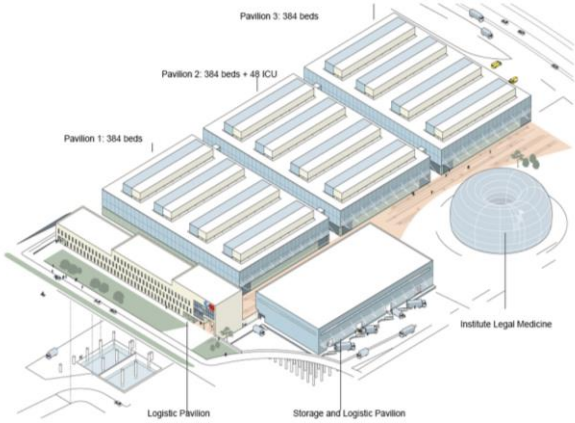

Fig. 13. Organigram of the Emergency Hospital in Madrid [material from Cristina Jorge archive]

Porous base materials or Cytoplasm

Compacted red soil acts as a granular fluid. The hardscape is really porous and soft and it has the same living beings as in the planting softscape. The pavements are porous using materials such as limestone, crushed red granite, quartz, feldspar, mica, and they are compacted following the contours of the terrain. On the underground galleries belonging to the previous unfinished City of Justice project, a part of the landscape intervention has required additional layers such as waterproofing, vapor barriers, drainage, and other elements typical of green roofs. To guarantee the compactness of the discharges, it has been necessary to carry out cleaning operations to remove the disintegrated and non-compacted soils.

Context Analysis

There is the possibility to create a creative-fit-healthy environment, so it would seem important to identify the environment of health and pathology. Promoted by McHarg and his students in the research about city of Philadelphia, it was relevant to investigate the factors of the social and physical environment that are identifying with these polarities and with the intervening phases [7].

The Emergency Hospital in Madrid with a total of 80,000 sqm has six infrastructures: three hospitalization pavilions with 10,500 sqm each, with more than 1,000 hospital beds, and 48 ICU beds; a storage and logistic pavilion where medical supply will be stored for all hospitals in the region; a multipurpose sanitary building, which will house the Summa 112 Contingency Center; and finally, 6,000 sqm of underground galleries with the central of air conditioning waste management and high voltage.

The landscape interventions are supported by the measures taken to ensure the proper functioning of the Emergency Hospital. The new Hospital in Madrid was built in response to the first wave of Covid-19 pandemic in Spain and it was promoted by the Dirección General de Infraestructuras of the Consejería de Sanidad de la Comunidad de Madrid. The original intention was help alleviate pressure on other public hospitals, focussing on the Covid-19, but there were political conflicts during the construction.

The purpose of these therapeutic gardens is to provide relief from the stress and the emotional trauma of the Covid-19 hospital environment. The corten steel edging pieces delimit spaces as open-air rooms that can be used after the treatment, can serve to remain an island or to join family members and wait medical reports.

The specifications of the Ordinance for the use of Municipal Green Zones have been considered. The definition of urban furniture, the necessary elements of the transport network and the infrastructure services have been adjusted to the Municipal Police Ordinance of the Urbanization.

Design Opportunities

New Topography

The site, at Doctor Fernandez Iparaguirre Avenue, is trapezoidal, presents an evenness of 4,5 meters and has a surface of 69.791 sqm. Topography has been modified to direct the water into the green areas and to function as a sponge in absorbing rainwater and releases it into other ecosystems. The design follows the natural contours of the land with prefabricated steel contours which helps to adapt the landscape intervention at the urgency of those moments and helps to adopt future adaptations and mutations. The terrain presents to the north a noticeable unevenness between the road parallel to the three pavilions of the emergency hospital towards the fended perimeter.

Green roofs over underground galleries

Over the previous subterranean gallery, the part of the landscape intervention has required additional layers such as thermal insulation, drainage, and other elements taken from green roof interventions.

