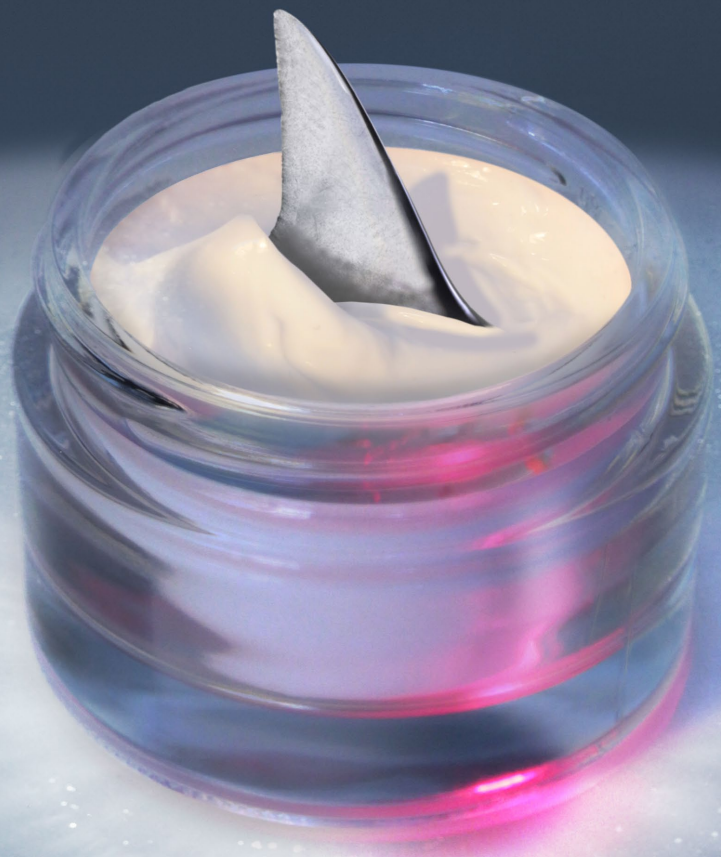
BLOOM

AN EXCLUSIVE STUDY BY BLOOM

March 2015

Beauty and the BEAST

Shark in our beauty creams



Some cosmetic brands still use a substance derived from the liver of sharks in the blends of moisturizing creams.

In 2012, BLOOM carried out a worldwide study on the use of shark squalane, a substance extracted from the livers of sharks, especially deepwater shark species which are especially vulnerable to overfishing and often endangered. The study revealed that the cosmetics sector was the main consumer of animal squalane, even though plant substitutes derived from sugar cane or olive were available. The report pointed to the urgency for corporations to take their environmental responsibility seriously and to modify their supply chain in order to exclusively use plant squalane. Two years later, in 2014, BLOOM proceeded to carry out the largest test ever made on commercial creams to identify the presence of shark squalane in them. In total, BLOOM tested 72 moisturizing creams whose list of ingredients mentioned “squalane”. Labels did not specify whether the squalane was animal-based (shark) or plant-based (olive or sugarcane). Ten creams out of 72 did not contain a sufficient volume of squalane altogether to identify its origin, but results were robust for 62 of the products tested. As a conclusion, one moisturizing cream out of five contains shark squalane. It appears that a high proportion of Asian brands still use shark squalane while Western brands, although still massively concerned by this issue in 2012, have globally shifted away from using shark substances. The fact that Asian brands lag behind with regards to adopting shark-free environmental standards for the composition of their cosmetics products points to the need of raising awareness in Asia on this issue and targeting communication efforts towards the Asian market, which has not been done up to now.

AUTHORS

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ABOUT BLOOM

BLOOM is a non-profit organization founded in 2005 that works to preserve the marine environment and species from unnecessary destruction and to increase social benefits in the fishing sector. BLOOM wages awareness and advocacy campaigns in order to accelerate the adoption of concrete solutions for the oceans, humans and the climate. BLOOM carries out scientific research projects, independent studies and evaluations that highlight crucial and unaddressed issues such as the financing mechanisms of the fishing sector. BLOOM's actions are meant for the general public as well as policy-makers and economic stakeholders. For more information, visit www.bloomassociation.org/en

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SUMMARY

SQUALANE STUDY

Squalane is a purified, odorless and hydrogenated (therefore non-oxidizable) version of "squalene", a lipid found naturally in many animals and plants, as well as in human sebum. It is a moisturizing ingredient that is non-greasy, pleasant to the touch, very soluble and resistant to extreme temperatures. These properties make it a favored ingredient in moisturizing creams, foundations and other cosmetic products.

In 2012, BLOOM published the first-ever assessment of the global squalane market.[1] This analysis revealed that the cosmetics industry was the main consumer of animal squalane. BLOOM estimated that, at the time of the study, the number of deep-sea sharks killed to meet annual international demand for animal squalane was about three million. At the time and because of budget and human resource limitations, the study was only released in French and English and no communication effort targeting Asian consumers, media or brands was undertaken.

Two years later, in 2014, BLOOM tested Western and Asian brands to find out if they had eliminated animal squalane from their supply chain. The objective was to provide a snapshot of changes in the use of shark squalane and plant squalane in cosmetics. 72 creams that listed squalane as one of their ingredients[2] were tested. This is to date the most comprehensive test ever made to identify the presence of shark squalane in cosmetics.

SQUALENE

Discovered in Japan in 1916, the largest quantities of squalene known in nature are found in shark liver oil, hence its name. It was first sought after as a lubricant for aeronautics applications due to its stability under extreme pressure and temperature.

Today, the main industrial use for shark liver oil is in cosmetics (about 90% of the total oil used), nutraceuticals (9%), as well as pharmaceuticals, textiles, and veterinary medicine (about 1%). Squalene can also be extracted from plants and fruits such as sugar cane and olives. However, the highest concentrations are found in the livers of deep-sea sharks (squalene comprises up to 96% of the oil in the liver), which are therefore making them more profitable to exploit.

1 R. Chabrol, 2012. The hideous price of beauty. An investigation into the market of deep-sea shark liver oil. BLOOM Association, Paris (France). 35 p.

2 'Ingredients' refer to the 'list of ingredients available either on the packaging or on the internet'. This list does not specify whether the moisturizing substance commonly used in cosmetics was derived from animals or plants

RESULTS

- 1 out of 5 creams tested contains shark squalane.
- In Europe, 9.4% of the creams (3 out of 32) contain shark squalane. These brands are **Méthode Swiss beauty care** (Switzerland), and **IOMA** and **Topicrem** (France). The Topicrem cream was produced in 2012, but the brand reportedly stopped using squalane in 2013.
- In the United States, 1 out of 14 creams analyzed contains animal squalane. The brand is **Bliss**.
- In Asia, 53% of the creams tested (8 out of 15) contain shark squalane. These brands are **BRTC**, **Cyber colors**, **Just Beyond - Organature**, and **Missha** (South Korea), as well as **Dr. Ci: Labo**, **Haba** and **Menard**
- The latter two creams use pure shark squalane.
- Five creams list 'squalane' in their ingredients, but the proportion of squalane in comparison to other components in the cream is too small to allow an analysis of the squalane and to determine whether it is of plant or animal origin. These brands are **Bergasol** (France), **Etude House** (South Korea), **Crabtree & Evelyn** (United States), **Germaine de Capuccini** (Spain) and **Mediterranea M-BIO** (Italy).
- Traces of shark squalane were detected in five other creams tested but when shark squalane represents less than 20% of the whole squalane (which was the case for these five creams), it is impossible for scientists to affirm that the squalane is indeed of shark origin. In order for the tests to deliver robust, unquestionable results, the shark proportion in the squalane has to be above 20%. These brands are **Boots n°7** and **Clinique** (United States), **DHC** (Japan), **Neogence** (Taiwan) and **Skin Peptoxyl Limited** (South Korea).
- Among the 25 largest worldwide cosmetics brands (2013 ranking), 15 sell at least one moisturizing cream that lists 'squalane' as one of the ingredients. 17 products from these 15 brands were tested here: none of them contains shark squalane.

72 CREAMS WERE SAMPLED

62 GAVE RELIABLE RESULTS

3 GEOGRAPHICAL REGIONS WERE STUDIED: ASIA, EUROPE AND THE UNITED STATES

15 OUT OF THE 25 TOP WORLDWIDE COSMETICS BRANDS WERE TESTED

RESULTS

- In more than 80% of the creams containing shark squalane, the squalane is a blend of plant and shark origin (the shark component often representing more than 50% of the blend).

SHARK SQUALANE IS OFTEN MIXED WITH PLANT SQUALANE

- The prices for all the creams containing shark squalane cover a wide range; the French **Topicrem** brand cream is the second least expensive overall with a sale price of €40/L, while the French **IOMA** brand is among the top 10 most expensive brands, with a price of €2,000/L;
- Three of the five most expensive creams (over €1,000/L) contain shark squalane (the Japanese brand **Haba**, the American brand **Bliss**, and the French brand **IOMA**);
- Out of the five creams for which there is a doubt regarding the presence of shark squalane, **Skin Peptoxyl Limited** is approximately €2,000/L and **Boots n°7** is the most expensive of all the samples, with a price of €7,200/L;
- Shark squalane is found in equal proportions in the least expensive and most expensive creams (compared to the mean purchase price of the creams tested, €844/L).

