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Color design research and developments with vegetable dyes

Delphine Talbot^{a*}

^a Assistant Professor at the Institute Superior Color Image Design, LARA-SEPPIA, University of Toulouse, France

ABSTRACT

Young researchers in design are now working on new products using natural dyes. Moreover they study how colors made with plants can be used as effective materials. Sensory design and care design are innovative ways of design that think about new uses for human beings. Taking care, considering color materials as medicines or simply good for skin, unlike petrochemical dyes.

The author will show new developments made by young designers: natural dye process for leather, innovative vegetable leather and colors, development of color ranges made by local plants, archeology of colors for new patterns, extraction process for weak dyes...

The author will also introduce a new common program of research about "color & care", specifically questioning the color materials made with both medicinal and dye plants. From a corpus about symbolic and traditional ways of using colors (ancient practices and local know how), the idea is to prove the medicinal potential of some natural dyed samples, through collaboration with chemists, and to develop some new care and color materials made from plants.

Keywords: *vegetable dyes, natural colors, care design, slow fashion.*

INTRODUCTION

At the Institute Superior Color Image Design we study about color, color as an object to conceptualize, color as a material to create, to inspire futur fashion trends, even futur ways of making design, finally. Some workshops permit to explore, learn and experiment many different ways of making colors and materials. The lecture today will specifically talk about making colors with natural dyes, specifically from plants. Including thus some techniques of making dye stuffs but also how the colors made from plants are complex, vibrating and deep.

Unless making colors with plants is a kind of cultural adventure, the discovering of its shades can lead us to a profound understanding of what is color: more than a surface or a light reflecting support, color is a multi sensory material, a support of meanings, an imprint of memories and knowledge.

Working in color design requires to know about all the different parameters of this particular object of studies and makings that is the color. In the Master Creation Research & Innovation in Colors and materials (Master CRIC), we learn how to explore all the sides of the color by focusing on one chromatic domain and by making successive cultural, technical, linguistic explorations, while experimenting with some new ways of producing colors from the understanding of its materiality and/or its typical or contextual existence. Then a precise dialogue is established between research and creation around a common objective: to make visible, understandable and palpable a chromatic domain whose name evokes as many imaginations as collective and singular memories.

Also designing ranges of colors allows both to offer a common field of reference for designers, but also to inspire ideas for projects in architecture, textiles, cosmetics... all sectors, all environments where the color is called upon to distinguish or even support creations.

TEXT

Let's discover now some recent creations and researches including some vegetable techniques into innovative color design or design of new materials.

From lichens to colors, for silk and wool

We will begin this presentation with the precious work of Aurelie Couvrat (Master CRIC 2017-19), about the colors of lichens.



Figure 1: Aurelie Couvrat, *Lichens*, Workbook cover page, Master CRIC 2017-19, ISCID, University of Toulouse.

Real object of research in color, the workbook permits to discover a specific exploration of chromatic domains and to classify some samples and color materials. At first, understanding the lichens as a vegetal in its own environment by duplicating the observed colors with painting, as a first step in appropriation of the domain.

