



# What's Lurking in Your Makeup?

## Effects of Bacterial Colonization in Cosmetics on the Skin

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### Abstract

Once we had been granted permission to move forward with our research project, we began working on our project by collecting different samples of makeup and beginning our tests to identify if there were any viable bacterial microorganisms in the make up samples. The purpose of our project was to find out what, if any, types of bacterial microorganisms grew on makeup. We believe that because the different skin types (Oily, Oily-Dry Combination, and Dry) contain diverse properties, it can effect the make up once it has been applied by allowing bacteria to thrive on it. We also believe that if bacteria does grow on make up, that could be a contributing factor as to why the skin may have mutations (such as acne or rosacea) apparent in the physical features of it.

### Questions → Thesis/Hypothesis

**Question-** Does any sort of bacteria grow on cosmetic products?

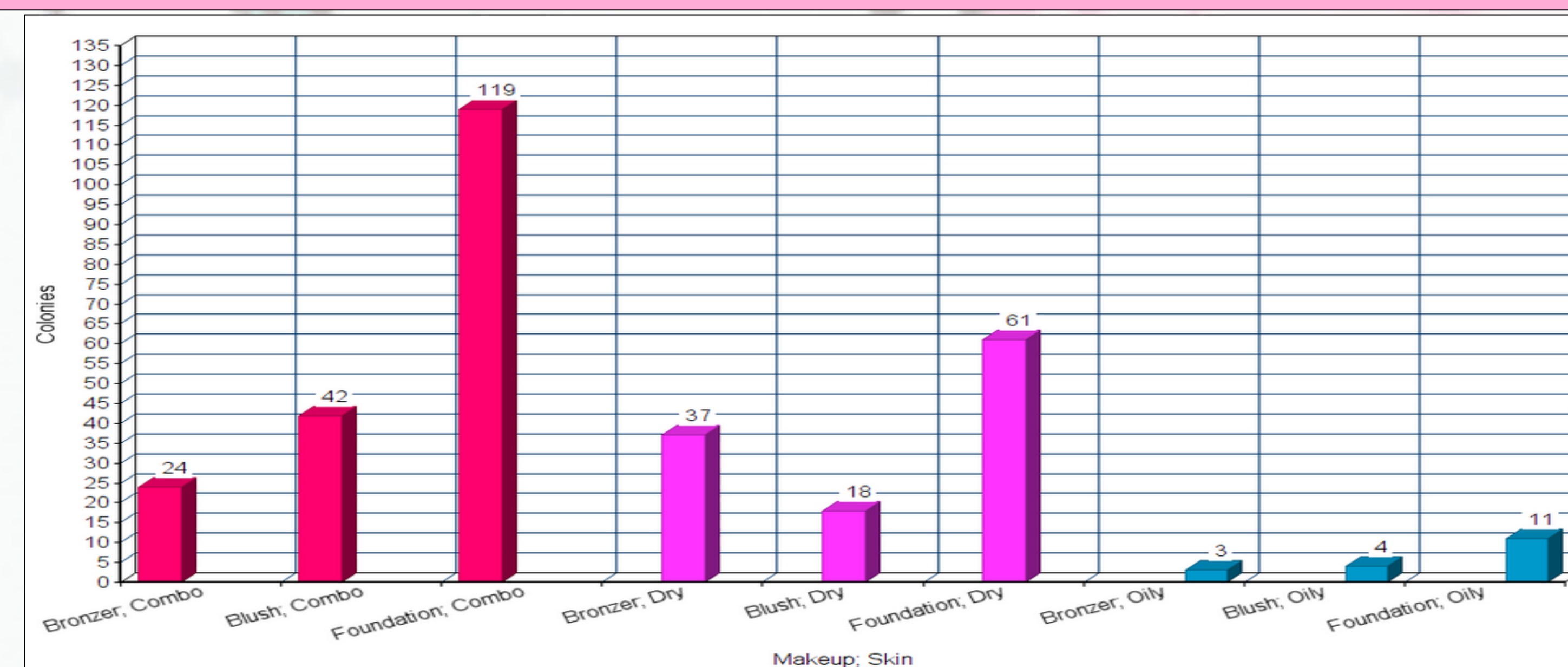
**Thesis-** Because makeup has properties based on certain skin types, those features could cause bacteria to grow on the cosmetic product