NO LINK CAN BE MADE BETWEEN THE PRICE OF THE CREAMS AND THE SOURCE OF THE SQUALANE USED

- Some brands list the source of squalane while others do not;
- Some brands use eco-certified products for some of their ingredients and publicly commitment to environmental sustainability but continue to use shark squalane; Others do not use shark squalane but do not communicate about environmental sustainability either;
- Some of the brands, like **Beyond**, employ purposefully misleading marketing by referring to squalane as a 'natural ingredient', allowing them to avoid disclosing the product's origin;
- Other brands practice deceptive advertising. This is the case with the Swiss **Méthode Swiss beauty care**, which uses shark squalane but nonetheless mentions that "*All [their] products draw on the Swiss Alps' richest natural resources*";
- It is possible that some suppliers deceive their clients by selling them a "pure plant squalane" which, in reality, blends in shark squalane (cheaper to produce than plant squalane). However, brands are not exempt from responsibility for the composition of their products since reliable, inexpensive and quick tests have been available since 2010 to verify the type of squalane being sold to them.

THERE IS NO CONSISTENCY IN THE COMPANIES' COMMUNICATION STRATEGIES ON USING PLANT OR ANIMAL SQUALANE

RECOMMENDATIONS

BLOOM's recommendations are as follow :

1. PLANT SQUALANE IS THE ONLY OPTION

Companies should make a formal and definitive commitment to replace their supply of animal squalane with plant squalane and ensure rigorous quality controls by testing the batches of plant squalane they receive.

2. SQUALANE TRACEABILITY SHOULD BE IMPROVED

Listing the origin of squalane ingredients should be made mandatory by product labeling legislations (Council Directive 76/768/CEE for the European Union). Individual brands can start implementing such labeling requirements to match their consumer awareness needs, without further waiting for legal constraints to be adopted.

3. A SEPARATE SHARK SQUALANE CUSTOMS CODE MUST BE CREATED

Shark squalane currently falls under the broad category of “fish oil”. A specific international customs code should be created that would allow to distinguish the following categories:

- olive squalane
- sugarcane squalane
- shark squalane

4. THE USE AND PRODUCTION OF SHARK SQUALANE SHOULD BE BANNED

The production and use of shark squalane drives the extinction of endangered and vulnerable species, it should therefore be prohibited at national and international levels. The World Trade Organization could even take steps to implement such a ban globally.

REVIEW OF THE MAIN CONCLUSIONS FROM THE 2012 BLOOM REPORT

(The Hideous Price of Beauty: an investigation of the deep-sea shark liver oil market)

- Global demand for shark liver oil was estimated in 2012 at 2,000-2,200 tons (a decrease of more than 20% from 2010). About 90% of this is used by the cosmetics sector, 9% by the nutraceutical market and 1% by other industries.
- More than three million deep-sea sharks are estimated to be killed every year to meet the needs of the shark liver oil market. These are vulnerable species, some of which are endangered. These sharks are often a result of specific fisheries targeting them, and not an accidental bycatch.
- In 2012, plant squalane was about 30% more expensive than shark squalane. According to one of our sources, today this difference is not so important any longer. This should facilitate the switch of the cosmetics sector to the use of plant squalane only.
- Spain plays a central role in the shark liver oil industry. The Spanish company Squalop Oil has a monthly production capacity of 80 tons of oil; they provide a quarter of the global supply of shark liver oil.
- The French company Sophim, which is currently the world's top squalene and squalane producer, was the main buyer of shark liver oil in the 1990s and 2000s, along with the Japanese company Kishimoto Special Liver Oils. They have since modified their supply chain and are currently producing plant squalane as well. According to the company, the animal-derived portion of Sophim's production in 2012 was substantially reduced and reserved for the pharmaceutical sector. We have no means to verify these declarations.
- In tropical and subtropical waters, the raw ingredient (squalene) is easier to access in the absence of proper fisheries management schemes and is cheaper to produce as well. Moreover, the concentration of squalene in the livers of the most common species in tropical and subtropical waters is greater than in European waters.
- There is a downward trend in the global supply of shark squalane, partly explained by a recent shift of European industrial fisheries towards the Southern Hemisphere where shark fishing is unregulated, unlike in Europe. This shift may have resulted in a larger supply of oil with higher squalene concentrations. The growing use of plant squalane in the cosmetics sector may also explain the downward trend.
- Most of the production of shark liver oil is currently done in the Indian Ocean, the Southeast Atlantic, and the Western Pacific. The main producers of oil are the Philippines, Indonesia, India, Australia and New Zealand.
- Apart from South Korea, there is no standardized code for the specific trade of shark liver oil. Shark liver oil is generally associated to a global "fish oil" code. Because of this, individual countries do not report oil trade to the FAO, making it exceedingly difficult to assess the global market for shark liver oil.
- The nutraceutical sector uses about 9% of the global supply of shark liver oil. Unlike the cosmetics sector, there has not been a significant effort to substitute plant squalane for animal squalane.
- In the pharmaceutical sector, shark squalene is primarily used as an adjuvant ingredient in vaccines. Laboratories prefer to use shark squalene for its higher purity.

CONTEXT

In 2008, the American NGO OCEANA published a study in which the various commercial uses of sharks were reviewed, including the extraction of liver oil for squalane production. This study revealed that the selective fishing of deep-sea sharks for their liver oil had significant impact on certain species, such as the common Portuguese dogfish (*Centroscymnus coelolepis*) and the leafscale gulper shark (*Centrophorus squamosus*).[3]

That same year, several Western cosmetics brands and manufacturers including Unilever, L'Oréal, Beiersdorf, LVMH, Henkel, Boots, Clarins, Sisley and La Mer (a brand in the Estée Lauder group) made a commitment to replace shark squalane in their products with plant squalane.[4] No similar commitment was made by any Asian cosmetic brand.

Shortly after that, in 2010, reliable laboratory tests to determine the source of squalane were developed (see Methods section). A series of blind tests on 8 creams (from brands widely available on the French market and which can be purchased in pharmacies) revealed that 7 of them contained shark squalane or a mix of shark and plant-derived squalane. These tests suggested that despite their public commitment to stop using it, some of the major brands in the cosmetics sector had not yet removed shark squalane from their production lines.

ENDANGERED SPECIES

The annual demand for squalene is between 1,000-2,000 tons, and the number of sharks required to make one ton of squalene is approximately 3,000. Between three and six million deep-sea sharks (extremely vulnerable due to their slow biological function and late sexual maturity)[a] are captured every year to meet demand! According to the International Union for Nature Conservation, some shark populations have already experienced a decline of nearly 95%.[b] The decline of top predators could have disastrous consequences on marine ecosystems.

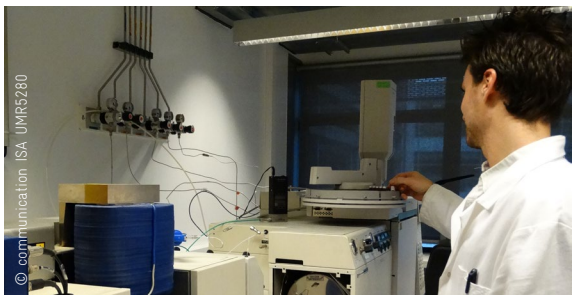
[a] Deep Sea Conservation Coalition, 2011. Save Deep-sea Sharks: Squalane and Trade restrictions. http://savethedeepsea.blogspot.fr/2011/08/save-deep-sea-sharks-squalene-and-trade.html

[b] S. Fordham, S.L. Fowler, R. Coelho, K.J. Goldman & M. Francis, 2006. *Squalus acanthias* (Northeast Atlantic subpopulation). IUCN Red List of endangered species. Version 2014.3. www.iucnredlist.org [retrieved on 22.02.2015]

3 Oceana, 2008. From head to tail: how European nations commercialize shark products. 17 p.

4 Ibid. R. Chabrol, 2012.

CONTEXT



In 2012, BLOOM carried out an analysis which, to date, is the only analysis of the global animal squalane market.[5] This study demonstrates the major role of the cosmetics sector in using shark squalane, highlighting the involvement of many Western brands. Specifically, this study proves that supply and demand for shark squalane is highly elastic and that the fishing industry would respond quickly to market demand. This behavior reveals the industry's selective fishing practices that target deep-sea sharks. The high price of oil derived from the livers of these sharks (between €9,700 and €12,200 per ton) is most likely the driving force behind this type of fishing. In 2012, the demand for shark liver oil decreased to 2,000-2,200 tons, about 90% of which was reserved for the production of squalane by the cosmetics sector.