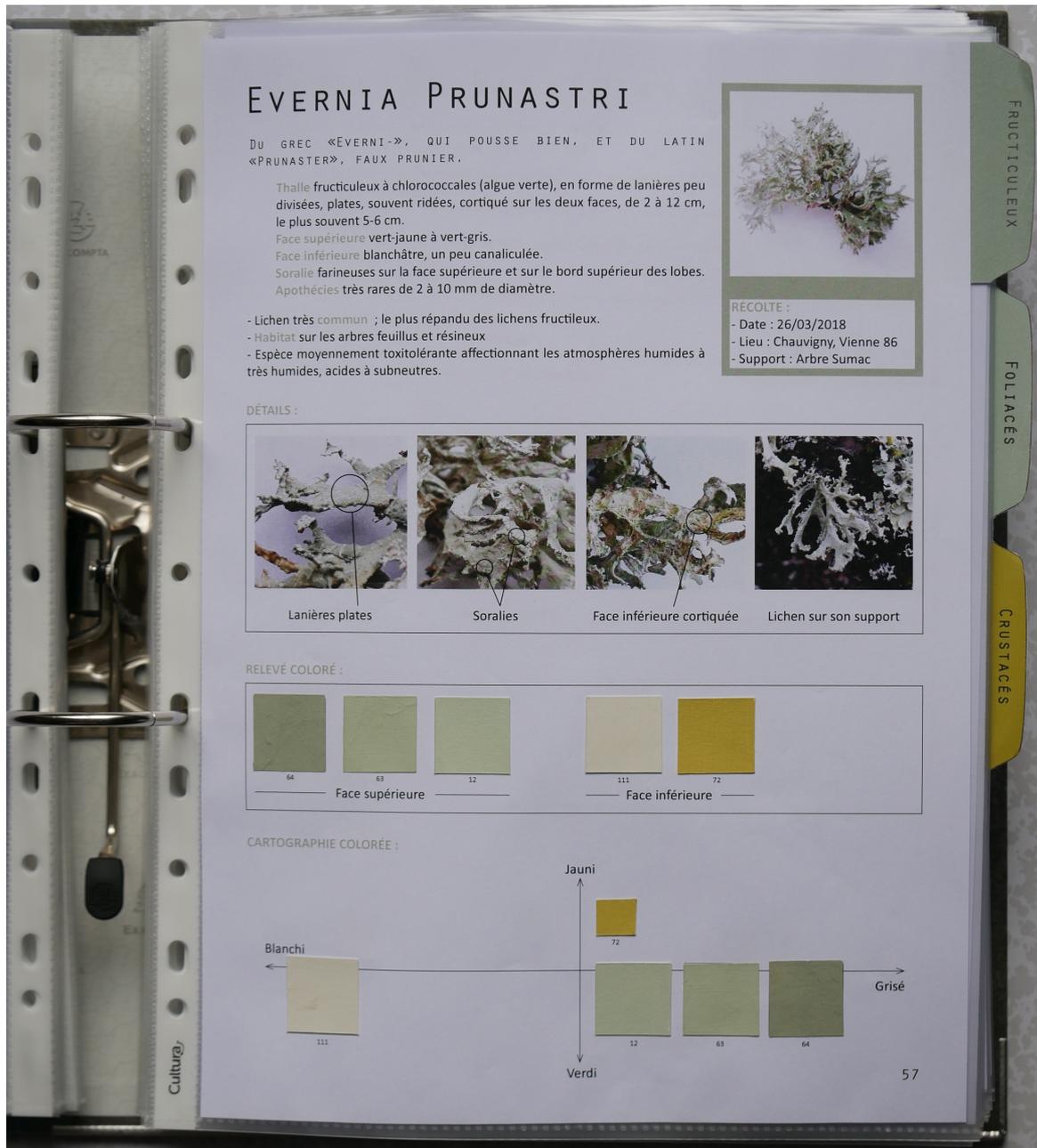


Figure 2: Aurelie Couvrat, *Lichens, "Evernia Prunastri, contretypes"*, Master CRIC 2017-19, ISCID, University of Toulouse.

Discovering all the tints of the material is the first step to understand color in all its variability. Duplicate the colors observed with some industrial tools, as Pantone or NCS color charts, is also part of the learning of the future colorist. It is a know-how. It is necessary to enable certain colors to be combined with others, to permit a graphic chain, to integrate industrial projects or mass production, or even to associate natural colors with some materials and/or a given industrial environment. Of course. Therefore, the colorist designer needs to be conscious that duplicate improve the delicate know-how of the translator: he will need to choose several shades from the color chart in order to indicate the complexity and the uniqueness of the specific color he choosed from the natural environment. Then, experiments will permit to explore the diversity of the tints from the lichens, inside, outside... And, at least, to extract the colors from the lichens, by different techniques of dyeing.

