A new class of three-body states beyond the Efimov effect\textsuperscript{1} NICOLAIS L. GUEVARA, BRETT D. ESRY, Department of Physics, Kansas State University — Recently, we have identified a new type of three-body bound state for three identical bosons interacting via attractive two-body $1/r^2$ potentials \cite{1}. These three-body states are bound even when the two-body subsystem does not support a dimer state. In fact, there are an infinity of such states. We will present an extension of this work to the system with two identical bosons ($B$) and one distinguishable particle ($X$). We have investigated the spectrum of this $BBX$ system assuming only that the $B + X$ interaction is an attractive $1/r^2$ potential. We have again found an infinite number of three-body bound states even though the two-body potential does not support a bound state. This effect is shown to exist at large mass ratios ($M_B/M_X$) and depends on the strength of the two-body interaction. The most favorable case is the molecular-type system, i.e., $M_B/M_X \gg 1$. While these new three-body states resemble Efimov states they originate from fundamentally different physics.

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\cite{1} N. L. Guevara, Yujun Wang, and B. D. Esry, arXiv:1110.0476 (2011)