**Question-** Does the type of skin have an influence on the species of bacteria that may grow on makeup?

**Hypothesis-** Bacteria present in used makeup can cause problems with the skin

### Materials and Methods

After gathering the makeup samples, we streaked the cosmetics with a sterile swab and saline onto trypticase soy agar plates with 5% sheep's blood (BAP) We placed the plates into a 37° Fresh Incubator for 24 hours. After the 24 hours were up, we gathered the plates and counted the colonies that grew. Once the colonies were counted and accounted for, we isolated different colonies, each based on different criteria (color, size, shape, form) onto sterile BAP plates and incubated them for 24 hours. Once the isolated colonies grew, we performed a series of identification tests. The gram stain was performed first in order to identify the staining characteristics of the different bacterial colonies. Once the results were categorized between gram positive (purple) and gram negative (pink) species we performed a catalase test, a coagulase test, and a latex agglutination test in order to speciate *Staphylococcus aureus* and *Staphylococcus epidermidis*. For gram negative bacilli we used biochemical identification tests to speciate such as triple sugar iron test, indole, oxidase, and motility. We gathered the test results and coordinated the them with known test results of bacteria in order to identify the species.

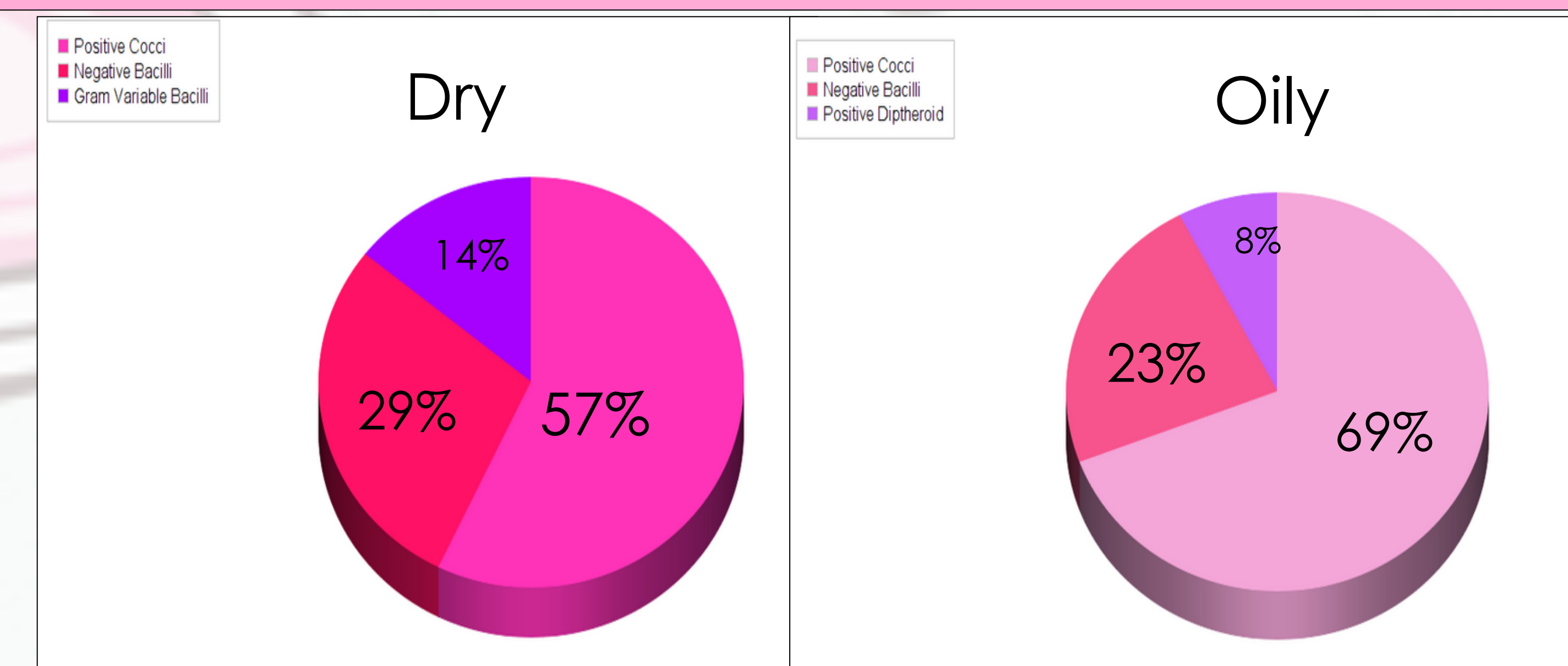


**Figure 1: Bacterial Colony Growth Between Makeup Types-** Based on the results presented in the graph, we are led to believe that there is a pattern between the oily samples and the dry samples in comparison to the colony growth.

