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Feasible Bid of Bacteria Collected from Human Hands for the Decolorization of Textile Dyes

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Description

We were able to obtain bacteria that decolorize dye from common hands with an efficiency of approximately $40_{\%}$. The bacteria were divided into azo dye-decolorizing and anthraquinone dye-decolorizing groups. The first was able to remove all of the color from actual textile wastewater, while the second could only remove some of it. These bacterial strains could possibly be used to evaluate the primary dyes found in textile wastewater and dye-polluted rivers. The azo dye-decolorizing strain separated Congo red into its intermediates, and then phenyl compounds were further broken down. It is intriguing to take note of that the color decolorization rate was corresponded with the huge measure of protein created by the azo color decolorizing bacterial strain, which went from 20 to 60 mg L-1. Additionally, we discovered that cell density has the greatest impact on the stabilization of the dye-decolorization reaction. Taking everything into account, microorganisms that can be utilized to treat material wastewater and remediate destinations of ecological contamination can be gathered effectively from human hands. The textile and dyeing industries' wastewater is a global cause of water pollution. After conventional biological wastewater treatment, dye contaminants in wastewater persist in treated water. The presence of residual dyes in the wastewater treatment process's effluent typically results in a vivid color, which is not surprising. Some dyes and the products of their degradation are known to be carcinogenic in addition to their color. After wastewater discharge from a dye house was stopped, it took textile dyes at least three years to degrade in river sediment, according to our previous research. To lessen the impact on water environments, dye-containing wastewater must therefore be decolored [1].

A promising technology is biological dye–decolorization treatment, which is less expensive than conventional coagulation–flocculation and produces less sludge. Albeit numerous microbes can decolorize colors, appropriate strains for modern applications should be gotten. Dye-decolorizing bacteria have been identified and isolated from sludge from textile wastewater treatment plants, textile effluent-contaminated soils, lake mud from sewage treatment plants, and petrochemical industrial wastewater treatment plants, according to numerous studies. In addition, a few microbes possessing human skin have likewise been accounted for to use azo colors. Rather than soil, sludge, or wastewater, bacteria can be isolated more safely and easily from human skin. Additionally, cultivating commensal bacteria on human skin is much simpler. Dye-decolorizing bacteria that can effectively treat textile wastewater can be found by focusing on individuals of a variety of backgrounds, occupations, and ages. However, there has not yet been any investigation into the capacity of bacteria on human skin to discolor dyes [2].

Human hands were the focus of this study because they are the most common place for dye-decolorizing bacteria to be collected. We looked into the characteristics of these bacteria, including their phylogeny based on the 16S rRNA gene sequence and their specificity to a kind of dye and real textile wastewater. The most efficient bacteria's dye concentration, cell density, and protein production were all correlated with the dye-decolorization rate, according to the findings. These results shed light on the availability and suitability of bacteria found on human hands for the decolorization of textile dyes.

Nine high school students were the source of the bacteria. Every understudy contacted two Luria-Bertani (LB) agar plates by squeezing every one of their fingertips. For several days, the agar plates were incubated at 25°C (room temperature). From the incubated agar plates, 45 bacterial colonies were selected at random, transferred to fresh plates, and stored in the refrigerator until further use [3].

Three azo colors (Congo red, corrosive red 114, and corrosive orange 7) and three anthraquinone colors (alizarin red S, atomic quick red, and carmine) were utilized to evaluate the color decolorization movement. Wako Pure Chemical Corporation, which is based in Osaka, Japan, supplied the Congo red and alizarin red S. Carmine, acid red 114, acid orange 7, and nuclear fast red were obtained from Tokyo Chemical Industry Co., Ltd. Due to their suitability for dyeing cotton fibers, azo dyes are the most frequently used dyes. Additionally, anthraquinone dyes are widely used and efficient for dyeing synthetic fibers. At a dye house, approximately 2000 m_3 of untreated textile wastewater were collected and discharged daily. The hundreds of dyes that were left unbound during the dyeing of cotton or synthetic fibers gave the raw textile wastewater a dark reddish-purple hue. After being centrifuged at 5000 rpm to get rid of bacteria and suspended particles, the textile wastewater was filtered through a membrane filter with 0.2 m pore size. Nature of the material wastewater was portrayed somewhere else [4,5].

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Conflict of Interest

None.

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