Bulgarian Journal of Agricultural Science, 26 (No 2) 2020, 332–338

New solution – fluorescent fish aquariums located in building elements and furnitures of the skyscraper Kun Min, China

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Abstract

Aleksandrov, Y. (2020). New solution – fluorescent fish aquariums located in building elements and furnitures of the skyscraper Kun Min, China. *Bulg. J. Agric. Sci., 26 (2)*, 332–338

The new solution is about creating an attractive habitat for aquariums using fluorescent fish. The aquariums are housed in floor lifts combined with gardens *(Annual international architectural elevator design competition);* on balconies and apartment buildings, *(Bamboo Skyscraper, Singapore);* on the floors of horseshoe elements covering the body of the skyscraper, *(Hong Kong Skyscraper)*; multi-storey rotating water rings, broken down into smaller volumes, for multifunctional use, used as aquariums, for aquaculture cultivation for the needs of residents, for sports, for artificial osmosis and others, *(Container Skyscraper, Mumbai, India);* the glowing fish are in streams connecting water curtains, flowing down the interior walls and passing under transparent floor coverings and reaching a pool or aquarium located on the first and second floors of an apartment dwelling, *(Skyscraper in Kun Min, China).*

A completely different living environment has been created for living, working and leisure environments, thanks to the new furniture design. Aquariums are appropriately built into the construction of chairs, dining tables, armchairs, sofas and tables, and so on. The furniture is part of the skyscraper project in Kun Min, China. To achieve this new solution, the theory of the innovative steps of the author was used.

Keywords: new solution; aquariums; fluorescent fish; furniture; skyscraper; Kun Min; interior

Introduction

The cultivation of the aquaculture has a special place in specialized literature. The regional organization for aquaculture farming, (Vlasarev D., 2013), is also relevant in the vertical city of tall skyscraper buildings. Height zoning for different aquaculture production areas is an integral part of their production and storage for the needs of the occupants. In this regard, aquariums are used for three purposes – aquaculture for food, aquaculture (glowing fish) for decorative effect and quenching of earthquake fluctuations if they are attached to ropes or chains to the floor structure.

The use of different forms of fluorescence in glowing fish enhances the potential for decorative effect in aquariums. „Biofluorescence results from the absorption of electromagnetic radiation at one wavelength by an organism, followed by its reemission at a longer and lower energy wavelength, visually resulting in green, orange, and red emission coloration in marine organisms" (Sparks et al., 2014). The authors stated: "We identified 16 orders, 50 families, 105 genera and more than 180 species of biofluorescence fish." (Sparks et al., 2014) The diversity of fluorescence patterns and colors in marine fish are:

A, swell shark (*Cephaloscyllium ventriosum*); B, ray (*Urobatis jamaicensis*); C, sole (*Soleichthys heterorhinos*); D, flathead (*Cociella hutchinsi*); E, lizardfish (*Synodus dermatogenys*); F, frogfish (*Antennarius maculatus*); G, false stonefish (*Scorpaenopsis diabolus*); H, false moray eel (*Kaupichthys brachychirus*); I, false moray eel (*Kaupichthys nuchalis*); J, pipefish (*Corythoichthys haematopterus*);

K, sand stargazer (*Gillellus uranidea*); L, goby (*Eviota* sp.); M, goby (*Eviota atriventris*); N, surgeonfish (*Acanthurus coeruleus*, larval); O, threadfin bream (*Scolopsis bilineata*) (https://doi.org/10.1371/journal.pone.0083259.g001).