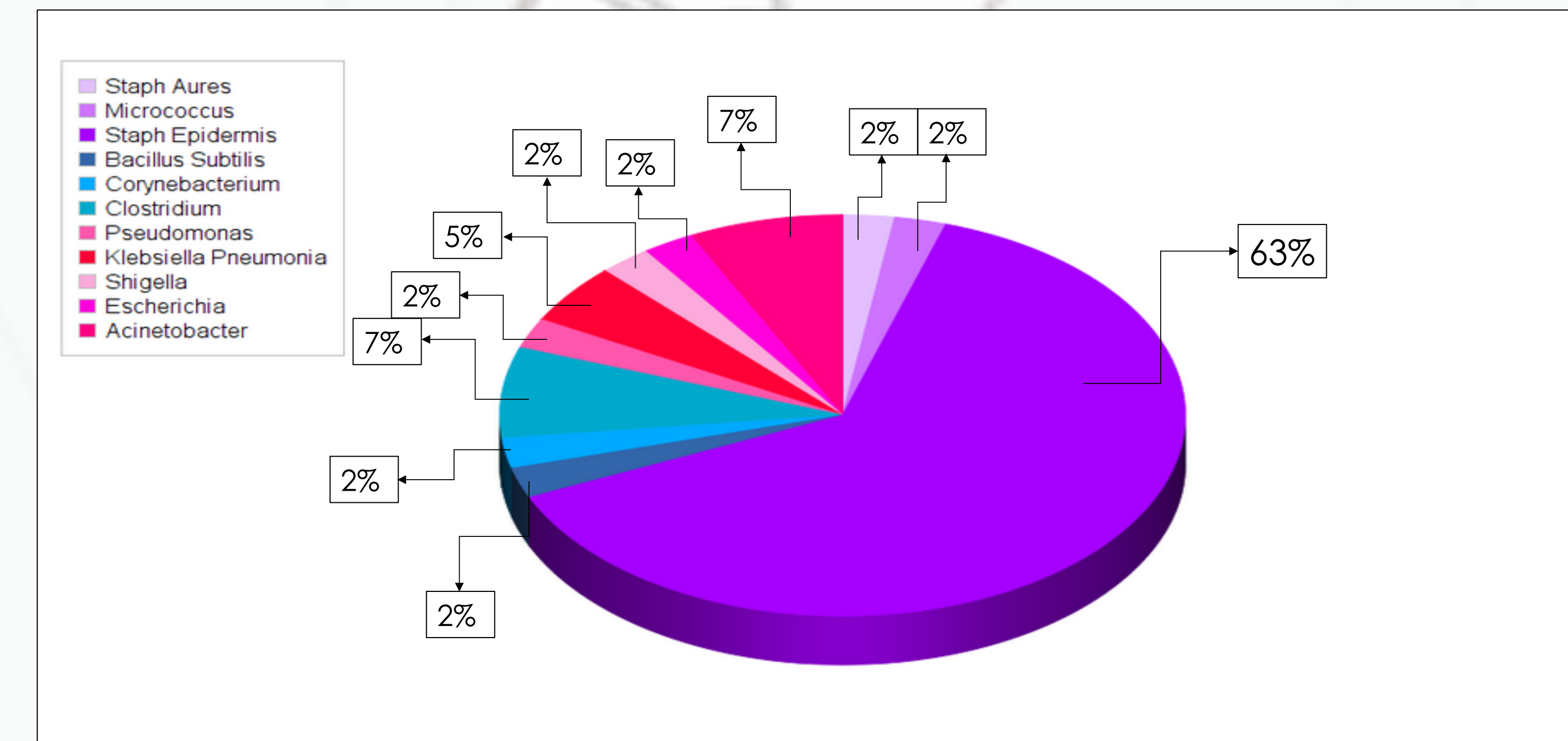
Plate #	Isolate	Gram Staining	Catalase	Oxidase	Indole	TSI	Motility
2	4	Negative Bacillus	Positive	Positive	Negative	K/K	Postitive
3	4	Negative Bacillus	Positive	Negative	Negative	A/A	Negative
4	2	Negative Bacillus	Positive	Negative	Negative	A/K	Negative
11	1	Negative Bacillus	Positive	Negative	Negative	A/A	Postitive
13	2	Negative Bacillus	Positive	Negative	Negative	A/A	Negative
14	1	Negative Bacillus	Negative	Positive	Negative	K/K	Negative
14	2	Negative Bacillus	Negative	Positive	Negative	K/K	Negative
14	3	Negative Bacillus	Negative	Positive	Negative	K/K	Negative
14	4	Negative Bacillus	Negative	Positive	Negative	K/K	Negative
16	4	Negative Bacillus	Positive	Positive	Negative	K/K	Negative
17	1	Negative Bacillus	Positive	Positive	Negative	K/K	Negative
18	1	Negative Bacillus	Positive	Negative	Negative	K/K	Negative
		Catalase	Positive				
4	1	Positive Bacillus	Positive	Motility			
13	1	Positive Bacillus	Positive				
13	4	Positive Bacillus	Negative				
19	1	Positive Diptheroid	Positive				
		Catalase	Latex	Coagulation			
1	2	Positive Cocci (Micrococcus)	Positive	Negative	Negative		
8	1	Postivie Cocci	Negative	Positive	Positive		
16	1	Gram Variable	Positive	Negative	Negative		

