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Characterization of Square-Free Rings.

Finite-dimensional square-free K-algebras have been completely characterized by Anderson and D'Ambrosia [1996] as certain semigroup algebras $A \cong K_\xi S$ over a square-free semigroup S twisted by some $\xi \in Z^2(S, K^*)$, a two-dimensional cocycle of S with coefficients in the group of units K^* of K. D'Ambrosia [1999] extended the definition of square-free to artinian rings with unity and showed every square-free ring has an associated division ring D and square-free semigroup S. We show a square-free ring R can be characterized as a semigroup ring $R \cong D^\alpha_\xi S$ over a square-free semigroup S twisted by some $(\alpha, \xi) \in Z^2(S, D^*)$, a two-dimensional cocycle of S with coefficients in the nonabelian group of units D^* of D. Moreover, this characterization leads to insight into the automorphism group Aut R. (Received September 19, 2007)