Indexing Water
Kunsthalle Lisabon (Lisbon, Portugal)
December 2017 – February 2018
More than a year ago, when I was invited by Luis Silva and João Mourão to develop a site-specific work for the Kunsthalle Lissabon, I thought it would be the right moment and context to start the process of following the thread of an idea I had considered for a long time: working with the colors of water.

The journey began when I had my first conversation with Marcel Wernand in his office at the Royal Netherlands Institute for Sea Research (NIOZ). I had come across his name while I was working on different projects involving landscapes in which one color was strongly dominant; greens in the forest in Malaysia, blacks in Hawaiian lava flows. Would the color of a seascape be blue? Probably not…

A few centuries ago, art and science were not the differentiated, separate fields such as we know them to be today; they had many points of correlation and coexistence.

As a practitioner in the field of art, I was aware of color studies in the history of art, yet color dictionaries were also developed in the field of natural sciences as a means of describing and communicating observations within nature. It was Marcel who introduced me to this knowledge, and to the sources from which I could learn more.

It is unnecessary to discuss Marcel’s background and expertise in this context, but nonetheless, I would like to mention that the particular combination of approaches in his studies, together with his personality, made the dialogue extremely interesting and enriching from the beginning.

It turned out that Marcel was not only a very knowledgeable researcher, but also a great storyteller. His research has taken him all around the globe, during which he has seen many waters and encountered many people. His interest in the history of color studies is what made it all come alive for me.

The interviews with Marcel became the very core of this project. I would continuously read the papers he has written, or others he would offer me, and look through books, getting more involved in the topic. The amount of information started to become overwhelming, and I realized that it had started being more constricting than inspiring.

I realized then that the most interesting thing I had in my hands was the series of conversations with Marcel—his stories, as well as the mental space that our dialogues were creating for me.

I decided that I pursue this further by continuing to talk to him, recording the interviews, letting the information sink in, and taking notes of the images that would materialize from these conversations.

The narrative of our conversations became the script of the exhibition, as well as the artist's book.

As the conversations were too broad, I proposed to Marcel that we take the color scale he uses in his studies as a guideline: the Forel-Ule scale. The scale has twenty-one colors. I suggested that Marcel and I should discuss one color at a time. He proposed grouping them. One day about blues, another about greens, yellows, and browns. Dissecting the scale by color groups helped me to understand the factors that affect the color of water.

A large volume of writing emerged from these conversations, including ideas for photographs, objects, and references that had exhibition space.

The color scale provides a pillar for the exhibition, as well as the publication, while objects, images, and text flesh out the story, offering the viewer various points of entry.

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Enlarged version of Forel-Ule Scale
acetate sheets and acrylic
147 × 420 cm
Water column – scale 1:10
Longer visibility record taken with the Secchi Disk
Glass, gel and pigments
790 cm × 3 cm diameter
Water column – scale 1:10
shortest visibility record taken with the Secchi Disk
solid glass
1 cm × 3 cm diameter
iv

Snap of Blue Grotto
photograph
50×28 cm
Phytoplankton drawings
watercolor on paper
3 drawings, 30 × 30 cm each (framed)
shelf: 160 cm length, 5 cm depth
Stones mentioned by Lorenz von Liburnau in his ‘mineral’ sea color scale (1898)
vitrine: 110 × 41 × 25 cm

Clear-blue [Azurite, Chalcocite, Sapphire, Halite, Beryl], Diffuse-blue [Indigo, Ultramarine, Lapis Lazuli, Turquoise], Blue-green [Diopside], Apple-green [Heliotrope, Actinolite, Emerald, Malachite, Chrysoprase], Yellow-green [Serpentine, Epidote, Olivine, Nephrite]
i. *Enlarged version of Forel-Ule Scale*

Forel scale design around 1900. The glass tubes are filled with a mixture of copper-sulphate and potassium chromate. The numbers above the tubes present the percentage yellow. [Historical reference based on Marcel Wernand’s archive]

The 21 tubes, contain colored solutions from blue, blue-green to cola-brown, are mounted in a frame and together form the Forel/Ule scale. Tube 22 (left) contains mQ water and does not belong to the scale. François-Alphonse Forel (1841–1912) / Wilhelm (Willie) Ule (1861–1940) [Historical reference based on Marcel Wernand’s archive]

The color comparator scale after Forel-Ule by Marcel Wernand

Process of re-making Forel-Ule scale by Hans Simons – referenced on Marcel Wernand’s research
The Secchi Disk, as created in 1865 by Angelo Secchi, is a plain white, circular disk 30 cm in diameter used to measure water transparency or turbidity in bodies of water. The disc is mounted on a pole or line, and lowered slowly down in the water. The depth at which the disk is no longer visible is taken as a measure of the transparency of the water. This measure is known as the Secchi depth.