**Figure 3: Atypical Biochemical Tests-** Different biochemical tests were performed to identify the various types of bacteria that grew from the isolated plates. The known properties of forms of bacteria can be compared to the results we obtained.

### Results



**Figure 2: Dry vs. Oily Gram Stain Pie Charts-** We determined that the percentage of the dry skin makeup versus the oily skin makeup was made up of mostly (Coagulase Negative) Staph Epidermis, and a few other A list Bacterial Species.



**Figure 4: Classification of Bacterial Species-** After conducting the various identification tests (stated in the materials and methods) we were able to compare results we collected from the data, and compare them to the properties of different forms of bacteria.

### Conclusion

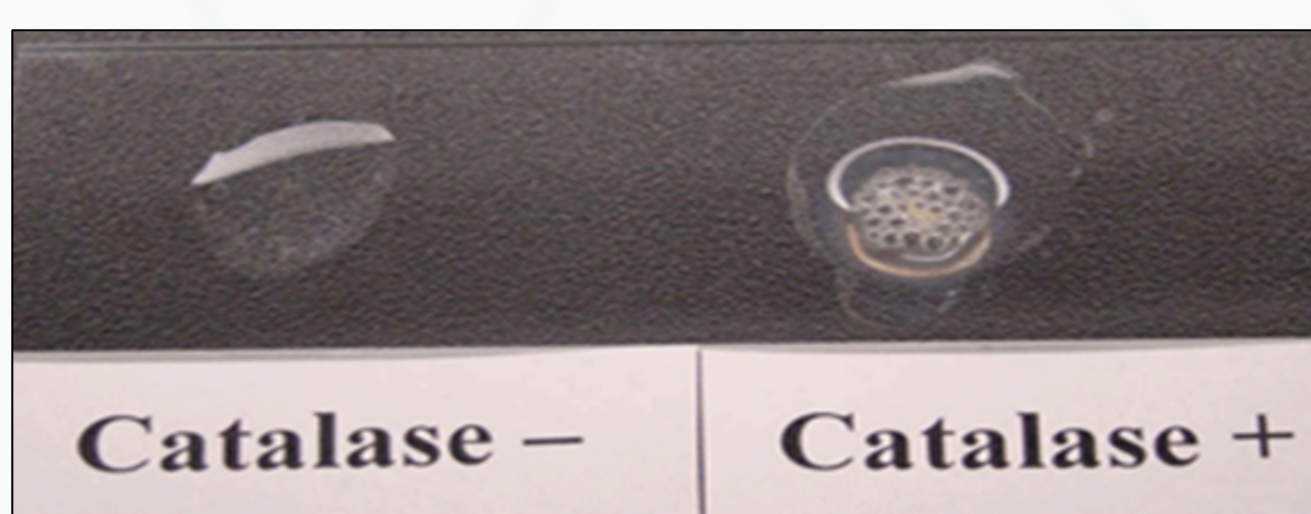
- Based on the data we've collected, we can concur that it's not the makeup causing the bacterial growth, it is the skin type that can cause the bacterial growth.
- Although we did not gather enough samples (due to the time constraint) we've reached a point in our research where the data leads us to believe that the oils in the skin act as a barrier and as a defense against harsh chemical reactions that makeup can cause. Due to the lack of oils in dry skin, it caused the bacteria to grow more.
- For future directions, this research could be furthered and continued with more trials and testing, but even furthermore, if our conclusion is correct, perhaps a medicinal treatment could be created to be applied to the makeup to prevent bacteria from growing.