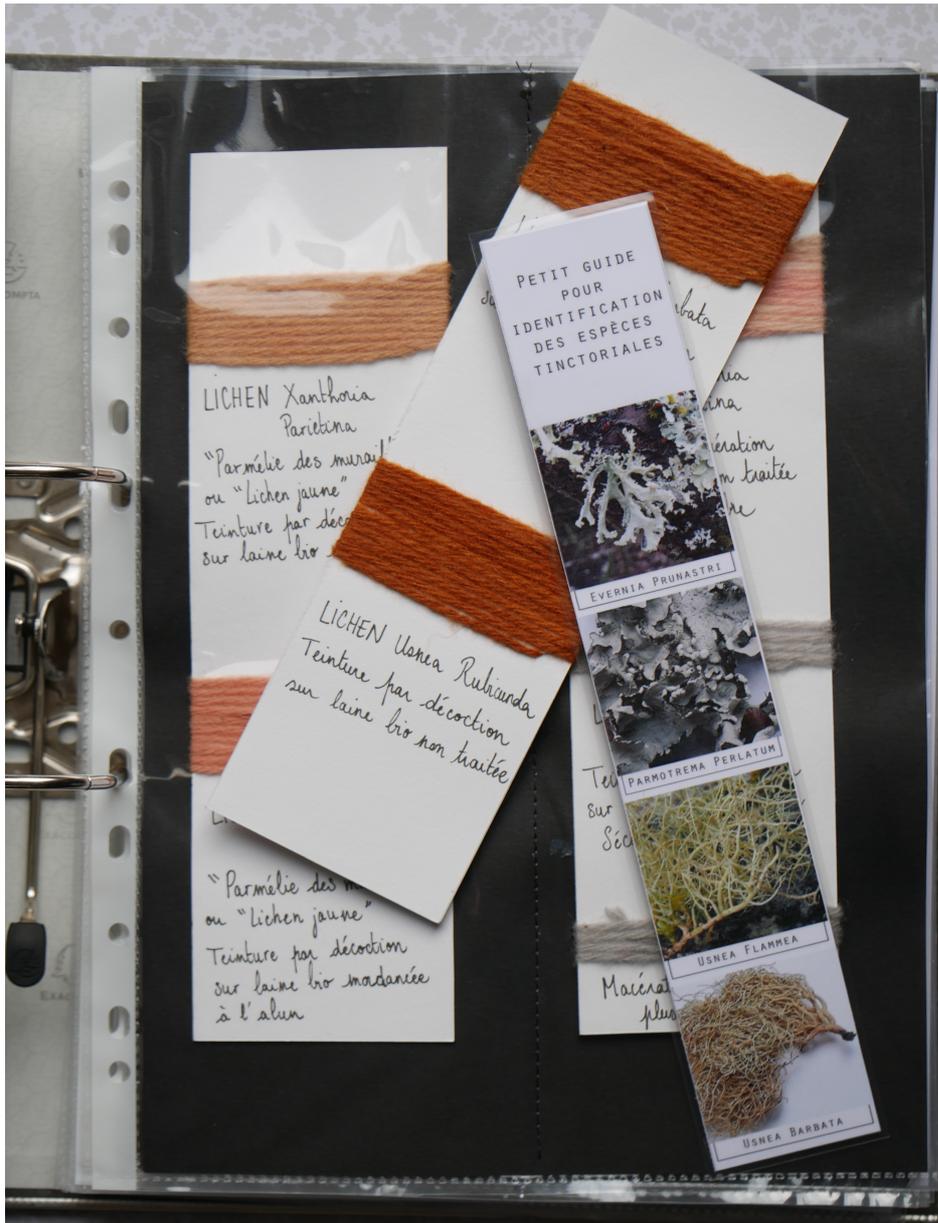


Figure 3: Aurelie Couvrat, Lichens, "Xanthoria Parietina, dyed samples", Master CRIC 2017-19, ISCID, University of Toulouse.

The method, whether vat by decoction or maceration (in ammonia or urine) and other, depends of the type of lichen used. Besides, the action of UV rays, for example, are important factors. Indeed, some species of lichens can give different results depending on the method chosen, for example the case of *Xanthoria Parietina* which will offer a different rose by maceration, from the one obtained by decoction, but it does not stop there because this last rose is unstable. The UV action will gradually lead it to a grayish and more stable blue. This phenomenon will thus become a huge field of experimentation in the search for new colors. Indeed, if it is first possible to vary the pink by the time of maceration but also by carrying out successive soaking (after drying) to intensify the color, it is also possible to obtain intermediate colors in purple hues and turquoise. These variations related to UV exposure are more easily observed by slowing the reaction (by re-humidification or by placing the samples in transparent plastic bags for example ...). It is in part thanks to this multitude of possibilities that the resulting palette is increasingly enriched.

The context of experiments also makes it possible to obtain two-tone yarns or fabrics, to bring out patterns... From coral to a grayish blue, the color designer rematerialize colors: from the model synthetic colors (one color / one tint) to re-discovering of the complex colors, by the natural dyes process, understanding the original complexity of colors, their vivacity, as they are again alive in the dyed textiles, and sometimes they move, according to different parameters (humid environment, PH variations, sunshine...). Some plants, particularly a lot of lichens, are reactive with the sun (photosensitive), or in the vat (PH sensitive), that would permit many different experimentations and ways of designing and thinking colors as alive and sensory materials.

