

1046-16-1091      **Martin W Montgomery\*** (mmontgomery@piedmont.edu), 165 Central Ave, Demorest, GA  
30535. *Square-Free Rings and their Automorphism Group.*

Finite-dimensional square-free  $K$ -algebras have been completely characterized by Anderson and D'Ambrosia 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 a field  $K$ . D'Ambrosia 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 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 a division ring  $D$ . Also, to each square-free ring  $R \cong D_\xi^\alpha S$  there exists a short exact sequence

$$1 \longrightarrow H_{(\alpha, \xi)}^1(S, D^*) \longrightarrow \text{Out } R \longrightarrow \text{Stab}_{(\alpha, \xi)}(\text{Aut } S) \longrightarrow 1.$$

connecting the outer automorphisms of  $R$  to cohomology groups related to  $S$  and  $D$ . (Received September 14, 2008)