BLOOM's study, which received significant media attention in 2012, alerts the cosmetics sector to its indirect responsibility for the global collapse of shark populations, especially deep-sea sharks. Following this study, BLOOM reported that cosmetic products would be tested again two years later. In 2014, BLOOM carried out the second phase of the study: performing tests worldwide on a range of cosmetic products listing squalane in their ingredients. These tests were meant to assess whether the cosmetics market had implemented more responsible practices through using plant squalane. The creams were tested by the research group '*Produits Naturels Biosourcés et Isotopes*' (PNBSI) from the *Institut des Sciences Analytiques* (UMR 5280 ISA), using isotopic analysis. ISA is affiliated with CNRS (National Scientific Research Center). With more than 200 scientists and technical staff, it is one of the largest European research centers for analytical science. Its teams work on performing physical and chemical assays, research, training, and production of analysis equipment. Headed by Dr. Hervé Casabianca and his assistant Patrick Jame, the PNBSI research group specializes in analyzing societal issues relating to sources, authenticity, and health impacts of natural products.

5 Ibid. R. Chabrol, 2012.

METHODS

SQUALANE ANALYSIS

In 2010, the isotopic analysis laboratory from the *Service Central d'Analyse* (SCA) was able to determine the source of the squalane by using isotopic measurements of carbon-13 (^{13}C).[6] Before this date, methods were based on searching for impurities specific to sharks or olives. Since shark squalane is purer than plant squalane, it was still much more difficult to observe additives. The measurement of stable organic isotopic ratios of $^{13}C/^{12}C$, $^{15}N/^{14}N$, $^{18}O/^{16}O$ and $H/^{1}H$ is a method widely used in determining the authenticity and source of certain ingredients, e.g. in perfumes and food. It is performed on a device called an isotope-ratio mass spectrometer (IRMS). For our purposes, this device measured the isotope ratio of $^{13}C/^{12}C$ of carbon dioxide (CO_2) obtained through burning the organic material. The measured ratio is compared to a standard, and is expressed in $\partial^{13}C$ (‰), corresponding to the difference in parts per thousand between the sample being: measured and a standard:

$$\partial^{13}C = \left(\frac{\left(\frac{^{13}C}{^{12}C}\right)_{sample}}{\left(\frac{^{13}C}{^{12}C}\right)_{standard}} - 1 \right) \times 1\,000$$

For carbon-13, the international standard is a calcium carbonate called VPDB (Vienna Pee Dee Belemnite). It has a higher $^{13}C/^{12}C$ ratio than most other organic compounds, whether they are natural or synthetic (petrochemical), which explains why measurements of $\partial^{13}C$ are almost always negative. For example, olive trees belong to a group of plants with a Calvin Cycle metabolism (also called "Type C_3" metabolism) and its $\partial^{13}C$ is close to -28‰.[7] By contrast, the $\partial^{13}C$ of squalane derived from sharks is approximately -20‰. This value does not depend on either the location where the shark was captured or its species, and a difference of 8‰ between the two sources of squalane is statistically significant such that the source can be verified. The same holds true for comparisons between squalane derived from shark and sugarcane.

The European cosmetics industry has benefited from the development of this new method to verify the authenticity of ingredients that go into their products. Patrick Jame (from the PNBSI research group) then wanted to go further with these investigations in order to see if it was possible to determine the source of squalane using cosmetic creams rather than raw ingredients.

6 Jame P, Casabianca H, Batteau M, Goetinck P and Salomon V, 2010 Differentiation of the origin of squalene and squalane using stable isotopes ratio analysis. SÖFW Journal 136(1-2): 2-8.

7 As for sugarcane (the second largest source of plant squalane) the isotopic value is close to -10‰.

METHODS

The experiment included two steps:

- Extracting squalane with a column of silicon and hexane as a solvent (additional compounds are extracted then);
- Determining the isotope ratio of $^{13}C/^{12}C$ of the squalane (and therefore its source) using a combination of devices and measurements.[8]

To validate this approach, a series of daytime creams was prepared by the company CRM International, with various proportions of shark and plant squalane (derived from olives). The samples were analyzed using the protocol described above and the results are presented in Table 1.

TABLE 1 Test results for samples prepared by CRM International and analyzed by SCA laboratories

% squalane		$\delta^{13}C$ (‰)	
Olive	**Shark**	**Theoretical**	**Measured**
100	0	-27.8	-27.9
75	25	-25.9	-25.8
62.5	37.5	-25.0	-25.0
50	50	-23.8	-23.4
37.5	62.5	-23.1	-23.0
25	75	-22.2	-22.1
0	100	-20.3	-20.1

The results obtained showed the relevance of the method for validation, with values close to -20‰ for samples made with shark squalane, -28‰ for samples made with olive squalane and intermediary values for blends. The precision of the method (uncertainty at ±0.3 ð) also means that the presence of shark squalane can only be determined with certainty if it makes up at least 20% of the total squalane present in the cream.[9]

SELECTION OF CREAMS TO BE TESTED

Due to the inherent difficulties in performing a random sampling of the global market (e.g. incomplete referencing of the thousands of brands sold globally, inaccurate labeling of products containing squalane, accessibility and cost issues, etc.), the study's sampling was performed using two criteria: the financial value of the brands and their geographic origin.

The first batch of creams was formed using the top 25 cosmetics brands in the world.[10] These influential brands may have a notable impact on the production of shark squalane, and even more so on deep-sea shark fishing. Research in retail outlets and on various online shopping sites[11] found cosmetic creams that list 'squalane' in their ingredients[12] for 15 out of the 25 world brands, and 17 products were eventually analyzed (see Appendix 1).

8 Gas chromatography, combustion interface and isotopic mass spectrometry.

9 P. Jame, H. Casabianca, M. Batteau, P. Goetinck, V. Salomon, 2010. Differentiation of the origin of squalene and squalane using stable isotope ratio analysis. SOFW Journal 136, p2-8.

10 2013 ranking made according to the financial value of the brands as published in: Anon, 2013. Global top 50 brands - 2013. SPC Magazine. Available online at: www.brandfinance.com/knowledge_centre/reports/brandfinance-cosmetics-50-published-in-spc [retrieved on 10 January 2015].

11 Research was performed on the brands' and their retailers' websites, as well as on websites that sort products depending on their ingredients, such as Le Flacon (see www.leflacon.free.fr).

12 These purchases were made directly in-store or online when necessary.

METHODS

Theoretically, shark squalane is used heavily in Asian brands, and because these brands are generally absent from the top 25 brands by volume, it was important that geographic location be included as a criterion in the study. The second batch of creams was gathered according to the geographic origin of the brands, defined by the country where their headquarters were located. Due to the purchase price and difficulties in accessing the products, only the brands from the three largest geographic regions by sales were sampled: Europe, Asia and North America (Figure 1).[13] 55 creams were added to the first batch of cosmetic products sampled, for a total of 72. See Appendix 2 for the full list of creams sampled.

Finally, a questionnaire about the business practice in purchasing plant or animal squalane, supply chain control, and corporate responsibility was sent to each brand of the 72 creams tested (see Appendix 3). With a response rate of less than 10%, the questionnaire did not provide any significant conclusions pertaining to brand's business practices, but insights from responses are covered in the Results and Discussion sections.

13 Europe makes 37% of the sales, Asia 26% and North America 20%. 2008 figures from V.Dermol, N.T.ŠircaandG.Đakovic,2013. Proceedings of the Management, Knowledge and Learning International Conference. Active Citizenship by Knowledge Management and Innovation, Zadar, Croatia. 9p.

METHODS

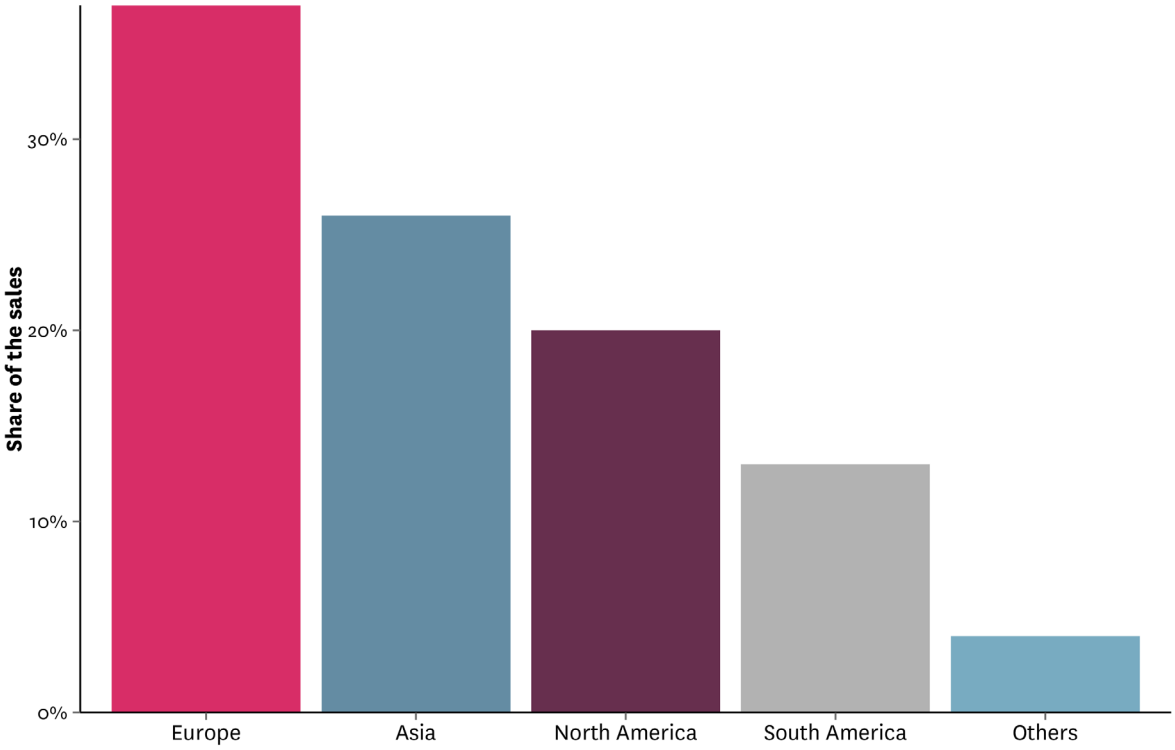


FIGURE 1
PORTION OF SALES ON THE GLOBAL MARKET FOR THE "SKIN CARE" SECTOR IN COSMETICS
Source : Dermol *et al.*, 2013.