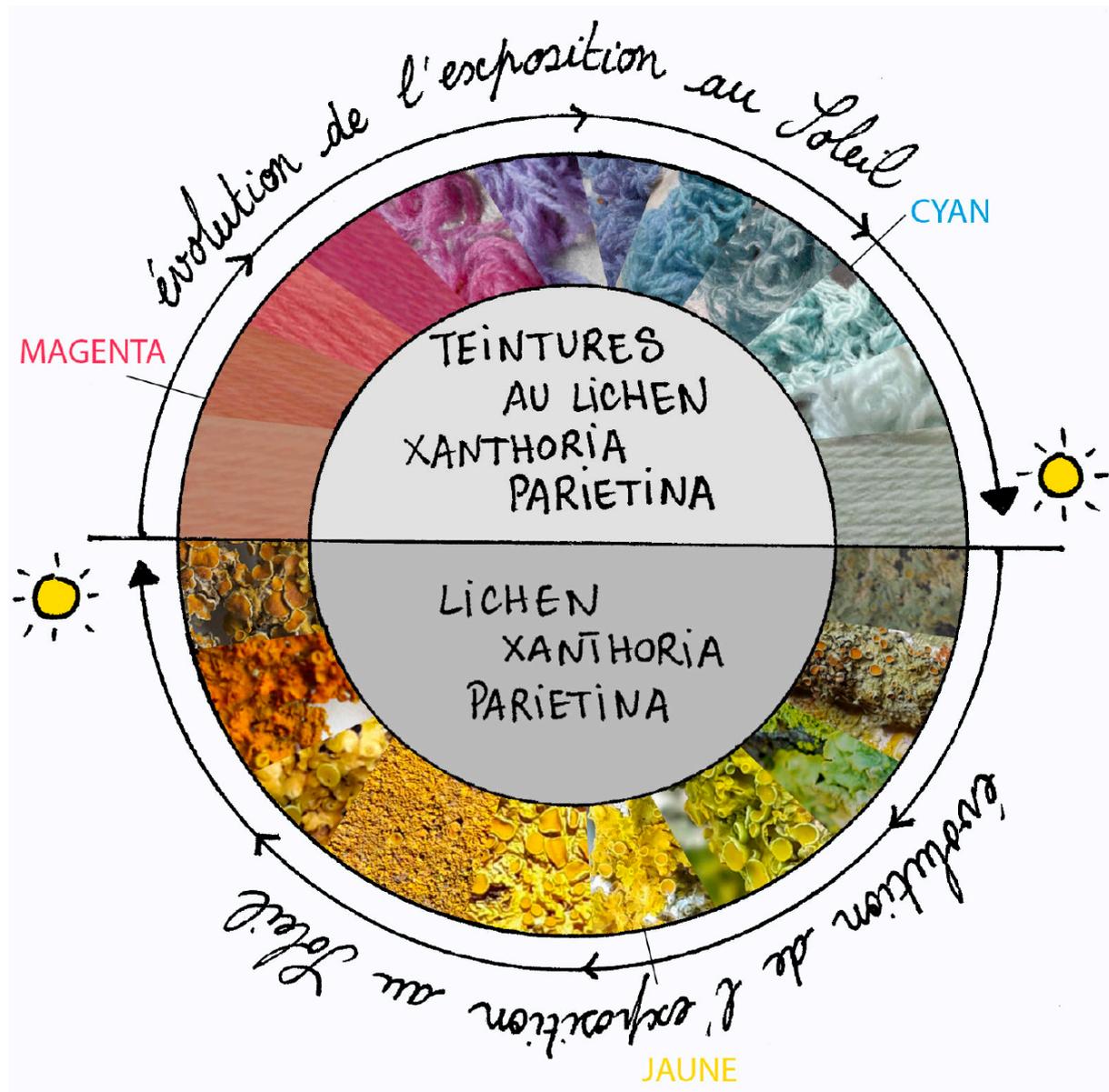


Figure 4: Aurelie Couvrat, Lichens, "Xanthoria Parietina, chromatic circle", Master CRIC 2017-19, ISCID, University of Toulouse.

In addition, tinctorial research around *Xanthoria Parietina* sheds light on a phenomenon surprising: the latter sees its visible color vary depending on its exposure to the sun but also its color hidden (and revealed by dyeing), depending on UV. We therefore notice here an astonishing complementarity between visible color and hidden color, which form a rather complete chromatic circle. A *Xanthoria* lichen implanted in shaded area will turn to a greyish green, while if it is exposed to the sun, its color will turn yellow then will become more and more orange. At the same time, a fabric dyed by maceration of this lichen may turn a bright pink almost coral, to a grayish blue when dried outdoors. It is as if a rematerialization of color visible was operated by switching from one medium to another. During this transfer, the color almost becomes its own complement, as subject to an inverted mirror effect. The aromatic circle made up, on the one hand, of the visible colors of the *Xanthoria Parietina* lichen, and on the other hand of the dyeing colors resulting from the latter. Each semicircle reflects the evolution of color, depending on exposure to the sun.