"Bioluminescence is based on chemical processes in which the released energy is released in the form of light" (https://triumf48.ru/bg/holidays/svetyashchiesya-zhivotnye-kto-svetitsya-v-temnote-raznovidnosti-morskih.html). The experimental activity is aimed at making bioluminescent flashes at night at a school for synchronized swimming in fish with a flashlight (Gruber et al., 2019). The recurrent and widespread evolution of bioluminescence in the marine environment of fishes is demonstrated in (Davis MP et al., 2016). Facilitation of species-specific deep sea bioluminescence is given in; (Davis et al., 2014). Under certain conditions, both phenomena can be used to create an attractive living environment, work environment and relaxation environment. Special attention is also paid to the so-called glowing aquarium fish – Glofish in an aquarium, by species, photo and description, conditions, behavior. Genetic modification of various types of fluorescent fish is marketed. Manufacturer: Taykong Corporation in Taiwan. Varieties of luminous aquarium fish for general purpose – Glofish (http://bgkids.hallowedgaming.com/experts/sveteshhi-riba-glofish-vidove-opisanie-sdrzhanie.html) and Glofish – a non-patent name for a fluorescent fish obtained by genetic modification (http://bgkids.hallowedgaming.com/experts/sveteshhi-riba-glofish-vidove-opisanie-sdrzhanie.html). Bioluminescence. The phenomenon is explained as the process of producing and emitting light from living organisms. Light is due to a chemical reaction between two substances – luciferin, which produces light, and luciferase, an enzyme that catalyzes the reaction. Almost all deep-sea life forms produce bioluminescence in one form or another, because their survival ultimately depends on it. Most light emissions belong to the blue or green light spectrum, and some fish even emit red and infrared light" (https://goguide.bg/koi-kakvo-zashto/1357-vylshebstvoto-na-bioluminestsentsiiata).

Concentration of glowing bacteria can cause light to shine if the effect of black light is created in the aquarium. Luminous glow (look-of-fire-high-res-stock-photography/153521; https://www.gettyimages.com/detail/photo/paint-sculpture-507).

"Photoluminescence is a secondary illumination under visible or ultraviolet light.... the phosphors soak up energy under the action of the violet and ultraviolet constituents of daylight, and at night they emit the accumulated energy. Photoluminescence is divided into phosphorescence (with it glowing for seconds, minutes, hours or even days) and fluorescence (glowing down to tens of milliseconds)" (https://en.wikipedia.org/) (Figure 1).

Fig. 1. Fluorescence is a fast photoluminescence process so you only see the glow when black light shines on the subject (Don Farrall / Getty Images)
(https://www.greelane.com/en/)

The arrangement of the aquarium with corals, fish, algae and other aquatic specimens creates new impressions and emotions when viewed by the inhabitants. (Figure 2).

Fig. 2. The aquarium, as a living accent in the interior
(https://www.google.com/)

Annual international architectural elevator design competition

Fluorescent algae housed in an aquarium are used for attractive lighting in a floor elevator, with even smaller elevators located in that elevator to serve its floors. A second aquarium with fluorescent algae is located on each floor of the skyscraper next to the entrance to the floor elevator. (Aleksandrov Y., 2019a; Aleksandrov Y., 2019b) Variant solutions of the floor elevator are given, too. The dimensions of the aquarium for fluorescent algae are given, too. The aquarium with a width of 80 cm and a green vertical garden is 60 cm wide, located next to the aquarium of the elevator. Their dimensions increase the inner diameter of the floor elevator by 2 × (80 + 60) = 280 cm (Figure 3) (innovation conceptual design, Aleksandrov Yanko, student MiIchailova Magdalena, 2014).

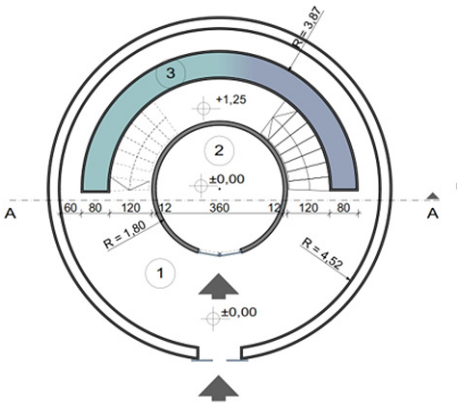


Fig. 3. Approximate dimensions of one

Superskyscraper in Singapore

According to the climate, such aquariums can also be located on the balconies of tall skyscraper buildings, which are shaped like floor gardens. For example, "Superskyscraper in Singapore" (innovation conceptual design, Aleksandrov Yanko, student Mustafa Hasan, 2014) (Figure 4).

