Supporting Information

Magnetic Ground State and Phase Diagram, $H_c(T)$, for Magnetically Ordered $[Ru_2(O_2CMe)_4]_3[Cr(CN)_6]$

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The possibility that **1** may contain a higher-than-second order transition was investigated. The transition below the tricritical point ($T < T_t$) is clearly a first order transition, due to the first derivative of energy (magnetization) being a discontinuous function. Between the tricritical point and critical temperature ($T_t < T < T_c$), a different type of transition occurs in which the first derivative of energy (magnetization) is continuous, but second derivative (susceptibility, χ) is discontinuous (Figure S1). When third derivative ($d\chi/dH$) is taken, no discontinuity is evident (Figure S2). Thus, the transition occurring between T_t and T_c is of the second order.

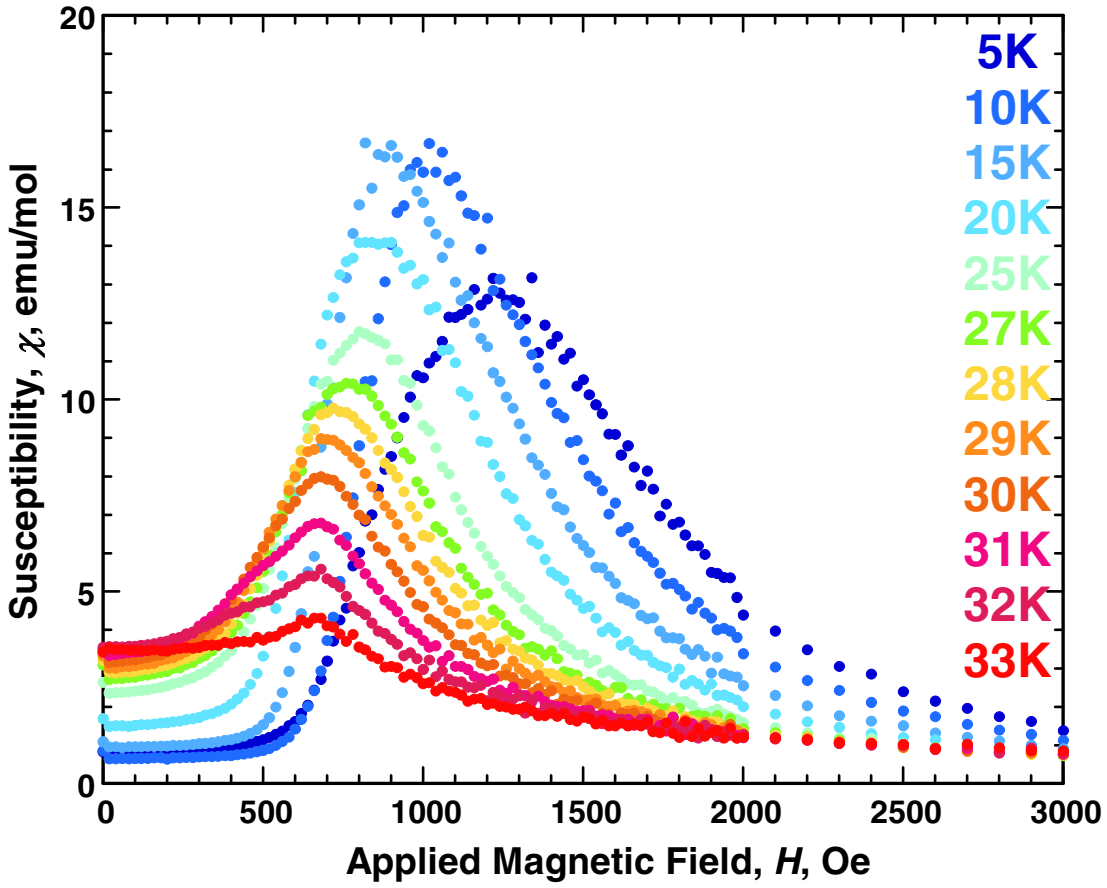

Figure S1. $\chi(H,T)$ data for **1**.

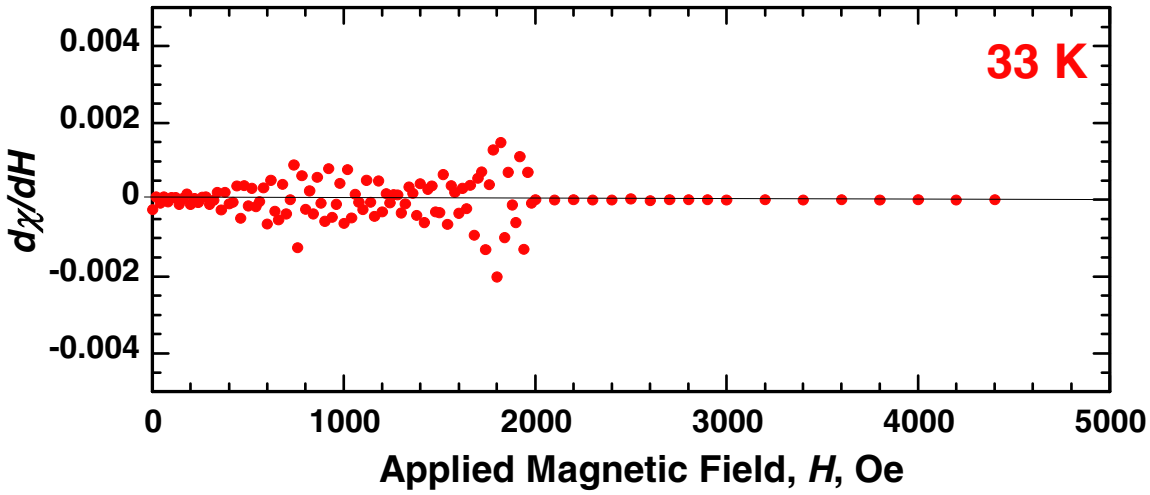

Figure S2. Representative 33-K dχ/dH data for **1**.