All this research results in a very complete colored palette of colors from a practice experimental dye in the posture of a lichenologist colourist.



Figure 5: Aurelie Couvrat, *Lichens*, "Colors on silk", Master CRIC 2017-19, ISCID, University of Toulouse.



Figure 6: Aurelie Couvrat, *Lichens*, "Colors on wool", Master CRIC 2017-19, ISCID, University of Toulouse.

From colors of ashes to vegetable color ranges and textile design

We will now discover another research in color design, this one from Chloe Prieur, (Master CRIC 2018-20), about the colors of ashes. She begun by observing different colors of different types of ashes (different woods were burnt), in order to make some collect of ashes materials, through photographs and samples of tints and duplicate colors.

Ash is an haptic color, very sensory, with a specific smell, texture, velvety... It reveals deep sensations of memories. Ashes do not have one specific color, but a great variety of shades, of colored grays. Ash is a delicate matter which is full of different colors. Between the serenity of browns, the softness of greens, the pearly of roses, the spirituality of violets, the coldness of blues, the evanescence of blacks...



Figure 7: Chloe Prieur, *Ashes*, "Colors of alive materials in it environment and duplicate with Pantone color chart", Master CRIC 2018-20, ISCID, University of Toulouse.

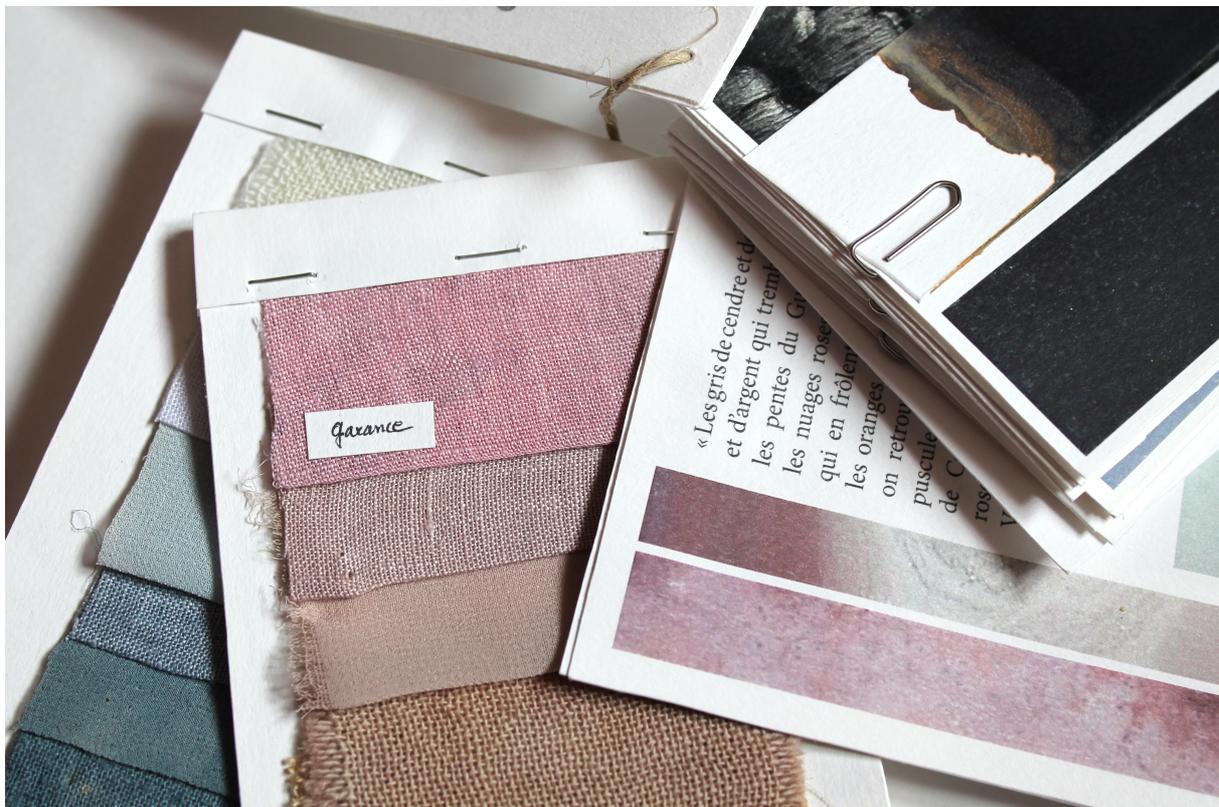


Figure 8: Chloe Prieur, *Ashes*, "Ash colors made with vegetable dyes -madder, isatis...-", Master CRIC 2018-20, ISCID, University of Toulouse.

