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COLOUMN

Communications and Comments

Eat a Rainbow.

[From an Advertising Campaign for healthy living]

2015 was the year of nature and food. This theme has been celebrated by the Universal Exposition (the Expo 2015) that has been held in Milano, Italia. The title of the Expo, *"Feeding the planet, Energy for Life"*, summarizes its main message: promoting a conscious production of food, by encouraging techniques, that ensure simultaneously high quality and environmental sustainability, in order to reduce energy waste and pollution as much as possible.

In 2015, the Gruppo del Colore – Associazione Italiana Colore also celebrated the Expo theme by:

1. organizing the 11th Colour Conference in Milano, in order to give to its participants the opportunity to visit the expo;
2. encouraging the submissions to the conference of works focused on the topic *"Food Colour"*;
3. dedicating a Special Issue of this Journal to the theme *"Food Colour"*;
4. inviting to the conference and awarding the Italian cook Gualtiero Marchesi with the Premio Colore, as an appreciation for his capability to merge the colors of food and dishes in an unique artwork.

In this column, we focus our attention on the topic *"Food & Colour"* that is of great interest for all of us, because color-based food visual inspection allows to decide about the freshness of the food, and food color often unawares influences our food choices. Due to its importance in our daily life, this topic has been addressed also before Expo 2015, as for instance the interim meeting *"Color and Food – From the Farm*

to the Table" organized in October 2010 by the International Colour Association in Argentina. Of course, Expo 2015 acted as a catalyst for many satellite events. Some examples are: the exhibitions *"I Colori del Cibo, I Colori dell'Arte"*, organized by the Musei Civici di Arte Antica (*"Food Colors, Art Colors"*, 2015, Bologna, Italy), *"I colori del cibo"* by Aliaon Ryde (*"Food Colors"*, 2015, Perugia, Italy), *"Intorno al cibo: colori, luoghi, curiosità"* (*"About food: colors, places, curiosities"*, 2016, Marina di Carrara, Italy); the interactive activity organized by the Museo Internazionale Scienza e Tecnologia Leonardo da Vinci to design the food of the future by combing color and flavor (2015, Milano, Italy); the recent 10th World Congress on Nutrition and Food Sciences in Osaka, Japan (2017).

We have opened our column with the sentence *"Eat a Rainbow"*, that is one of the many slogans launched by medical and pharmaceutical associations to promote the consumption of fruits and vegetables necessary for healthy living. We all have surely seen posters and brochure reporting the color chart of healthy fruits and vegetables. On this chart, the beneficial properties of fruits and vegetables have been broken down by their color (see Figure 1 for an example). Red fruits and vegetables are rich of lycopene, ellagic acid, quercetin, and hesperidin. Orange and yellow fruits and vegetables contains beta-carotene, zeaxanthin, flavonoids, lycopene, potassium, and vitamin C. Green fruits and vegetables are rich of chlorophyll, fiber, lutein, zeaxanthin, calcium, folate, vitamin C, calcium, and beta-carotene. Blue and purple fruits and vegetables provide lutein, zeaxanthin, resveratrol, vitamin C, fiber, flavonoids, ellagic acid, and quercetin. White fruits and vegetables include beta-glucans, EGCG,

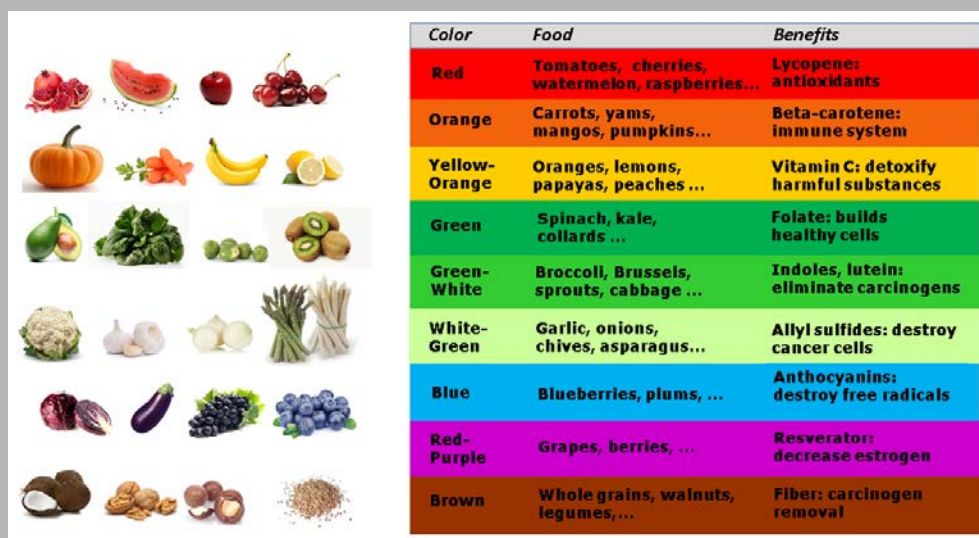


Figure 1: A color chart of healthy fruits and vegetables, adapted from <http://www.rawayurveda.com/4974/eat-a-rainbow-food-color-chart/>

SDG, and lignans. These nutrients are important to reduce the risk of tumors and to control blood pressure and LDL cholesterol levels. They normalize digestion time, support retinal health and vision, reinforce immune system activity, and fight harmful free-radicals. From the color chart, we deduce that "eating colors" is fundamental for our well-being.