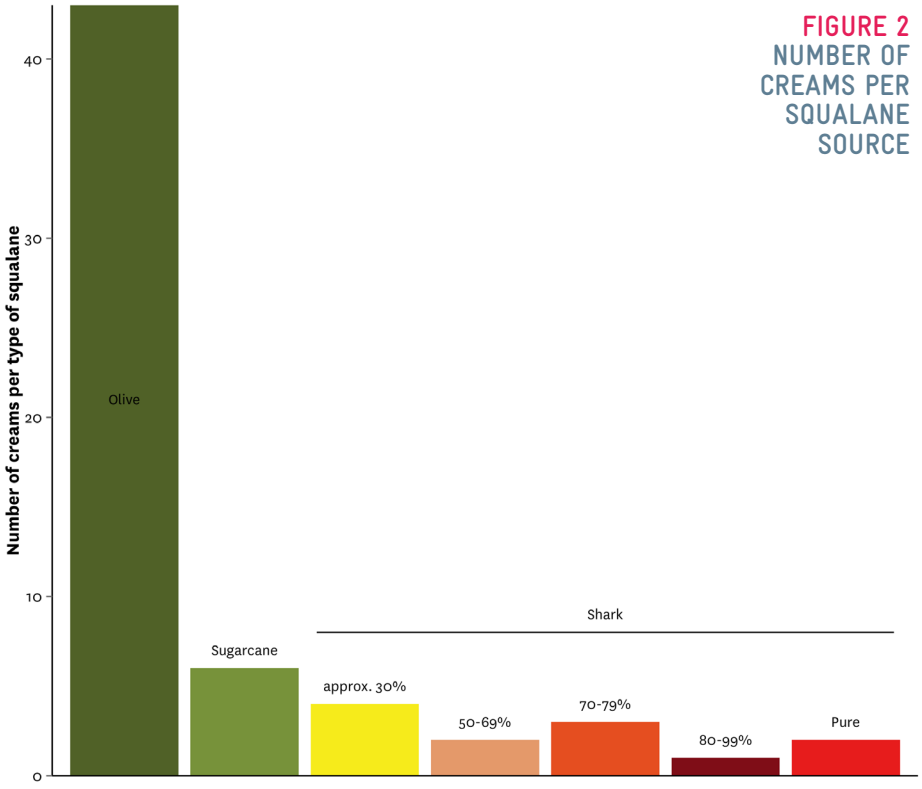
RESULTS

PROPORTIONS OF ANIMAL AND PLANT SQUALANE

Out of the 72 creams tested, 67 contained shark squalane or plant squalane in sufficient quantities to be detected. The uncertainty of the analysis was too high to confirm that the squalane was shark squalane whenever it was present in concentrations below 20% of the total of squalane used in a cream.[14] Out of these 67 creams then, 5 potentially containing shark squalane at concentrations around 10% were excluded from the results (brands: Boots N°7, Clinique, DHC, Neogence and Skin Peptoxyl Limited – see Appendix3). Out of the 62 remaining creams, 12 contained shark squalane (1 cream in 5 or 19.3%). Ten in proportions of 20% to 80% of the total of squalane used in the cream (depending on the brand). Two others had pure shark squalane (100% of the squalane used in the creams). In short, two-thirds of the creams contained shark squalane in concentrations higher than 50% of the total amount of squalane used in each cream (Figure 2).[15]

As for plant squalane, 86% of the creams contained pure olive-based squalane (70.3% of the total number of creams; the rest of the plant squalane came from sugarcane).

FIGURE 2
NUMBER OF CREAMS PER SQUALANE SOURCE



14 See 'Methods' section.

15 The twelve creams containing shark squalane came from France (2 creams out of 19 samples, or 11%), Japan (3 creams out of 7 samples or 43%), South Korea (5 creams out of 7 samples, or 71%), Switzerland (only one sample) and the United States (1 out of 14 samples, or 7%).

RESULTS

BLOOM's analysis showed that squalane in Asian creams is different from that in Western creams and contains more shark squalane (Figure 3).

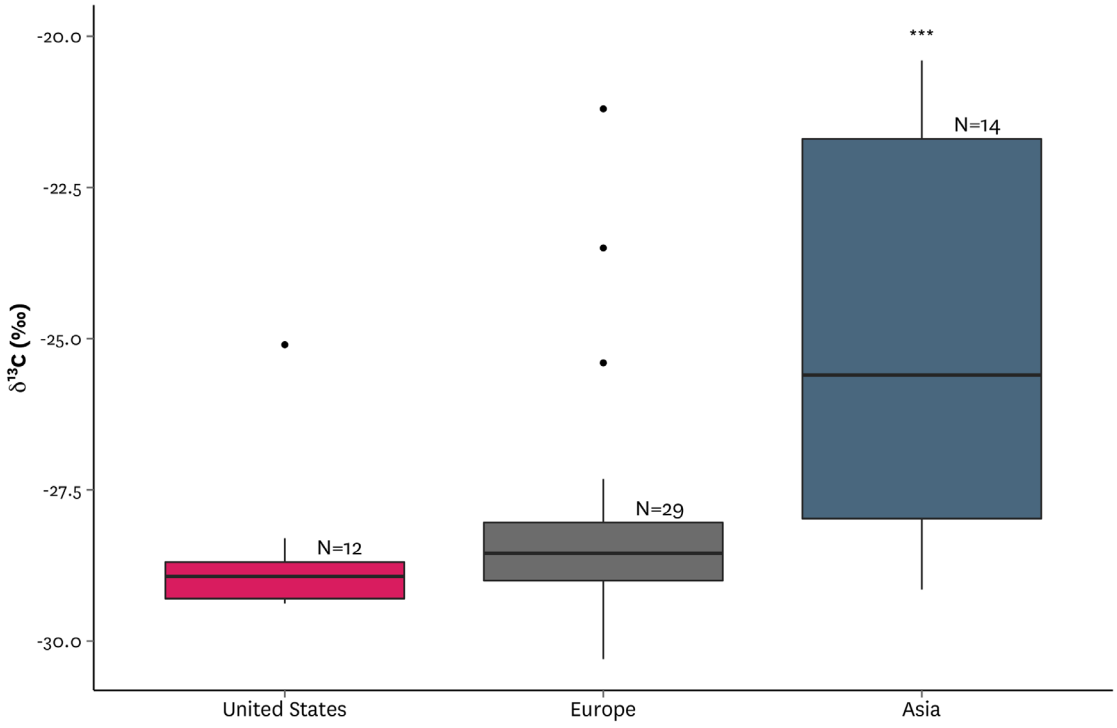


FIGURE 3 STATISTICAL ANALYSIS (ANOVA) OF THE ISOTOPIC ANALYSIS OF THE CREAMS FOR THE THREE MAIN GEOGRAPHIC GROUPS (EXCLUDING BRAZIL)

As sugarcane squalane isotopic ratio is close to -10‰, this figure does not show the seven creams that contain squalane derived from this source (outliers: one cream for Asia, two for the United States and three for Europe). The difference between Asia and the two other regions is statistically significant ($p \approx 2.10^{-4}$).

RESULTS

ANALYSIS BY REGION

In Europe, 9.4% of the creams (3 out of 32) contain squalane with concentrations of shark squalane from 30% to more than 80% (brands: IOMA, Méthode Swiss beauty care and Topicrem; Figure 4). In the United States, only 1 out of 14 samples contained shark squalane (blended squalane with about 30% shark squalane; brand: Bliss). Finally, in Asia, more than half of the creams tested (8 out of 15) contained shark squalane (brands: BRTC, Cyber colors, Dr. Ci: Labo, Haba, Just Beyond – Organature, Menard and Missha), two of which contained 100% shark squalane (the Japanese brands Haba and Menard).