From understanding ash in its environment, the wood in fire, Chloe did duplicate the tints she observed by using Pantone color chart and by vegetable dyeing process. Many plants did help her to create subtle hues of ashes on textiles, as linen, silk, cotton... She classify also her tints according to their vivacity or brightness, thanks to some cartographies. Then she combined some materials sample, in order to show the specific velvety of the powders, with some images, color samples... to create some color ranges, precious for designers and for making projects with color, as a conceptual and material support.

Moreover, Chloe, during her work experience, collaborated with AHPY Creations from Pastel Blue, a textile finishing company in Toulouse. She created, in collaboration with Annette Hardouin (master dyer) and Yves Patisier (fashion designer) a color ranges and textile design, with blues made from *Isatis tinctoria* (Pastel, the local plant for blue) and patterns inspired from *Viola savis*, both on the thematic "pastel & violet", two heritage plants of Toulouse.



Figure 9: Chloe Prieur & AHPY, *Pastel & Violet*, Master CRIC 2018-20, ISCID, University of Toulouse.

Indigo dyeing for goat leather

Another exemple of collaboration would show us how color design can be at the center of a project. Thus would be between Kheira Terbah and Alran tannery in Mazamet, in France, a great exemple of a research and development on colors made by plants. Kheira, colorist designer, did explore the possibilities to color leather with indigo, in collaboration with an

engineer, in order to find the best process to obtain stable and uniform colors on goat skin. It was a long exploration to find the good way to fix the color into the leather without alter the quality of the skin material, weak in water.



Figure 10: Kheira Terbah & Tannery Alran, *Bluesoul: Isatis, Orient, Temple* - three colors of leather dyed with indigo, Master CRIC 2016-18, ISCID, University of Toulouse.

This range of nubuck goat leathers dyed with vegetable indigo is kind of rare on the markets. Nevertheless, in Japan, some manufactures of leather work with vegetable indigo. In Tokushima, Kinuya Co. Ltd., and in Kyoto, Sukumo Leather, two tanneries perpetuate this ancient know-how rooted in Japanese culture. Hand dyed from traditional way thanks to the famous *sukumo*, dye substance produced from indigo fresh leaves, the craftsmen then unveil bovine leathers with shades majestic, surmounted or not by motifs, also made manually. As a great example of making stable colors with plants on leather.

Color design for vegetable leather

Understanding that color design is a great way to choose for innovative projects, the Institute Superior Color Image Design organize twice a year the Design Innovation Weeks (DIWE) in order to make some student groups, from the 6 different Masters, to work on specific projects submitted by local companies or institutions.

Recently some students in Master class worked on a project submitted by a young start-up, Mondin, to plant-color a leather made from grapes pomace. The start-up develop a new kind of leather, for luxe developments, around the patrimonial identity of their roots, the wine and the grapes cultures. For them we explored the potential of leathers as a multi sensory material, its textures, its softness, were observed and duplicate, in order to give to the new material a kind of alive aura and to instill recognition of it as « leather », with many possibilities of sensory variations. The tints of vegetable colors were thought through the material transparency and its specific golden shade. The main objective was to imagine how

the natural dyes would evolve in a certain kind of transparency, playing with light, and a non-uniform colorful support.

LES TEINTURES VÉGÉTALES

- | | |
|----------------------------|----------------|
| ROUGES | BLEUS |
| TANNIN DU VIN ET DU RAISIN | Indigo |
| Sureau | PASTEL |
| Avocat | Nerprun |
| GARANÇE | Choux rouge |
| Hybiscus | Iris de jardin |
| Oignon | |
| Phytolaque | |
| VIOLETS | VERTS |
| Sureau Yehle | Iris de jardin |
| Sureau Noir | Nerprun |
| Orcanette des teinturiers | |
| Bois de Campêche | |
| Rose tremière | |



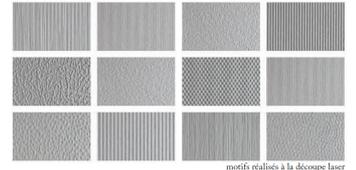
Camille Giuseppin, Maïlys Pasquer, Mélissa Motte, Marine Archambault-Alexandre

Master 1 .JSCID .DIWE 2019-20

PISTES DE PROCÉDÉS DE FABRICATION D'UN MOTIF

Diverses techniques permettent de graver - imprimer - déposer des motifs sur des supports. Le cuir est facilement modulable et ces quelques techniques ouvrent des possibilités variées dans la création d'un graphisme.