The chart shows that colors of fruits and vegetables are related to their nutritional properties. Recognizing them helps to select the nutrients we need. We also observe that color is a powerful indicator of the food quality: a red meat is fresh, while a brown one is not. At the same time, a food with too brilliant colors looks artificial, and it is considered to contain colorants possibly dangerous for the health: therefore, a pistachio ice cream with a faded greenish color will be preferred to one with a bright, gaudy color. The relationship between food quality and color is so important that in 1979, Switzerland has founded the Natural Food Colours Association, an international non-profit association with the mission of acting on behalf of the natural food colour and/or colouring foods industry.

Nevertheless, the importance of the color as detector of the nutritional characteristics of the food is not the only one link between color and food.

The papers published in the Journal Special Issues as well as some works

presented at the 11th Colour Conference investigated the relationships between color and food from different point of views. The issues addressed in these works can be divided in 5 groups:

1. Color and marketing: three papers [1], [2], [3] published in the Special Issue focused on the relevance that color packaging has on the food market. They state that food package is not only a hygienic protection for the aliments, but it is also a marketing tool: package colors represent the aliment contained in, describe its properties, facilitate the visual identification of the product, enhance its desirability also on the basis of emotions and cultural issues. Color is a sign that guides the consumer choice.

2. Color food and taste perception: two journal papers [4], [5] and one conference work [6] addressed the problem of how color influences the taste perception, also when combined with other sensorial stimuli (e.g. music), and how the taste is perceived by color-blind people. The impact of the colors on the taste has been proved by many experiments that considered not only the color of the food but also the colors of the tablecloths, of the plates and/or of the environment

where people eat.

3. Food Coloring: one conference paper [7] addressed the issue of the food coloring, by reporting an activity organized by the Fondazione MUBA Museo dei Bambini and Expo 2015 and tailored to teach the children the differences between natural and artificial food coloring;

4. Color Food and Art: one journal paper [8] and two conference papers [9], [10] focused on the topic "*colored food and art*". The journal work examined aesthetic issues in the Chinese art of tea, where the color of the tea blend interacts with the glazed, jade Chinese pottery (i.e. the celadon) creating new chromatic effects. One conference paper presented a series of dishes inspired by other artworks, like paintings and sculptures. The other one reported on the role of the color in the Futuristic Cuisine.

5. Colored Light for Plant Growing: one journal paper [11] described the importance of the colors in plant growth: the color of the light illuminating a plant is relevant to the development and to the nutritional quality formation of the plant. The paper presented a LED based system, able to create lighting conditions ensuring an optimal growth and productivity of the plants, with the final goal of promoting a novel agriculture, including also the new trend of home farming.

Despite the issues described in the points above have been analyzed independently, they are strictly related to each other. All these work evidence the relevant role of color to food perception. The papers at points 1, 2, 4 and mainly focused on emotional issues relating food and color. The papers of the groups in points 3 and 4 focused on chemical and physical cues of the binomial color

& food, but, although the authors do not mention it explicitly, these features can be related again to the emotional/perceptive issues analyzed by the works in points 1, 2, 4. In fact, the problem of finding good colors for packaging (point 1) is similar to the problem of enhancing visual quality of an aliment by natural and/or artificial coloring (point 3): in both the cases, the aim is to make the product more attractive, desirable, "*beautiful to see and to eat*", in one word a synesthetic artwork (points 2 and 4). The lighting system that controls the plant growth and production mentioned at point 5 may also improve the visual appearance of the plant, satisfying (again) the visual sense.

To conclude, we invite you to have a look to Figure 2 that we have designed to sum up pictorially the main message of Expo 2015. This Figure collects a set of monochromatic paintings of Carl Warner, the foodscapes, where food becomes a structural element of our daily life, like home, balloons, islands, animals. "*We are what we eat*", said the German philosopher Feuerbarch. Here the world too is what we eat. In our opinion, these paintings are meaningful: they are not only nice, funny examples of colored food-art, but also an invitation to respect nature, as structural part of us and of our life, like Expo 2015 has highlighted.

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Figure 2: Twelve paintings of Carl Warner, along with the color spectrum. These images show the large variety of food colors and they are an example of how food can stimulate the human creativity. "We are what we eat", said the German philosopher Feuerbach. Here the world too is what we eat. In our opinion, Carl Warner's artworks are very meaningful: they invite to respect nature, as structural part of us and of our life. This is also the message of Expo 2015. The titles of Warner's paintings showed here (<http://www.carlwarner.com/>) are the following: column on left: Garlicshire, Fishscape 1, Lettuce seascape, Yellow island, Pasta island, Banana balloon; column on right: Corn candle, Broccoli forest, Celeri forest, Red hot chilli scorpion, Pumpkin paradise, Candy cottage.

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