A Novel and Innovative Chemical Strategy for Mosquito Repellent Cotton Textiles

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Textiles and human evolution are entwined with each other for protection from natural forces and personal hygiene/attraction. Consumers today desire more scientifically advanced clothes that protect them from natural forces and amplify their comforts and pleasures. Phenomenal advancement took place with the invention of dichlorotriazine dyes that changed the cotton dye and apparel industry significantly. The central theme of our research project has therefore been to try and develop triazine-based dyes for the incorporation of mosquito repellent (MR) molecules into the cellulosic cotton fibres of textiles. Two aims in this study are 1. To develop triazine-based MR compounds; 2. To test their efficiency on Aedes aegypti mosquitoes that cause many diseases including Dengue, Zika fever etc. Cyanuric chloride can undergo temperature-controlled sequential S N Ar reactions with nucleophiles. At 0 °C, nucleophiles can displace one of the three chlorine and the remaining two chlorines can be displaced at higher temperatures. The nucleophile for the first displace is a DEET (diethyl m- toluamide) derivative or Icaridin, known MR molecules. DEET was modified to afford DEET-NH 2 which was treated with cyanuric chloride to obtain the desired Procion-MX type MR molecule (SaHo- MR1) and similarly Icaridin derivative SaHo-MR2 were synthesized and characterized by spectroscopic techniques. The remaining two chlorines of MR1 and MR2 were utilized for the modification of cellulosic cotton, a natural biopolymer with a massive number of hydroxyl groups. Both the compounds and their corresponding modified cotton pieces were investigated for MR properties. MR studies showed that the SaHo-MR1 is not very promising; however, SaHo-MR2 showed remarkable repellence.

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