Measurements made on the voyage from Gorinchem to Port Harcourt in the period June 2015 by Damen captain Jaap de Jong

| Date month | Start Time | Latitude | Longitude | Lat Decimals | Lon Decimals | Secchi in m | Flu | Position name | Remarks | Scoop | Foot note 1
|------------|------------|----------|-----------|--------------|--------------|-------------|-----|---------------|---------|-------|-------------
| 13 x       | 12 June 2015 | 12:00   | 06:00     | 50          | 15          | 50.2500     | -4  | -1            | S good, Flu good | good | N/A          
| 3 x        | 13 June 2015 | 12:00   | 06:00     | 45          | 26          | 47.4333     | -8  | -3            | S good, Flu good | moderate | N/A          
| 7 x        | 13 June 2015 | 12:00   | 11:00     | 49          | 31          | 38.4167     | -13 | -1           | S good, Flu good | good | moderate | N/A          
| 9 x        | 16 June 2015 | 12:00   | 11:00     | 50          | 30          | 33.8333     | -13 | -6           | S good, Flu good | moderate | N/A          
| 11 x       | 12 June 2015 | 13:00   | 11:00     | 50          | 18          | 24.5500     | -3  | 4            | S good, Flu good | good | N/A          
| 12 x       | 14 June 2015 | 12:00   | 11:00     | 50          | 41          | 17.5667     | -7   | 4            | S good, Flu good | good | N/A          
| 13 x       | 14 June 2015 | 12:00   | 11:00     | 50          | 20          | 14.7913     | 21   | 10            | S good, Flu good | moderate | N/A          
| 14 x       | 13 June 2015 | 12:00   | 11:00     | 4          | 2            | 6.6666      | 4    | 3            | S good, Flu good | moderate | 19x          
| 15 x       | 24 June 2015 | 12:00   | 11:00     | 4          | 10          | 0.6666      | 6    | 29           | Gulf of Guinea/Right of Breiz | good | 21x          
| 26 x       | 26 June 2015 | 12:00   | 11:00     | 4          | 6            | 0.0000      | 3    | 54           | Sight of Breiz | good | 25x          

[from Marcel Wernand’s archive]
iv. Snap of Blue Grotto

painting The Blue Grotto at Capri, 1835, by Heinrich Jakob Fried (1802–1870) [Historical reference based on Marcel Wernand’s archive]

Revisiting the Blue Grotto, inside the Grotto
photo: Irene Kopelman, November 2017

v. Phytoplankton drawings

Colleting plankton samples at the Jetty at the Royal Netherlands Institute for Sea Research (NIOZ)

Drawing set up in the Lab at the Royal Netherlands Institute for Sea Research (NIOZ)
A simple design, using the eye to determine the colour of pure water, was proposed by the German researcher J. Kayser. A 4.5 meters long metal tube, A-B, was half-filled with distilled water. Colorless glass windows closed the tube at both sides. White light of an electric lamp L is transmitted through the tube. The lens C mirrors the image on screen O-P. The white of the lamp can be seen in the bottom half and the blue as resulting color of the by water filtered rays can be seen at the top half of the screen.

Reconstruction at NIOZ's LAB of Kayser's tube.

"Seawater is transparent and can be discriminated into two colors; a reflected and a transmitted color. Blue is the color of pure water." (Kayser, Physik des Meeres, 1873) [Wernand at Royal NIOZ Lab. 2003]
Irene Kopelman

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Project by Irene Kopelman
inspired by a cooperation with Marcel Wernand, scientist of the Royal Netherlands Institute for Sea Research and Coastal Ocean Darkening research project

Curated by:
João Mourão and Luís Silva

Credit documentation of the exhibition:
Bruno Lopes

Production glass works:
VICARTE (Vidro e Cerâmica para as Artes)
Robert Wiley, Amelie Girard

Production enlarged version of Forel-Ule Scale:
Hans Simons

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Ayumi Higuchi

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