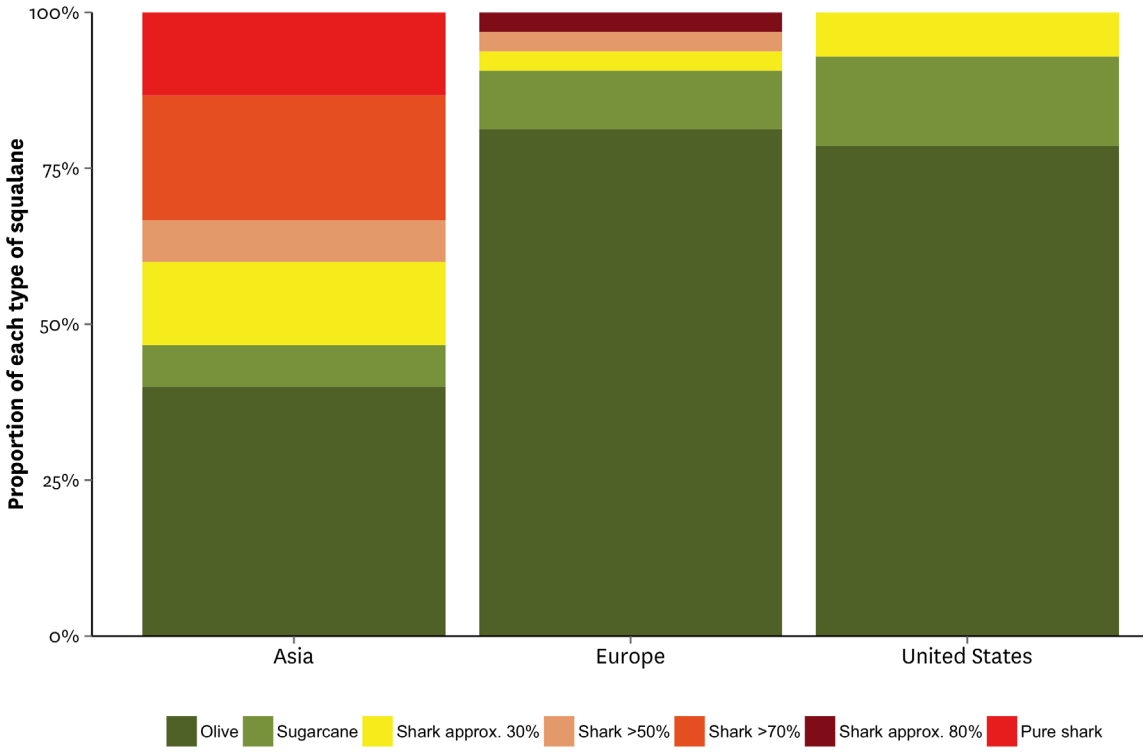


FIGURE 4 PROPORTION OF SHARK, PLANT AND BLENDED SQUALANE PER MAIN GEOGRAPHIC REGIONS ANALYZED

RESULTS

TYPE OF SQUALANE AND CREAM PRICE

The average price of the creams tested here is €844/L (€42/50mL). The least expensive cream costs €39.3/L (brand: Lavera) and the most expensive costs €7,200/L (brand: Boots N°7 – excluded from the study due to concentrations of animal squalane <20%). A comparison of the proportion of animal to plant squalane by the purchase price is presented (Figure 5). This comparison highlights the following elements:

- The prices for creams containing shark squalane cover a wide range; the cream by the brand Topicrem is the second least expensive with a sale price of €39.4/L, while the IOMA brand is among the top 10 most expensive brands, with a price around €2,000/L;
- Three-quarters of the creams (9/12) containing shark squalane are sold at prices below the mean price of the sampled batch. These prices range from €40 to €767/L;
- Two of the 10 most expensive creams contain shark squalane (the American brand Bliss and the French brand IOMA);

Thus, shark squalane and plant squalane are found in all price ranges. Moreover, 20% of the least expensive creams (sold at below-average prices) contain shark squalane and 19% of the most expensive creams (sold at above-average prices) also contain it. **Therefore, no link can be made between the price of the products tested and the source of the squalane used.**

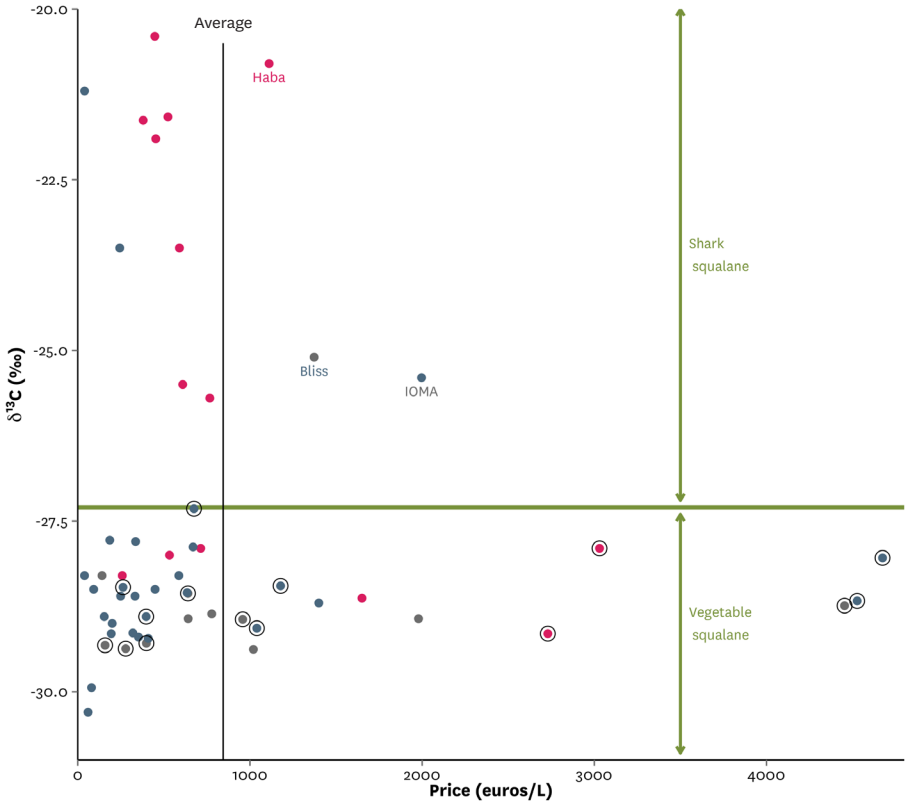


FIGURE 5 ISOTOPE RATIOS FOR CREAMS ANALYZED DEPENDING ON THEIR PRICE

The seven creams containing sugarcane squalane (isotopic ratio close to -10‰) are excluded (outliers). The purity of the shark squalane increases as values approach -20‰ and beyond -27‰, squalane is derived from plants. The points representing the top 25 worldwide brands by volume are circled. The average price for the creams is 844 euros per liter.

● **Asia** ● **USA** ● **Europe**

RESULTS

ANALYSIS OF THE 25 LARGEST BRANDS WORLDWIDE

Fifteen out of the top-25 brands worldwide[16] sell creams listing 'squalane' in their ingredients. Those tested in this study (see Appendix 1) all contain plant squalane. However, additional information from the Shiseido brand,ranked 18th out the top worldwide brands, suggests that caution should be taken. The brand indicated that they had reduced their use of shark squalane by 50% since 2010, but that shark squalane remained a part of the supply chain.[17] However, the two samples tested contain 100% plant squalane. Thus, it is possible that some of the other large worldwide brands also continue to use shark squalane, even though this is not reflected in the study.

COMPANIES' ENVIRONMENTAL AND COMMUNICATION POLICIES

A search of the websites for brands involved in BLOOM's study showed that they differ widely in terms of environmental policies and communication strategies about squalane use in their products. Some of them expressly mention the presence of squalane (both animal and plant based) in the ingredients of their creams. In other cases, the compound is merely listed in the product ingredients. This search also helped to highlight a dichotomy between the environmental objectives announced and the reality of industrial practices.

Where squalane is plant-based, the product information ranged from listing squalane as one of the ingredients (with the brands Clinique and Estée Lauder, for example) to prominent display of the plant source and highlighting of 'eco-responsible' processes on the brand's packaging or on the website (Weleda, The Body Shop, and A-DERMA). Additionally, other brands display strong environmental commitments by implementing eco-responsible and sustainable practices, such as using exclusively vegan formulas (Clarins and Dr. Scheller). However, there is no information about sources of specific ingredients, as is the case with Dior, Lancôme and Garnier.[18]

Where squalane is shark-based, it is rarely explicit: of the brands tested in this study, only Haba states that it "[has] developed an extremely pure squalane (99.9% pure) made from deep-sea shark liver containing a high percentage of squalene" (Figure 6).[19]

16 Anon, 2013. Global top 50 brands. SPC Magazine, April 2013 edition. Ranking made according to the brands' financial value.

17 Private conversation with Shiseido, January 2015.

18 See website of the L'Oréal group http://www.loreal.fr/fournisseurs/notre-politique-dachats-responsables/une-mobilisation-commune-pour-lenvironnement.aspx [page retrieved on 01.10.2014]

19 http://www.habaus.com/products/squalane [page retrieved on 01.10.2014]

RESULTS

Other brands use the fact that shark squalane is by definition a 'natural' ingredient in their marketing. This is the case with the brand Méthode Swiss beauty care, which explains on their homepage that "all [their] products draw on the Swiss Alps' richest natural resources",[20] even though their product Renewal cleansing cream contains squalane composed of more than 50% shark squalane (most likely not from the Swiss Alps). Other brands make environmental sustainability a priority. This is the case with the brands Missha and Topicrem, whose creams tested in this study contain 80%-pure shark squalane and which are developing sustainable development charters.[21] Three other brands state that they have a particularly strong environmental commitment. The brand Just Beyond – Organature, for instance, presents itself as respectful of the environment, with statements like "Beyond is committed for sustainable beauty in consideration to environment" and "[we are] against animal hunting".[22] Yet its product (Eye cream - organic argan oil therapy) was found to contain squalane with a 30% shark-based concentration.