Fig. 14. Topography movements in the construction phase of the Emergency Hospital landscape [photo by Cristina Jorge]

Fig. 15. Greenroof movements in the construction phase of the Emergency Hospital landscape [photo by Cristina Jorge]

Fig. 16. The main view of northside of the Emergency Hospital landscape_Dry climate [photo by Cristina Jorge]

Fig. 17. The main view of northside of the Emergency Hospital landscape_Prevailing Winds [photo by Cristina Jorge]

On the surface, there is a level of anthropic fillings formed by crumb sands and coarse sands. Fill thicknesses typically range from 0.50 to 7.00 m, depending on the zones. The greatest thicknesses are found next to the underground gallery that was built as part of the ill-fated City of Justice campus. These excavations were partially filled in at some points, probably compacting the ground, until the work stopped, and later they were filled with soils probably uncompacted to cover or hide the enormous concrete gallery. This gallery connects underground the Institute of Legal Medicine with the 6,800 sqm of central facilities (boilers, air conditioning, supplies, transformers). There will be up to 5 km of fiber optics, central equipment to allow network connectivity and 300 Wi-Fi access points.

Compactness Alkaline soil

The penetration test carried out at various points indicate the presence of medium to low compactness materials that shows they are not spilled materials, but materials that have undergone certain compactness, either by the machinery or by their own weight. The age of these fillings exceeds the eleven years of climatic agents, especially rainfall. To guarantee the compactness of landfills, it has been necessary to execute a series of clean-ups to remove the spilled and non-compacted soils. The grading level is +642. It has been necessary to raise some areas and to fill others. Additionally, certain areas were cleaned by digging below the general level of grading. These soils were compacted to at least 95 % of the maximum density of the reference Modified Proctor in layers of 25 cm, by using self-propelled vibratory roller after wetting and spreading the layers. The samples extracted at a depth of 0.8m are: PH (S1 / 0,8m) = 7,9. As the PH sample is superior to 7, the soil is alkaline. The level of alkalinity in human blood determined by CO2 (as in the ocean) shows an equally small tolerance.

Microclimate Considerations

It is possible to see the ordering of physical processes accomplished by precipitation, erosion and sedimentation, volcanism and upliftting, lighting and evaporation, all reducing the randomness of matter essential to this ordering; but overwhelmingly the plant is seen to be the basic agent for the ordering linked with entropy and creation. Negentrophy is the term that McHarg use to describe the sum of all life and all time as a tide of ordering moving deferentially against the force of entropy, evolving from the order of the nonliving into life, from simple to complex life, from uniformity to diversity, form a small number to an infinitude of species, aspiring to dynamic equilibrium [7].

Beyond descriptions of abundance of micro-organisms in the atmosphere, is it relevant an understanding of their dynamics in terms of both

Fig. 18. The main view of northside of the Emergency Hospital landscape_Rainfall [photo by Cristina Jorge]

Fig. 19. The main view of northside of the Emergency Hospital landscape_Snow [photo by Cristina Jorge]

biological and physic-chemical properties and of the transport processes by air at different scales as riders of atmospheric transport systems. Airborne microorganisms, mostly bacteria, are normally, dispersed into the air, which can have both beneficial and detrimental effects. Climate change directly and indirectly influences microbial communities and their functions through several interrelated factors, such as temperature, precipitation, soil properties and plant input [3].

Dry climate. The studies of trees, shrubs, and herbaceous species have been carried out according to sunshine and UV index of 2,769 hours per years. The predominance of two types of strategies is fundamentally directed to withstand unfavorable summer conditions: sclerophilia, which manifests itself in many woody plant species, and the annual cycle–terophytes–, dominant among the species pasturelands.

Prevailing winds. The dominant winds that are from the southwest have the pavilions of the hospital built to protect the green infrastructure. In general, winds from the southwest by night are more frequent than those from the northeast at night. In winter, the winds from the northeast are dominant both day and night where the industrial building is located as wind barrier. In the hospital, the air flow is conducted by a particular air conditioning circuit the new air is expelled through the clean area and collect through the dirty area.

Rainfall. Climate, above all precipitation, is one of the most limiting factors, not only because of its inherent characteristics but also because of its influence on the processes of edaphogenesis and productivity. In addition, precipitation is subject to great variability, not only between the different seasons of the year but between successive years. The approximate rainfall is 450 mm, the average annual temperature is 13.7 ° C and the average relative humidity 57 % in Madrid.

Snow. The heaviest snowfall in five decades has blanketed Madrid over in January 2021, after a giant storm hit southern and central Spain, causing some damage to newly planted trees and shrubs. Linking with microscale analysis, the microscope can reveal the striking forms of snowflake crystals. The electron micrograph shows the modular geometry of the atoms, the crystalline form of giant molecules.