Arcology skyscraper in Hong Kong

Floor gardens with recreation areas combined with fluorescent fish aquariums may also be located in horseshoe-shaped hollow elements, broken down into floors, such as an archaeological skyscraper in Hong Kong (Aleksan-

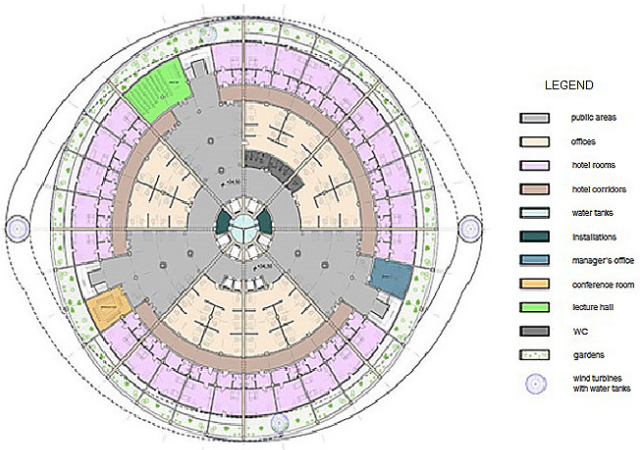


Fig. 4. Typical floor plan (level + 34.50); "Superskyscraper in Singapore

Fig. 5. Hong Kong. Panoramic view (innovation conceptual design)

drov, 2018a)**.** Through the hollow-shaped hollow elements, the shells of gardens and aquariums actively participate in the silhouette of the city (innovation conceptual design, Aleksandrov Yanko, Aleksandrova Liudmila, student Tcvetko Kirilov, 2013) (Figure 5).

In the Mumbai project, the floor space between the cylindrical volumes of the clusters have transparent aquariums hung on ropes that act as a quencher for oscillations in the structure of the skyscraper. (Figure 5).

Container skyscraper, Mumbai, India

In the Mumbai project (Aleksandrov et al., 2018b) translucent aquariums suspended from ropes are placed between the cylindrical volumes of the clusters and act as a quencher of vibrations in the structure of the skyscraper. (Figure 6, 7, 8) Rotating rings and pathways transport the containers, which are adapted for inhabitation and the chambers of the "container" type, which are intended for cultivation of fruits and vegetables to the respective floors for mounting. Two aquariums are hung to the floor plates in order to extinguish vibrations in case of an earthquake (innovation conceptual design, Aleksandrov Yanko, student Michailova Magdalena, 2015) (Figure 6).

Such floor gardens are located beneath an elliptical cabin lift, such as in front of and behind the gardens, and below the lift there are also waterfalls in a transparent double shell.

Fig. 6. Container Skyscraper, Mumbai, India

For example, "Container Skyscraper, Mumbai, India" (Aleksandrov, 2018b). In this example, there are also two types of aquaculture aquarium that use fish fluorescence to produce attractive effects. Residents may have their own kennel, for example, for trout (innovation conceptual design, Aleksandrov Yanko, student Michailova Magdalena, 2015) (Figure 7, 8).

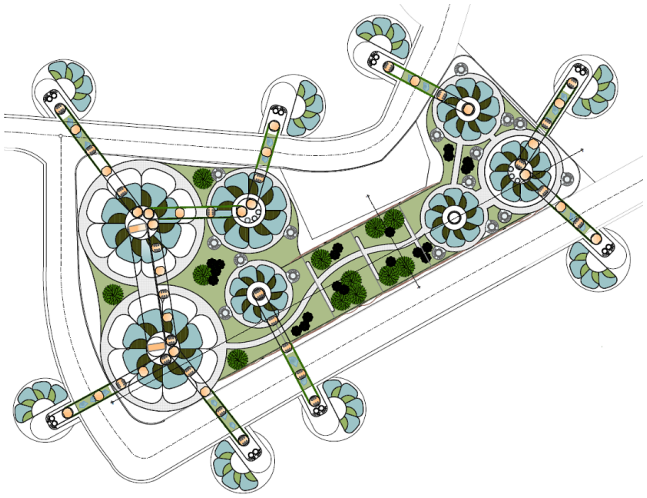


Fig. 7. Container skyscraper, Mumbai, India. On the roof are provided water rings – ponds for recreation (jacuzzi), sports, for fish farms, some of which are rotatable and used for artificial osmosis