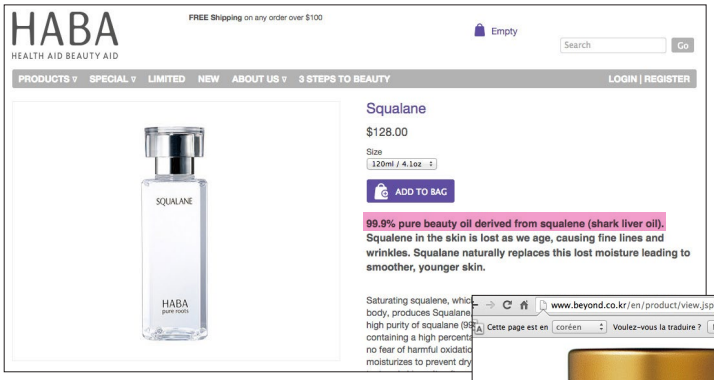


FIGURE 6 HABA SQUALANE CREAM

"99.9% pure beauty oil derived from squalene (shark liver oil)"
Source : http://www.habaus.com/products/squalane

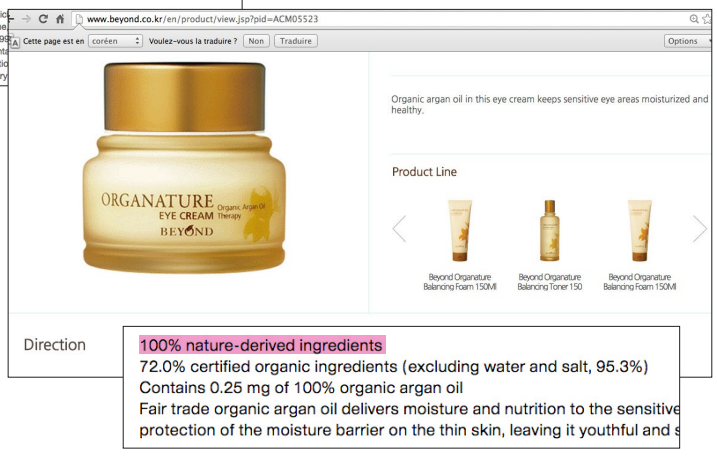


FIGURE 7 JUST BEYOND ORGANATURE, EYE CREAM ORGANIC ARGAN OIL THERAPY CREAM

"100% nature-derived ingredients".
Source : http://www.beyond.co.kr/en/product/view.jsp?pid=ACM05523 [screenshot, 20.03.2015]

20 http://methodeswiss.com/fr/brand.php [page retrieved on 30.09.2014]

21 http://www.misshaus.com/about_us [page retrieved on 01.10.2014], http://www.topicrem.com/fr/laboratoire/nos- engagements.html [page retrieved on 01.10.2014]. Topicrem stopped using shark squalane in 2013 (the cream analyzed here was produced in 2012).

22 http://www.beyond.co.kr/en/beyond/beyond_story.jsp [page retrieved on 01.10.2014]

RESULTS

The brand BRTC indicates that the complexes used "consist of natural plant extracts".[23] On its website, the brand also highlights a certification from the ECOCERT environmental management system, an organization that ensures that no product comes from dead animals.[24] In reality, only some ingredients are certified ("Blue Phyto" complex), and such a presentation on the website may lead to consumer confusion. Indeed, the cream 1st Ampoule BB Cream by the brand in question highlights the use of ECOCERT-certified lavender water, but also contains squalane composed of more than 70% shark squalane.

Finally, out of the other brands whose creams contain shark squalane, 4 of them show no sign of an environmental policy or commitment on their website: Bliss, Cyber colors, Dr. Ci: Labo, and IOMA.[25] It should be noted, however, that the majority shareholder group of the IOMA brand is Unilever, a multinational company with annual revenue of nearly 50 billion dollars, which committed to eliminating the use of shark squalane from its production lines in 2008.[26] Table 2 below shows a summary of the environmental policies of the various brands sampled in BLOOM's study.

23 BRTC products are composed of many patented complexes that consist of ingredients from natural plant extracts. See their online website available at http://www.brtcstore.com/FAQRetrieve.aspx?ID=35993&Q= [retrieved on 18.03.2015]

24 See the ECOCERT website, available at http://www.ecocert.com/cosmetique-ecologique-et-biologique [page retrieved on 01.10.2014] at the BRTC website available at http://www.brtcstore.com/brtcstore-about-brtc.html [retrieved on 18.03.2015]

25 In 2002, DHC (DHC Corporation) was ISO 14001-certified, an international standard of environmental management which the company may voluntarily choose to comply. Blended squalane with about 10% shark squalane was detected in one of its creams. However, this rate is lower than the 20% considered as the minimum acceptable threshold in terms of the analysis' margin of error. This particular case should therefore be subject to further testing in order to verify if DHC has effectively fulfilled the conditions of its environmental certification or not.

26 Oceana, 2008. From head to tail: how European nations commercialise shark products. 17 p.

TABLE 2 The 12 creams containing shark squalane and the environmental policies of their brands

Name of the cream	Brand	Company	Head-quarters	Environnemental policy	Shark squalane (%)
Aqua-Collagen-Gel Enrich-Lift	Dr. Ci: Labo	Dr.Ci:Labo Co.,Ltd.	Japan	Non-existent	≈ 30 %
Eye cream - organic argan oil therapy	Just Beyond Organature	LG Household and Health Care	South Korea	Strong[a]	≈ 30 %
Anti-aging moisture cream	Bliss	Steiner Leiser Limited	United States	Non-existent	≈ 30 %
7 Beauty pro line - Lightening day cream	IOMA	Unilever (-IOMA)	France	Non-existent	≈ 30 %
Renewal cleansing cream	Méthode Swiss beauty care	SP Laboratories	Switzerland	Strong[b]	› 50 %
Cyber C'Kin power white	Cyber Colors	Sasa	South Korea	Non-existent	› 50 %
4in1 Eco-BB cream	Cyber Colors	Sasa	South Korea	Non-existent	› 70 %
Perfect cover BB cream	Missha	Able Cosmetic	South Korea	Strong[c]	› 70 %
The 1st Ampoule BB Cream	BRTC	AMI Cosmetic Co Ltd	South Korea	Strong[d]	› 70 %
Ultra-hydratant Lait Crème	Topicrem	Mayoly Sprindler	France	Strong[e]	› 80 %
Squalane	Haba	Haba Laboratories Inc	Japan	Non-existent	100 %
Herb Mask	Menard	Nippon Menard Cosmetic Co	Japan	Strong[f]	100 %

a The Beyond website highlights values particularly concerned with the environment ("Beyond is committed for sustainable beauty in consideration to environment"). The brand has two lines of products, one whence the cream analyzed here and another resulting from an "eco-beauty" concept. See their website at www.beyond.co.kr/en/beyond/beyond_story.jsp [retrieved on 12.12.2014]

b *"All our products draw on the Swiss Alps' richest natural resources". See the website methodeswiss.com [retrieved on 09.01.2015]*

c "Environmental protection is a great priority [to our company]". See the website at www.misshaus.com [retrieved on 12.12.2014]

d Cream containing both shark squalane and lavender water, an ECOCERT-certified ingredient (a certification system that rejects any use of products that require killing an animal).

e Display clearly on their website that "it is essential for [them] to help respect the environment", and are currently working on implementing a sustainable development charter. See their website at www.topicrem.com/fr/laboratoire/nos-engagements.html [retrieved on 09.01.2015]. Note: Topicrem banned the use of squalane in its products in 2013.

f ISO 14001 certified in 2002. ISO 14001 is an international environmental management standard that certifies that the company is in the process of measurably improving its environmental impact. See the website at www.iso.org [retrieved on 25.02.2015].

DISCUSSION

THE COSMETICS COMPANIES DISTRIBUTED OVER THE THREE REGIONS STUDIED HAVE MADE PREDICTABLE DEVELOPMENTS

The isotopic analysis laboratory of the *Service Central d'Analyse*, headed by Dr. Hervé Casabianca and his assistant Patrick Jame, carried out assays of squalane in 2011. 7 out of the 8 creams tested (all from large brands which are widely available on the French market and which can be purchased in pharmacies) contained shark squalane.[27] BLOOM's new 2015 study shows that today, most of the large Western brands no longer use this compound.