Soft Planting Palette with non-allergic species

It is a building plot where the open areas were occupied by wild species and altered by human activity. There are no species included in the Catalogue of Endangered Species. Some monoecious trees are less allergenic than others. This is because not all pollen is created equal. The worst pollen for allergy sufferers is the type that has a fine texture. Coarser pollen tends to stick closer to home, rather than traveling around and launching attacks on the poor allergy-sufferer.

Drought tolerant plants, or native plants, requires less water than a lawn. They are more adapted to the environment and are also born with natural defenses meaning less fertilizers and fewer pesticides are required for them to thrive.

Following the classification system of microorganisms, such as five major kingdoms have been described and include prokaryote (e.g. archaea and bacteria), protoctista (e.g. protozoa and algae), fungi, plantae, and animalia, the soft planning palette has been developed. A kingdom is further split into phylum or division, class, order, family, genus, and species, which is the smallest group.

Microorganisms:

Mutation & Adaptation_Phases and Restrictions

As conditioning factors, we can say that all food, all fossil fuels, fibres, all atmospheric oxygen, the stabilization of the earth's surface and its terrestrial water systems, the melioration of climate and microclimate have been accomplished by the plant: all animals and thus all men were plant parasites. It is established this realization of dependence as a crushing blow of anthropocentrism [7].

Unfortunately, community leaders and politicians rarely look beyond the immediate response and future. Due to the urgency in the inauguration, the economic restrictions, and the extra cost of the Emergency Hospital in Madrid with respect to the initial budget, some parts of the landscape

TABLE 1
Soft landscape Palette: Sierra Norte Layer
[created by Cristina Jorge]

Type A_ Vegetation_ Sierra Norte layer
Classe 1: Trees
▪ Order A1_ Hackberry (Celtis australis) ▪ Order A2_Gall Oak (Quercus faginea). ▪ Order A3_Oak Melojo (Quercus Pyrenaica)
▪ Classe 2: Shurbs
▪ Order Aa1_Myrtle (Myrtus communis) ▪ Order Aa2_ White rockrose (Cistus monspeliensis) ▪ Order Aa3_Genista (Genista hispánica)
▪ Classe 3: Groundcovers
▪ Order Ah1_Cotoneaster (*Cotoneaster Coral Beauty)* ▪ Order Ah2_Rosemary (Rosmarinus officialis) ▪ Order Ah3_Thyme (Thymus vulgaris)

TABLE 2
Soft landscape Palette: Vega Campaña Layer
[created by Cristina Jorge]

Type B_ Vegetation_Vega Campiña layer
Classe 1: Trees
▪ Order B1_Carob tree (Ceratonia siliqua) ▪ Order B2_Judas tree (Cercis siliquastrum) ▪ Order B3 Crape myrtle_(Lagerstromia indica)
▪ Classe 2: Shurbs
▪ Order Ba1_Laurel (Laurus nobilis) ▪ Order Ba2_Viburnum (Viburnum tinus) ▪ Order Ba3_Mastic (Pistacea lenticus)
▪ Classe 3: Groundcovers
▪ Order Bh1_Teucrium (Teucrium fruticans) ▪ Order Bh2_Salix (Salix salvifolia) ▪ Order Bh3_Erigeon (Erigeon karvinskineon)

TABLE 3
Soft landscape Palette: Estepa Sur layer
[created by Cristina Jorge]

Type C. Vegetation_Estepa Sur layer
Classe 1: Trees
▪ Order C1_Wild cherry (Prunus avium) ▪ Order C2_Japones plum (Prunus cerasifera) ▪ Order C3_Strawberry tree (Arbutus unedo)
▪ Classe 2: Shurbs
▪ Order Ca1_Hawthorn (Crataegus monogyna) ▪ Order Ca2_Phyllyrea (Phillyrea angustifolia) ▪ Order Ca3_Blackthorn (Prunus espinosa)
▪ Classe 3: Groundcovers
▪ Order Ch1_Jasmine (Jasminum fruticans) ▪ Order Ch2_English Lavander (Lavandula angustifolia) ▪ Order Ch3_Honeysuckle (Lonicera implexa)

architecture project have not yet been built and others have had to be modified and reduced. For this reason, as part of the adaptation and mutation process, there is a key plan (phase 1) that may be completed when the pandemic has finished, and the times relax and a key plan (phase 2) that were modified to comply with the schedules, deadlines and, new budget available which meant a notable reduction in numerous budget

Fig. 20. Key plan Phase 1 of the Emergency Hospital landscape in Madrid [drawing by Cristina Jorge]

Fig. 21. Key plan Phase 1 of the Emergency Hospital landscape in Madrid [drawing by Cristina Jorge]

chapters. The hospital and its landscape of the future will be in constant flux, like a theater, transforming its space to the event. In the OMA office work research, they ask whether the hospital using its waste as resource, could it rebuild itself perpetually. The hospital of the future will be self-sufficient, like a green house or a microorganism, producing its own crop or its own way of feeding [4].