- _ L'innovation peut passer par le mode de création de motifs et de production.
- _ Incorporer de nouvelles technologies dans un savoir-faire traditionnel autour du cuir.
- _ Rapidité d'action.
- _ Utilisation de logiciels (Processing) pour apporter des variations de motifs, un effet plus naturel comparé aux faux cuirs avec une régularité constante.



motifs réalisés à la découpe laser

Camille Giuseppin, Maïlys Pasquer, Mélissa Motte, Marine Archambault-Alexandre

Master 1 .JSCID .DIWE 2019-20

PROPOSITION TINCTORIALE PAR LE TANNIN

HISTORIQUE

_ Substance végétale présente comme métabolites secondaires par les plantes (arbres, plantes à fleur), dans leurs écorces, leurs racines, feuilles, etc...

_ Extrait au Moyen-Âge dans les écorces de chênes ou de châtaigner pour travailler la préparation du cuir.

_ Présent naturellement dans le vin, créer une gamme colorée à partir du raisin rouge ou plantes tannées.

RAPPORT AU LUXE

_ Revalorisation de cette substance au coeur même du vin et du marc de raisin, utiliser les ressources premières avec lesquelles est créé le cuir végétal.

_ Rapport au savoir-faire français et des différents terroirs du vin (Sud-Ouest, Sud-Est).

COLORIS //

_ Une large gamme de teintes est donnée, utilisant les marcs de raisin, avec plus ou moins d'affinage pour donner différents coloris.



poudres de tannins

manucier de tannins issus du raisin



Camille Giuseppin, Maïlys Pasquer, Mélissa Motte, Marine Archambault-Alexandre

Master 1 .JSCID .DIWE 2019-20

PROPOSITION TINCTORIALE PAR LE PASTEL DES TEINTURIERS

HISTORIQUE

_ Culture en France du pastel, savoir-faire particulier dans le Sud-Ouest, qui produit en quantité des teintures de très bonne qualité en raison de son climat.

_ Toulouse : terre d'élection de la culture du pastel.

_ Source d'enrichissement pour les marchands pastelliers.

_ Rapport à l'artisanat français et du terroir.

RAPPORT AU LUXE

_ Le pastel a connu une période très faite dans les années 1450-1560 où il fait figure «d'or bleu» et permet à de grands marchands comme Pierre d'ASSEZAT à Toulouse de constituer des fortunes considérables, hôtels, participant à une valeur patrimoniale reconnue.

COLORIS

_ Une large gamme de teintes données, essais sur cuir déjà effectués et qui fonctionnent, une bonne adhérence à la matière, un fort pouvoir colorant et qui prospère dans le temps.



fleur de pastel des teinturiers

manucier de bleus sur cuir (c) Kheira Terbah, ISCID 2018



Camille Giuseppin, Maïlys Pasquer, Mélissa Motte, Marine Archambault-Alexandre

Master 1 .JSCID .DIWE 2019-20

Figure 11: Camille Giuseppin, Maïlys Pasquer, Mélissa Motte, Marine Archambault-Alexandre & Mondin start-up, *Vegetable colors for vegetable leather*, DIWE 2019, ISCID, University of Toulouse.

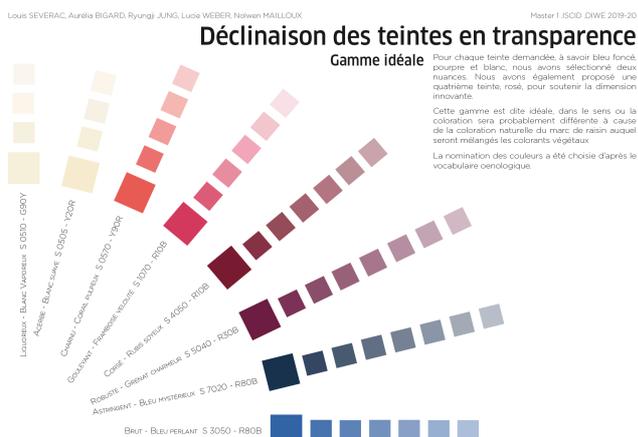


Figure 12: Louis Severac, Aurelia Bigard, Ryungji Jung, Lucie Weber, Nolwen Mailloux & Mondin start-up, *Vegetable colors for vegetable leather*, DIWE 2019, ISCID, University of Toulouse.