However, the Asian market shows a definite delay in adopting industry alternatives and shark squalane is still an ingredient in many creams. Japan is the world leader in consumption of skin care cosmetic products, with nearly 20% of global sales in 2007,[28] and more than half of the Japanese creams sampled use shark squalane. Asia is making a slower transition to plant squalane than Europe and the United States. A representative from the Shiseido brand (18th in the ranking of the largest brands worldwide in 2013) informed BLOOM in a written interview that Shiseido has reduced its use of animal squalane by 50% since 2010, the date when the first reliable method to determine squalane source became available on the market. A transition to more sustainable practices may therefore be underway, even though this start is largely insufficient to address the urgent vulnerability of deep-sea shark populations. BLOOM hopes that the results of its study performed on a wide range of cosmetics will encourage the Asian market to follow Shiseido's example and modify their supply practices by using existing plant substitutes that are more ecologically sustainable.

SOLUTIONS EXIST FOR BRANDS THAT WISH TO MOVE FORWARD

Alternatives to shark squalane exist (olive and sugarcane squalane), and some brands such as Dr. Scheller and Clarins have been using entirely plant-based formulas for years.[29] One of the reasons plant squalane is 'cut' with shark squalane may be that shark squalane remains less expensive than plant squalane. It is therefore possible that squalane 'cut' with shark is a way for suppliers to increase their profit margin. Source certificates for squalane are not enough to enforce industry standards and the only way for a brand to ensure the quality of plant squalane supplied is to implement source tests. All companies are able to perform these tests, which today are quick, reliable, and easy to implement.[30] Brands no longer have any excuse to justify the presence of animal squalane in their products.

BLOOM recommends all cosmetics brands move forward in careful controls of their supply chains in order to reconcile the production of body care products and protecting the environment.

27 P. Jame, H. Casabianca, M. Batteau, P. Goetinck, S. Guibert, R. Watts, 2011. Determination of squalane origin in commercial cosmetic creams using isotope ratio mass spectrometry. *SOFW Journal* 137, p12-16.

28 Euromonitor International, 2008. Category watch : five trends driving the global skin market. Article available at www.marketresearchworld.net/content/view/2329/77/ [retrieved on 03.03.2015]

29 A questionnaire was sent to all brand companies concerned by the tests. Only eight questionaires were answered, and our tests showed that seven of the eight do not use shark squalane. Two of them (Bioturm and Weleda) have been testing their supply chain for years. Others such as Shiseido have been in the process of reducing their use of animal squalane (not detected in the cream tested in this study) by 50% since 2010.

30 In reality, these tests may be implemented at all levels of the supply chain, i.e. not only by the brands that make and sell the cosmetics, but also by bulk suppliers of ingredients. These bulk suppliers and the producers of the raw materials should also be held accountable for ensuring the quality of their products.

DISCUSSION

INTERNATIONAL REGULATIONS MUST BE TIGHTENED TO PROHIBIT COSMETICS BRANDS FROM USING SHARK SQUALANE

DEVELOP A EUROPEAN DIRECTIVE ON PACKAGING AND LABELING

No international regulations currently exist mandating that brands state on their website, packaging, and labels the presence of shark squalane.

Some brands, such as Chanel and Darphin, give no signs of environmental commitment on their website or any indication as to the origins of their squalane on the packaging of their products. However, it seems that they do not use shark squalane. Other brands use ingredients certified by organizations like ECOCERT (which prohibits the use of products derived from dead animals[31]) while still including animal squalane (BRTC).[32] Other types of environmental certification and enforcement measures exist, such as the 'Controlled Natural Cosmetics'[33] directive (adopted by Lavera) or the Union for Bioethical Trade, an initiative launched in 2007 by the United Nations, of which Weleda is a member. These certification systems are only followed by a portion of the brands, and the potential for fraud makes them dubious. It is difficult for consumers to assess the veracity of a claim without having the means to verify what the products they buy really contain. Therefore, it is crucial that, beyond the efforts made by the brands in terms of transparency, purchasing, and controlling their ingredients, international regulations should intervene in regulating the use of shark squalane and the listing of it as an ingredient in relevant products. A first step may be to amend the European 'Cosmetics Directive' (Council Directive 76/768/CEE) by considering the recommendations formulated herein.

ESTABLISH A SPECIFIC CUSTOMS CODE

Other than South Korea, no nation has an individual customs code for squalane; instead, squalane is usually included in the "fish oils" customs categories. This makes it difficult to monitor and study trends in production and commercial exchanges on the global market of shark squalane. BLOOM recommends that customs agencies develop specific codes for 'Plant Squalane' and 'Shark Squalane' in order to more easily trace the flow of the merchandise.

31 See the ECOCERT website, available at www.ecocert.com/cosmetique-ecologique-et-biologique [retrieved on 02.03.20]

32 The BRTC cream tested contains squalane composed of more than 70% shark squalane as well as ECOCERT-certified lavender water (see Table 2).

33 Directive of the BDIH, an association of companies manufacturing and selling medications and cosmetics based in Mannheim (Germany). Includes criteria such as "resorting to raw ingredients derived from dead vertebrates (e.g. animal fats) is not authorized".

CONCLUSION

Sharks are especially vulnerable to overfishing due to their slow growth, late maturity, and low fertility rate. The total number of sharks killed each year is estimated at one hundred million, with three to six million caught specifically to meet global squalane demand. The decline of top predators like sharks poses a major threat to marine ecosystems. In order to maintain the stability of the oceans as the Earth's most critical biodiversity reserves, BLOOM recommends that governmental and international institutions take steps to improve the traceability of plant and shark squalane, create customs codes for the trade of these materials, and ultimately ban the production and use of shark squalane.

BLOOM calls upon brands that continue to use shark squalane to adopt environmentally sustainable practices by replacing this animal squalane with available plant alternatives. Additionally, brands that are already dedicated to eliminating shark squalane from their products can test their bulk ingredients to ensure quality and consistency. In taking action to make shark squalane use a practice of the past, the private sector has the potential to be a change maker in environmental sustainability and marine biodiversity conservation.

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INSTITUT DES SCIENCES ANALYTIQUES

With the participation from the *Institut des Sciences Analytiques*.

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APPENDIX 1

2013 RANKING OF THE 25 BRANDS OF HIGHEST VALUE ON THE WORLD FINANCIAL MARKET AND CREAMS SAMPLED

2013 ranking	Brand	Financial value ($M)	Headquarters	Cream analyzed	Result
1	Olay	11.71	United States	Advanced age-defying eye roller	Plant (olive) squalane
				Total effects 7 in 1	Plant (sugarcane) squalane
2	L'Oréal	8.70	France	None [a]	-
3	Neutrogena	6.94	United States	Anti-age hand cream	Plant (olive) squalane
4	Nivea	5.84	Germany	FPS15 skin protecting fluid	Plant (olive) squalane
5	Lancôme	5.51	France	Nutrix Royal	Plant (olive) squalane
6	Avon	5.17	United States	No squalane [b]	-
7	Dove	4.24	United Kingdom	No squalane [b]	-
8	Estée Lauder	3.87	United States	Rehydrating triple cream masque	Plant (olive) squalane
9	Biore	3.38	Japan	No squalane [b]	-
10	Christian Dior	2.95	France	Baume onctueux pro-jeunesse	Plant (olive) squalane
11	Pantene	2.91	United States	No squalane [b]	-
12	Chanel	2.81	France	Le Lift	Plant (olive) squalane
13	Aveeno	2.79	United States	Restructuring positively ageless	Plant (olive) squalane
14	Garnier	2.63	France	BB crème	Plant (olive) squalane
15	Schwarzkopf	2.42	Germany	No squalane [b]	-
16	Maybelline	2.40	United States	Dream matte mousse	Plant (olive) squalane
17	Clarins	2.37	France	Sérum Multi-Réparateur Restructurant	Plant (olive) squalane
18	Shiseido	2.20	Japan	Benefiance Wrinkle Resist 24	Plant (olive) squalane
				Future solution total revitalizing cream	
19	Clean&Clear	2.20	United States	No squalane [b]	-
20	Natura	1.85	Brazil	Chronos 45+	Plant (olive) squalane
21	L'Occitane	1.70	Luxembourg	Crème de beauté sublime	Plant (olive) squalane
22	Johnson's	1.51	United States	No squalane [c]	-
23	Lux	1.50	United States	No squalane [d]	-
24	M.A.C	1.38	United States	Studio Moisture Cream	Plant (olive) squalane
25	Kérastase	1.36	France	No squalane [b]	-

[a] No cream of the brand L'Oréal itself but many brands in the L'Oréal *group* have been tested: Garnier, Kiehl's Lancôme, Maybelline, La Roche-Posay, Roger&Gallet and The Body Shop.
[b] No squalane listed in the ingredients of skin creams (makeup products are not included in this study).
[c] Do not confuse the *brand* Johnson's with brands in the parent *group* Johnson&Johnson (e.g., Neutrogena, Aveeno).
[d] A cosmetic cream sold by Lux (Indie Lee brand) clearly displays the use of squalane, but there does not seem to exist a product from the Lux *brand*.