Conclusions

In the last chapter of Design with Nature, "The City: Health and Pathology", there is a synthesis about the importance of identifying the environments of health and pathology. McHarg and a group of students were concentrated on the presence of health and disease as indicators of creativity and fitness, destruction, and unfitness in the city of Philadelphia. Summarizing that at that moment (1969), it seemed clear that crowding, social pressure, and pathology did correlate sufficiently to justify more serious investigation. The central proposition had been that creativity and destruction are real phenomena, that both have attributes, that fitness and unfitness-in

the evolutionary way-are expressions of these, as are health and disease [7].

The creativity is represented by how micro-organisms are beneficial in producing oxygen, decomposing organic material, providing nutrients for plants, and maintaining human health, but some that represent the destruction can be pathogenic and cause disease in plants and humans.

The destruction is focused on viruses which are noncellular entities that consist of a nucleic acid core (DNA or RNA) surrounded by a protein coat. They often infest prokaryotic and eukaryotic cells causing diseases. Although viruses are classified as microorganisms, they are not considered living organisms. Viruses cannot reproduce outside a host cell and cannot metabolize on their own.

Beyond the living and non-living system of primitive organisms that have guided the design and distribution of these external areas that try to prevent possible infections, the eternal materials of the finite earth, increased by the residues of long dead encapsulations of ancient sunlight creatures, move again and again through plants, animals and wastes, constantly recycled by decomposers.

Algae and plant cells have a second set of bodies that they use to carry out photosynthesis. Known as chloroplasts, they capture incoming sunlight energy. The energy drives biochemical reactions including the combination of water and carbon dioxide to make organic matter. Chloroplasts, like mitochondria, bear a striking resemblance to bacteria. Scientists became convinced that chloroplasts, like mitochondria, evolved from symbiotic bacteria – specifically, that they descended from cyanobacteria, the light-harnessing small organisms that abound in oceans and fresh water. It had been suggested in the late 19th century when similarities between mitochondria and bacteria were noted, but largely dismissed until it was revived and championed by Lynn Margulis in the 1960s and 1970s; Margulis was able to make use of new evidence that such organelles had their own DNA that was inherited independently from that in the cell's nuclei [6].

The science of the relations of organisms and the environment in the quest for survival, success and fulfillment offers an invaluable insight. It shows the way for the man who would be the enzyme of the biosphere that acts as biological catalysts, enhancing the creative fit of man-environment, realizing man's design with nature.

In the last picture of the video The Hospital of the Future, we can see a small building in a forest, because we need to think about the hospital, not in terms of a finite product, but in terms of a process and not as a building, but in terms of an organism. The hospital of the future will give way to the machine, liberating its staff from routine tasks and leaving precision in hands of accurate devices. Finally, OMA ask about the possibility of having a hospital more human in the future [8].

Emergency situations caused by natural disasters, pandemics or war conflicts have the potential to speed adaptation processes to new landscape interventions and innovative building systems through topographic movements, new materials, and light structural prototypes. From the astronaut as instructor whose aspiration is survival, the purpose is to create a self-sustaining ecosystem, whose only import is sunlight, whose only export is heat, sufficient to sustain a man for a certain period of time. From Dersu Uzala's film (Akira Kurosawa, 1976) [1] to The Revenant's film (Alejandro González Iñárritu, 2015) [9] we can see the need for a more targeted approach to a landscape architecture of survival as the main character of one of these films said: "As long as you can still grab a breath, you fight".

