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The necklace conjecture.

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Summary: The authors of the article "Necklaces, symmetry and irreducible representations of wreath products", in vol. 13 (no. 3) of this journal, describe a method for producing a set of k-bead, n-color necklaces for the group $C_k \wr C_n$, and define two such necklaces to be equivalent if one can be mapped to the other by means of a rotation. They prove that each nonequivalent necklace in the set of k-bead, n-color necklaces can be used to form a degree-k representation of $C_k \wr C_n$, and that the degree-k representations derived from necklaces having s-fold rotational symmetry will reduce into s irreducible representations of degree $m = k/s$. In what we call here the "necklace conjecture," the authors of the above mentioned article conjecture that the irreducible representations of $C_k \wr C_n$, obtained from nonequivalent necklaces are mutually nonequivalent. Finally, they prove that if the necklace conjecture is true, then the set of irreducible representations of $C_k \wr C_n$, obtained in this way is a minimal complete set of irreducible representations for $C_k \wr C_n$. In this paper, we prove the necklace conjecture, thereby establishing the result that the set of nonequivalent necklaces produces exactly one copy of each irreducible representation of $C_k \wr C_n$.

Classification: H40 H70 N70
Keywords: group theory; wreath products; semidirect products; representation of groups; finite groups; permutation groups; combinatorics; enumeration; discrete mathematics; matrices