APPENDIX 2

FULL LIST OF CREAMS ANALYZED (72)

Brand	Name of the cream sampled	Headquarters (parent company)	Squalane source
A-DERMA	Crème Epitheliale A.H à l'avoine rhealba	France	Olive
Avalon Organics	Wrinkle defense serum	United States	Olive
Aveeno	Restructuring positively ageless	United States	Olive
Beauté Pacifique	Crème soyeuse hydratante toutes peaux	Denmark	Olive
Bergasol	Lait solaire SPF 6 corps et visage	France	Quantity of squalane too low to be analyzed
Bioderma	Crème nourrissante dermo-breveté	France	Sugarcane
Bioturm	Creme neutral für besonders empfindliche Haut	Germany	Olive
Bliss	Anti-aging moisture cream	United States	**Shark, ≈ 30%**
Boots N°7	Instant radiance concealer	United States	Uncertain*
BRTC	The 1st Ampoule BB Cream	South Korea	**Shark, >70%**
Caudalie	Crème velours ultra-nourrissante	France	Olive
Chanel	Le Lift	France	Olive
Clarins	Sérum Multi-Réparateur Restructurant	France	Olive
Clinique	Moisture surge CC cream	United States	Olive
Clinique	Age defense BB cream	United States	Uncertain*
Cover FX	Cream Concealer	United States	Olive
Crabtree & Evelyn	Gardeners Hand Therapy	United States	Quantity of squalane too low to be analyzed
Cyber Colors	4 in 1 Eco - BB cream	South Korea	**Shark >70%**
Cyber Colors	Cyber C'Kin power white	South Korea	**Shark >50%**
Darphin	Soin des yeux	France	Olive
DHC	Acerola Cream	Japan	Uncertain*
Dior	Baume onctueux pro-jeunesse	France	Olive
Dr Scheller	Black currant & marula refreshing moisture care night	Germany	Olive
Dr. Ci: Labo	Aqua-Collagen-Gel Enrich-Lift	Japan	**Shark, ≈ 30%**
Dr.G - Gowoonsesang Cosmetics	Instant Face Rescue	South Korea	Olive
Eau thermale Avène	Tolérance extrême crème hydratante apaisante	France	Olive
Estée Lauder	Triple crème Masque réhydratant	United States	Olive
Etude House	Precious make up Essence Mineral	South Korea	Quantity of squalane too low to be analyzed
For Beloved One	Melasleep Whitening White Truffle	Taiwan	Olive
Garnier	BB crème	France	Olive
Germaine de Capuccini	Hydracure	Spain	Quantity of squalane too low to be analyzed
Haba	Squalane	Japon	**Shark 100%**
IOMA	7 Beauty pro lin crème éclaircissante jour	France	**Shark, ≈ 30%**

* The quantity of shark squalane detected is lower than the minimum threshold of validation of the results, which is 20%. Therefore, it is not possible to confirm the source of the squalane contained in this cream.

APPENDIX 2
FULL LIST OF CREAMS ANALYZED (72)

Juhldal	PSO Specialcreme n°14	Denmark	Olive
Just Beyond - Organature	Eye cream - organic argan oil therapy	South Korea	**Shark, ≈ 30%**
Kiehl's	Cryste marine ultra riche	United States	Olive
Kosé	Medicated Sekkisei Emulsion	Japan	Olive
L'Occitane en Provence	Crème de beauté sublime	Luxembourg	Olive
La Roche-Posay	Toleriane riche	France	Olive
Lancôme	Nutrix Royal	France	Olive
Lavera	Honey moments body lotion	Germany	Olive
MAC	Studio Moisture Cream	United States	Olive
Matas - Plaisir	3in1 serum	Denmark	Olive
Maybelline	Dream matte mousse	United States	Olive
Mediterranea M-BIO	Crema Viso Antiage	Italy	Quantity of squalane too low to be analyzed
Menard	Herb Mask	Japan	**Shark 100%**
Méthode Swiss beauty care	Renewal cleansing cream	Switzerland	**Shark >50%**
Missha	Perfect cover BB cream	South Korea	**Shark >70%**
Natura	Chronos 45+	Brazil	Sugarcane
Neogence	Hyaluronic Acid deeply moisturizing cream	Taiwan	Uncertain*
Neutrogena	Crème mains anti-âge	United States	Olive
Nivea	Fluide perfecteur de peau FPS15	Germany	Olive
Olay	Advanced age-defying eye roller	United States	Olive
Olay	Total effects 7 in 1	United States	Sugarcane
Peter Thomas Roth for Sephora	Oiless Oil 100% purified squalane	France	Sugarcane
Philosophy - Hope	Hope in a jar oil-free	United States	Sugarcane
Piubi	Siero viso al latte di bufala	Italy	Sugarcane
Roger & Gallet	Fleur d'Osmanthus	France	Olive
Sebamed	Anti-ageing Q10 protection cream	Germany	Olive
Sephora	Skin perfect CC cream	France	Olive
Shiseido	Benefiance Wrinkle Resist 24	Japan	Olive
Shiseido	Future solution total revitalizing cream	Japan	Olive
Simple	Kind ti skin vital vitamin night cream	United Kingdom	Olive
SK II	Facial Treatment Massage Cream	Japan	Olive
Skin	Skin anti-aging hand cream	United Kingdom	Olive
Skin Peptoxyl Limited	Hydra Boosting Complex 100% Squalane oil	South Korea	Uncertain*
Sonia Olivieri	Crema antiacne	Italy	Olive
Stiefel	Physiogel hypoallergenic	United States	Olive
The Body Shop	Aloe soothing night cream	United Kingdom	Olive
Tony Molly	Tomato Box	South Korea	Sugarcane
Topicrem	Ultra-hydratant Lait Crème	France	**Shark >80%**
Weleda	Weisse Malve Pflegelotion	Germany	Olive

* The quantity of shark squalane detected is lower than the minimum threshold of validation of the results, which is 20%. Therefore, it is not possible to confirm the source of the squalane contained in this cream.

APPENDIX 3

CREAMS IN WHICH THE QUANTITY OF SQUALANE IS TOO LOW TO BE ANALYZED

Brand	Headquarters	Cosmetic cream analyzed
Bergasol	France	Lait solaire SPF 6 corps et visage
Crabtree & Evelyn	United States	Gardeners Hand Therapy
Etude House	South Korea	Precious make up Essence Mineral
Germaine de Capuccini	Spain	Hydracure
Mediterranea M-BIO	Italy	Crema Viso Antiage

CREAMS WITH SQUALANE CONTAINING AROUND 10% SHARK SQUALANE (I.E. UNDER THE MINIMUM THRESHOLD OF CERTAINTY OF 20%)

Brand	Headquarters	Cosmetic cream analyzed
Boots n°7	United States	Instant radiance concealer
Clinique	United States	Age defense BB cream
DHC	Japan	Acerola Cream
Neogence	Taiwan	Hyaluronic Acid deeply moisturizing cream
Skin Peptoxyl Limited	South Korea	Hydra Boosting Complex 100% Squalane oil

APPENDIX 4

QUESTIONNAIRE SENT TO THE COMPANIES (ENGLISH VERSION)

USE OF SQUALANE IN THE COSMETICS INDUSTRY

The information you provide is essential to our study. Please answer accurately.

INFORMATIONS

Name of the group or company you represent:
Which of your brands are involved the use of plant or animal squalane?

1. USE OF ANIMAL SQUALANE IN PRODUCTS

1.1 Does one or do several of the products or brands of your company contain shark squalane?
☐ YES ☐ NO

1.2 If so, can you specify which product(s) and/or which brand(s)?
1.3 Did one or several of your products or brands use to contain animal squalane but no longer do?
☐ YES ☐ NO

1.4 If so, can you specify which product(s) and/or brand(s)?
1.5 If so, can you specify when these changes occurred and why? i.e. what drove this decision: e.g. prices, considerations relating to Corporate Social Responsibility, change in formula, etc.)

2. SUPPLY CHAIN (IF YOUR COMPANY USES NEITHER ANIMAL NOR PLANT SQUALANE IN ITS PRODUCTS, PLEASE SKIP DIRECTLY TO THE END OF THE QUESTIONNAIRE)

2.1 Does your company have one or several suppliers of squalane? Could you mention it or them below?
2.2 From which country or countries does your supplier/do your suppliers purchase their raw ingredient?
2.3 At what price (per kilo or per ton, for example) does your company purchase animal squalane? plant squalane?
2.4 Per year, how much squalane does your company purchase?

APPENDIX 4
QUESTIONNAIRE SENT TO THE COMPANIES (ENGLISH VERSION)

3. TRACEABILITY OF PLANT AND ANIMAL SQUALANE

(If your company uses no form of squalane it its products, please skip directly to the end of the questionnaire)

3.1 Has your company implemented a traceability system for the sources of the squalane purchased?

☐ YES ☐ NO

3.2 If so, when was it implemented?

3.3 If so, what does it consist of? (sampling method, percentage of the total volume tested, etc.)

4. CORPORATE SOCIAL RESPONSIBILITY (CSR)

4.1 Does your company have a CSR policy?

☐ YES ☐ NO

4.2 If so, is it public?

☐ YES ☐ NO

4.3 Does your company have specific internal directives for purchasing squalane? If so, since when?

4.4 Would your company be able to share these directives with BLOOM?

☐ YES ☐ NO

5. CONTACT

LAST and first name:

Position in the company:

Email:

Telephone: