

UNIVERSITY OF DELAWARE  
DEPARTMENT OF MATHEMATICAL SCIENCES  
DISCRETE MATHEMATICS SEMINAR

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# The Sporadic Simple Groups: Why So Many? Why So Few?

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The 26 sporadic simple groups are an intriguing collection of mathematical objects. I shall begin with a very brief survey of these groups and some of the anomalies which permit them to exist. Then I will focus on two lines of research with which I have been involved recently. The first gives a partial explanation for why there are so few sporadic groups: Most simple groups have a unique "characteristic prime" (0 for the alternating groups). Sporadic groups tend to have two characteristic primes and this phenomenon can only happen finitely often. (This is joint research with Gorenstein, Lyons and Kochagina.) The second line of research investigates sporadic objects which are not quite groups. Using early work of mine, Levi and Oliver have constructed an infinite family of sporadic objects  $\{\text{BSol}(q) : q = p^n, p \text{ odd prime}\}$ , extending in some sense the smallest Conway group. This raises the fascinating possibility that the sporadic groups fit into infinite families of group-like objects. This investigation is just beginning. (This is joint research with Linckelmann, Broto, Levi and Oliver.)