Credits

Project: Emergency Hospital Landscape in Madrid; Location: Madrid, Spain; Designer Landscape architecture project: Cristina Jorge_Cjcpaisaje; Architecture: Chile15 arquitectos; Commissioned by: Servicio de Salud de la Comunidad de Madrid; Surface: 7.434 m2; Design: 2020; Realization: 2020

References

1. **Arseniev, V.** Dersu Uzala, la taiga de Usuri. Barcelona: Mitos Bolsillo, Grijalbo Mondadori, 1978.
2. Bellman / Hausmann/ Janke/ Schneider, Invertebrados y organismos unicelulares. Barcelona: Ediciones Blume, 1994.
3. **Cavicchioli, R., Ripple, W. J., Timmis, K. N. et al.** Scientists' warning to humanity: microorganisms and climate change. Nat Rev Microbiol 17, 569–586, 2019. https://doi.org/10.1038/s41579-019-0222-5
4. **De Graaf, Reinier_OMA**. The Hospital of the Future, video. Oma's New Film explores the Hospital of the Future. Dezeen, 3 March, 2021. https://www.dezeen.com/2021/03/03/hospitals-of-the-future-reinier-de-graaf/
5. **Lovelock, J., Bateson, G., Margulis, L.,** and others. GAIA. Implicaciones de la nueva biología (3ª edición). Barcelona: Editorial Kairós S. A, 1989/1995.
6. **Margulis, L.** The Origin of Eukaryotic Cells, New Haven: Yale University Press, 1971.
7. **McHarg. Ian L.,** The City: Health and Pathology Introduction. Design with Nature. New York, Library of Congress Catalog Card Number 76-77344, Published for the American Museum of Natural History, Double / Natural History Press, Doubleday & Company, Inc., Garden City, 1969.
8. **OMA**, The Hospital of the Future, video. Oma's New Film explores the Hospital of the Future. (ArchDaily. January 20, 2021). https://oma.eu/projects/the-hospital-of-the-future
9. **Stamp, E.** Step inside Leonardo Di Caprio`s New Movie, The Revenant. Architecture Digest, 7 January 2016.

10. **Streble, H., Krauter, D**. Atlas de los Microorganismos de Agua Dulce. Cilia and Trichocyst. Ediciones Omega, SA, Barcelona, 1987.
11. **Wosse, C., Kandler, O. Wheelis, M. L.** Towards a natural system of organisms: Proposal for the domains Archaea, Bacteria and Eucarya. Macronuclei and micronuclei. Proc. Natl. Acad. Sci, USA. vol 87, pp. 4576-4579, June 1990.

AUTHOR:
Cristina Jorge. Architect Cjcpaisaje (www.cjcpaisaje.com). Landscape architecture office focus on financial centres, healthcare sector, sports cities and airport facilities ("Dehesa landscape" Grand Prix 6th L.A. exhibition Belgrado 2015/ On the move, LAE, 2015/ Biennial L.A.Barcelona, 2014). Ph.D. Professor at Architecture Projects department, Superior Polytechnical School, University of Alicante (2021), Valladolid (2020) and Alcalá (2006-18), at IE University, Spain (2004-2008). Visiting Professor at L.A. department, GSD Harvard University (2015), at TU Graz, Austria (2008), at PUCCAMP-Campinas, Brasil (1999) and FAU Montevideo, Uruguay (1997). Professional Photographer&Illustrator (MAP11 Toulouse 2011/ PhotoEspaña PHE 2015 / Lensculture 2015/ 6º RDVI Strasburg 2016), IberoAmerica Ilustra Mexico (2016–2019). E–mail: cjcpaisaje@gmail.com

Kopsavilkums. Madrides ārkārtas slimnīcas mikro parki rada dabisku saliekamo elementu sistēmu, kuras mērķis ir ātra ieviešana, izolācija un aizsardzība, atsaucoties uz vienkāršu integrētu dzīvo mikroorganismu sistēmu. Aprakstītās mikro iekārtas nodrošina apļveida laukumus, kur pacienti, apmeklētāji vai veselības aprūpes speciālisti var satikties slepenās vietās, ko ieskauj koki un krūmi, vai garas zaļas salas, kur viņi var staigāt. Ainavu arhitektūras projekta platība ir 7 434 m^2, un tas aizņem 69 791 m^2 lielu zemes gabalu, kas atrodas Madrides Hortalezas (*Hortaleza*) rajonā. Sauso klimatisko apstākļu dēļ ir izvēlētas pielāgotas sugas ar zemu ūdens patēriņu, samazinot alerģiju vai elpošanas problēmu risku.