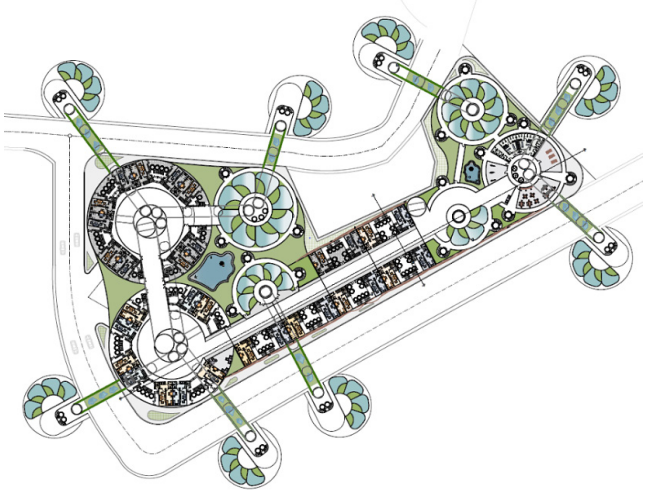
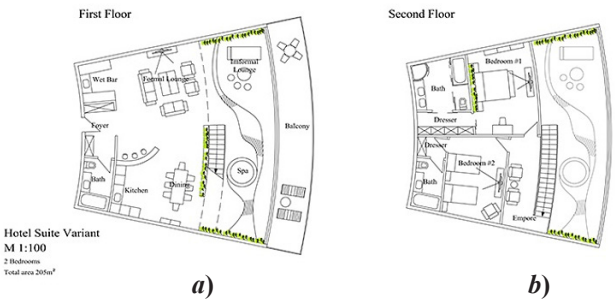


Fig. 8. Container skyscraper, Mumbai, India. Larger swinging transparent aquariums (left) are intended for ing medium-sized fish species and smaller swinging transparent aquariums (right) for small-sized species

Hotel apartment skyscraper in Kun Min, China

The biodiversity in agriculture and the economic productivity of the yards is essential for the nutrition of the population in Arguni Bava, Cayman Region, West Papua, Indonesia (Antoh et al., 2019). The use of this principle in high-rise buildings enables residents to have biodiversity for their own needs, even in the interior of a home. (Skyscraper Project in Kun Min. China (Fig. 9, 10-a, b) In the interior of the apartment, a stream of water under transparent cover flows from two green walls located on the first and second floors of the apartment. The water is collected in a multifunctional circular pool: jacuzzi, decorative aquarium with fluorescent fish or aquaculture kennel for consumption. These features can be shared between the pools located on the first and second floors (innovation conceptual design, Aleksandrov Yanko, Aleksandrova Liudmila, student Kostadinov Viktor, 2015) (Figure 9, 10-a, b).

Fig. 9. Skyscraper Project in Kun Min China



***a*)** ***b*)**

Fig. 10-*a*, *b*. Hotel apartment – first and second floor; Kun Min, China

Aquaries installed in interior furniture

"Danio Glo. General information. Danio glo is an artificially bred fish, but in the wild this does not happen. … Its ancestors, common Zebra fish (Brachydanio rerio) come from small streams and rivers India, Pakistan, Bhutan, Nepal, Myanmar. Along with guppies and swordtails, it is considered one of the most popular fish in the aquarium. Description. The fish has a very long body that reaches the size of the aquarium 4-5 cm (2 inches). With coloring, they can be very different and bright colors. Light green, green, orange, purple, yellow, gold, red. There are longitudinal stripes along the body and ribs. If you watch your video with a macro, you can see the antennas on the side of the fish's mouth! (https://amazonium.net/bg/2018/08/21/).