The color design process included to watch over the types of existing animal leathers, their textures, effects and sensoriality, to create some maps to classify the samples and to observe and identify some effects, then to name them. To take up certain surface effects and transpose them to vegetable leathers, with the aim of allowing users to rediscover a certain sensuality and fine diversity of certain luxury leathers. Some experiments about textures (imprint) permit to model some samples of reference for future projects. Methodologies in color design are employed, such as analysis of existing similar materials, identification and nomination of textures and effects, experiments in surface design, chromatic research (techniques, tests, experiments...). Some symbolic associations, to make sense, to tell a story, are made in order to (re)invent the history of this new material, to create its own identity. And, as well, to infuse the samples with an aura, associating color, as surface effect, with some symbolizations, thanks to the naming phase. Also, to take up the lexicology around wine, grapes, to enhance its heritage aspect and its anchoring in a recognized territory.

Color & Care: an interdisciplinary and multisectoral program of research

After this exploration of researches and developments in color design, we will now introduce a specific research about color and care, through a corpus of specific uses of textiles dyed with vegetable colors, to protect, care for or even cure. Born in 2017 in Madagascar (Symposium "Naturally - Voajanahary", in collaboration with Dominique Cardon, emeritus reach director in archeology and history, CNRS), this interdisciplinary research project focus on identify plants that are both coloring (stable colors) and healing, by at first producing a corpus of dyed textiles uses for their symbolic (protection, hydratation...) or even their therapeutic purposes, and then to prove the efficiency of the healing capacities of plants inside the dyed fabric, one in contact with the skin. In other words, researching how to link the color of the plants to the therapeutic powers of the plants, in one material. And by extension, to imagine some materials (textiles or cosmetic) which take care of environment, and moreover, can heal people, or at least protect them. The main stake being to prove the real capacities of textiles dyed with plants to heal, more than symbolic uses as history or archeology could say about traditional practices observed in different parts of the world.

In Madagascar (2017), an exploration of the endemic flora was made by the identification of plants to the virtues coloring and therapeutic (double uses) thanks to some local botanists, by making some experimentations of coloring with plants thanks to some local craftswomen (traditional techniques), by visiting some places of production textile (dyeing and weaving with local plants).

In a second hand, from some tinctorial and medicinal plants, the production of a range of colors prescriptive for of uses in health beauty (cosmetic and care) and coloring textile mainly is proposed, made by some various natural dyed textiles samples, from different parts of the world. This tool can allow at all business wishing itself differentiate through the color, in adding a dimension ecological see therapeutic at her production, of develop his offer. This range can as well be a model, a support at launch of a color project investing in ecological or even therapeutic issues. A consultation or an advice adapted at some project would be so proposed in continuity of the support. It may allow some developments in industry of color, mainly textile.

Are put at honor in this project: of principles articulation between color and care; the combination approaches in sensory design and color design; the prescription colored for the environments industrial and the companies tours towards innovation (beauty-health, textile, habitat...); an intercultural and interdisciplinary posture for a project which concerns many fields of research (applied arts, arts and crafts, design, history, anthropology, archeology, health, chemistry) and different sectors of activities (beauty-health, textile, industry of the color in general).



Isatis tinctoria L. guide



Polygonum tinctorium AIT

ANTIBACTÉRIEN

Réparation, Cicatrisation

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ANTI-RADICALAIRE,
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Protection de la peau

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Figure 13: Delphine Talbot (color designer) and Vanessa Causse (forecast designer), *Color & Care: Natural dyeing and medicinal virtues*, "Color range - work in progress", Toulouse, Paris, 2019-21.

Moreover, the development of a program of research in partnership with laboratories in pharmacognosy, chemistry, history and design, integrated at different universities based in France, Greece and Japan, is mainly expected. The integration of specialists keys in this program of research (craftswomen, master dyers, forecast and color designers) is as well planned. A research of funding is currently at the study. In a second time, the goal would be to associate of companies for the bet in square applications developments in different sectors of industry (textile, cosmetic, medical, environnement...).

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Kheira Terbah, artisan designer colorist: <http://dante.univ-tlse2.fr/5277/> + <https://www.anellastudio.com>

Camille Giuseppin, Mailys Pasquer, Mélissa Motte, Marine Archambault-Alexandre, Louis Severac, Aurelia Bigard, Ryungji Jung, Lucie Weber, Nolwen Mailloux: students of the Master 1, promotion 2019-20, Institute Superior Color Image Design, University of Toulouse.

Collaborators:

AHPY, Créations bleu de pastel: <https://www.ahpy.eu>

Alran SAS, tanneur mégissier: <https://www.alran.fr>

Start up Mondin, cuir végétal de luxe: <https://www.mondin.io>

Forecast designer:

Vanessa Causse: <https://www.eurosima.com/orateur/vanessa-causse/>