### Acknowledgements

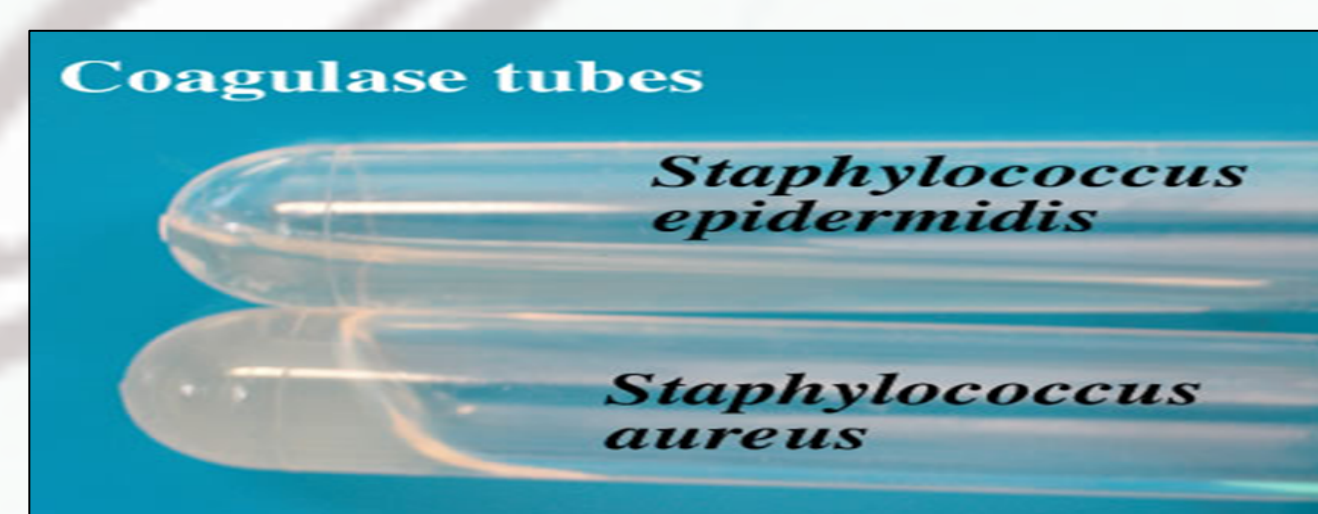
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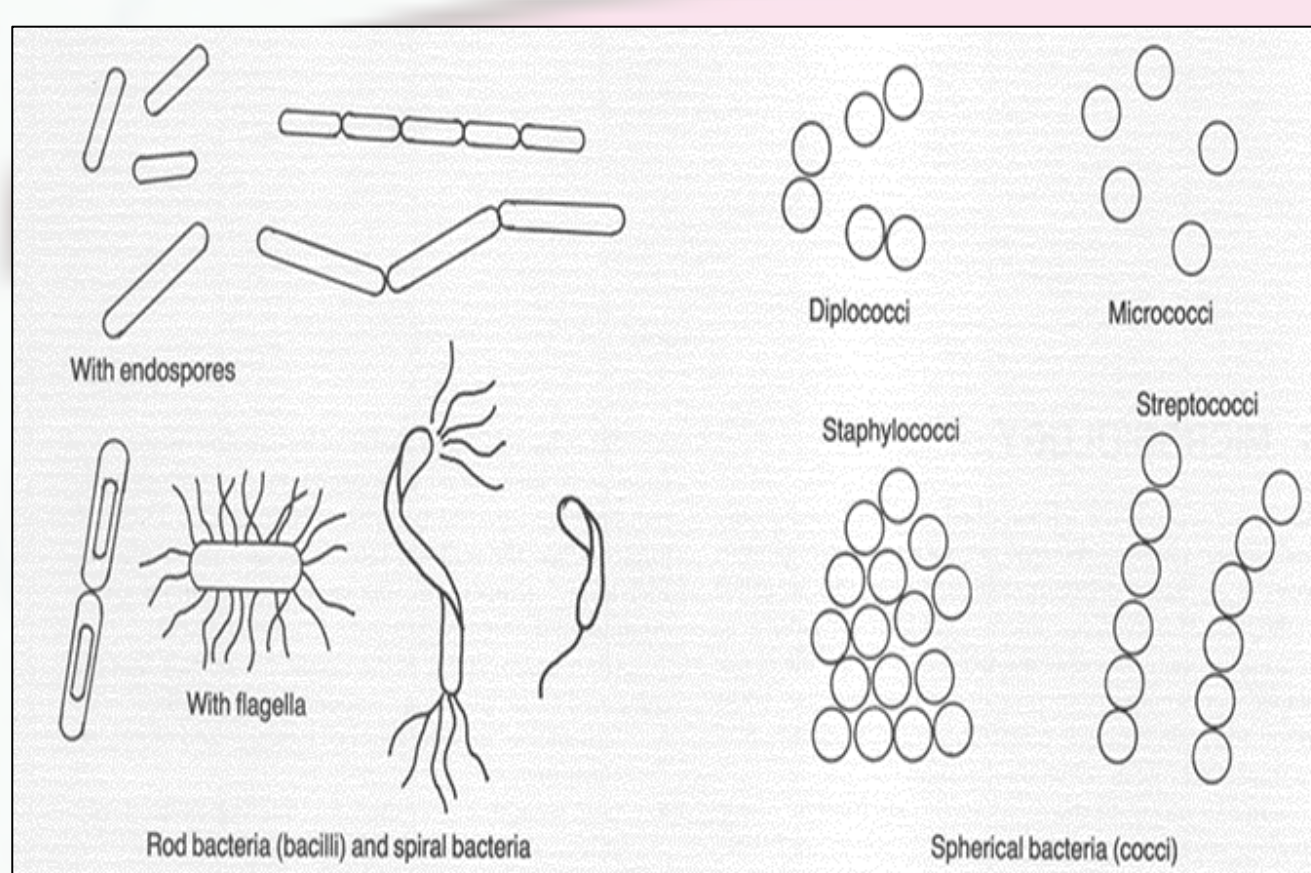
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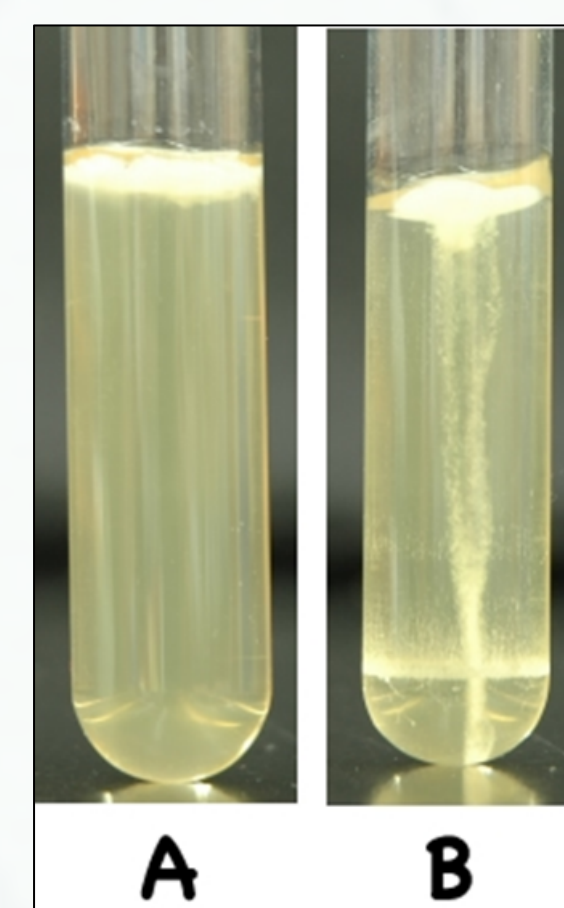
Catalase Test Visual Results - <http://microbeonline.com/wp-content/uploads/2013/10/catase-test.jpg>



Coagulase Test Result Examples- [http://www.uwyo.edu/molb2210\\_lab/images/coagulase1.jpg](http://www.uwyo.edu/molb2210_lab/images/coagulase1.jpg)



Gram Stain Bacterial Figures-[http://www.itri.org/InfoServ/Webpub/fulldocs/ilca\\_manual4/images/FIG%207%20P16.gif](http://www.itri.org/InfoServ/Webpub/fulldocs/ilca_manual4/images/FIG%207%20P16.gif)



Motility Test Result Examples- <http://blogberlinmd.com/phototri/motility-of-bacteria>