Compensating for color vibration deficiency (shortage) in the living area (residential, recreational or work environment) is an opportunity to relieve stress in the workplace.

The supporting structure of the aquariums should be telescopic. In this way, the same structure can be stretched and shrunk depending on the upright, such as the working position of the human body or the sitting position (at work or in the chat area). Another option is the installation of aquariums with colorful fish in furniture elements – sofas, chairs, chairs and dining tables and more (innovation conceptual design, Aleksandrov Yanko, student Bojoura Doncheva, 2017) (Figure 11).

In the interior of popular public places

In this case, the furniture includes chairs, armchairs, seating stools. With these furniture are furnished: workplace in the office, as well as dining places in the restaurant, coffee, patisserie or spectator seats in the theater, cinema, gym and more (innovation conceptual design, Aleksandrov Yanko, student Bojoura Doncheva, 2017) (Figure 11, 12, 13).

Relaxed furniture is a sofa, bed or double bed in the master bedroom. This is how they are furnished: the apartment, the hotel room, the beds in the SPA center and others. A new solution is proposed for restoring residents by using the fluorescence of fish housed in aquariums embedded in

Fig. 11. Three chairs with built-in aquariums

interior furnishings. Specialized centers for energy diagnostics and restoration with non-traditional methods or specially furnished apartments in hotels or apartment houses, which can be rented even for hourly use, are most suitable in this respect. Still, one can organize their home in a similar way (innovation conceptual design, Aleksandrov Yanko, student Bojoura Doncheva, 2017) (Figures 14, 15) The location of the aquariums can be integrated with the vegetation hanging from the ceiling or with green interior walls (Figure 14).

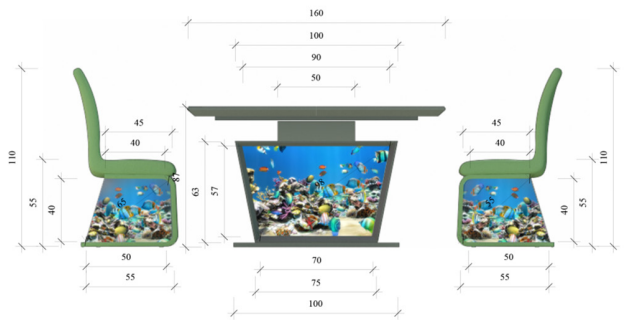


Fig. 12. Dining tables and chairs with built-in aquariums

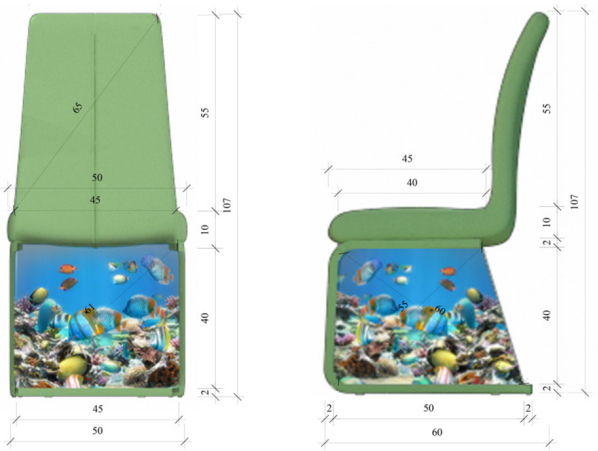


Fig. 13. Dining chair with built-in aquarium

Fig. 14. Variant. Aquariums are combined with hanging vegetation and green walls

Fig. 15. Variant. Cold food countertop with built-in aquarium

Conclusion

• An opportunity has been shown to achieve a calming relaxing effect for the inhabitants of a habitable space using aquariums using fluorescent fish. Moreover, these aquariums are located in the furniture. Aquariums can be combined with green walls, (Aleksandrov, 2019a; Aleksandrov, 2019b) or hanging plants.

• Telescopic support aquariums are particularly suited to modular solutions that can be incorporated into furniture.

• It is suggested that all future occupants of buildings be instructed when designing the interior for possible ways of eliminating the stress of daily living in the home, work environment and leisure environment.

• New solutions can be without or with an inventive step, with vibrations of glowing fish in aquariums located in seating furniture and backrests present in both cases as a major feature of the interior.

References

Aleksandrov, Y. (2018a) New solution – cultivation of soft fruits and vegetables in a superskyscraper in Hong Kong. *Bulgarian Journal of Agricultural Science*, *24(1),* 151–157.

Aleksandrov, Y. (2018b) New solution – Cultivation and storage of soft fruits and vegetables in chambers of the "containers" type with positive temperatures (Container Skyscraper, Mumbai, India). *Bulgarian Journal of Agricultural Science*, *24(2),* 326–334.

Aleksandrov, Y. (2019a) New solution – attractive lighting with fluorescent algae in aquariums, situated in multi-storey transparent elevators and in floor gardens inside skyscraperers. *Bulgarian Journal of Agricultural Science*, *25(4),* 710–716.

Aleksandrov, Y. (2019b) New solution – A skyscraper with integrated floor gardens, multi-storey panoramic elevators and aquariums filled with fluorescent algae. *Bulgarian Journal of Agricultural Science*, *25(3),* 595–604.

Antoh, A. A., Arifin N., Chozin M. A., Afrin, H. S. (2019) Short communication: Agricultural biodiversity and economic productivity of the yards in Arguni Bawah, Kaimana District, West Papua Province, Indonesia. *Biodiversitas 20(4),* 1020-1026.

Gruber, D. F., Phillips. B. T., O'Brien, R., Boominathan, V., Veeraraghavan, A., Vasan, G., O'Brien, P., Pieribone, V. A. & Sparks, J. S. (2019) Bioluminescent flashes drive nighttime schooling behavior and synchronized swimming dynamics in flashlight fish. *Plos One*, 14: e0219852. PMID 31412054 DOI: 10.1371/journal.pone.0219852

Davis, M. P., Holcroft, N. I., Wiley, E. O., Sparks, J. S. & Leo Smith, W. (2014). Species-specific bioluminescence facilitates speciation in the deep sea. *Marine Biology*, 161: 1139-1148. PMID 24771948 DOI: 10.1007/s00227-014-2406-x

Davis, M. P., Sparks, J. S. & Smith, W. L. (2016) Repeated and widespread evolution of bioluminescen ce in marine fishes. *Plos One*, *11(6)*: e0155154. PMID 27276229 DOI: 10.1371/journal.pone.0155154

Sparks, J. S., Schelly, R. C., Smith, W. L., Davis, M. P., Tchernov, D., Pieribone, V. A. & Gruber, D. F. (2014). The Covert World of Fish Biofluorescence: A Phylogenetically Widespread and Phenotypically Variable Phenomenon. *PLoS ONE, 9(1)*. https://doi.org/10.1371/journal.pone.0083259

Vlasarev, D. (2013). Regional localization of complexes of aquaculture. III (3), 389-394. *Proceedings 13th International Scientific Conference VSU' 2013*. Dedicated to the 75 Anniversary of VSU 6 – 7 June 2013. ISNN: 1314-071X. Sofia, Bulgaria.

https://doi.org/10.1371/journal.pone.0083259.g001

http://bgkids.hallowedgaming.com/experts/sveteshhi-riba-glofish-vidove-opisanie-sdrzhanie.html

http://bgkids.hallowedgaming.com/experts/sveteshhi-riba-glofish-vidove-opisanie-sdrzhanie.html

https://www.gettyimages.com/detail/photo/paint-sculpture-507

https://en.wikipedia.org/

https://www.google.com/

https://amazonium.net/bg/2018/08/21/

https://www.greelane.com/en/

https://goguide.bg/koi-kakvo-zashto/1357-vylshebstvoto-na-bioluminestsentsiiata

https://triumf48.ru/bg/holidays/svetyashchiesya-zhivotnye-kto-svetitsya-v-temnote-raznovidnosti-morskih.html

Received: June, 3, 2019; *Accepted:* August, 5, 2019; *Published:* April, 30, 2020