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Closed-form asymptotic sampling distributions under the coalescent with recombination for an arbitrary number of loci

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Obtaining a closed-form sampling distribution for the coalescent with recombination is a challenging problem. In the case of two loci, a new framework based on asymptotic series has recently been developed to derive closed-form results when the recombination rate is moderate to large. In this paper, an arbitrary number of loci is considered and combinatorial approaches are employed to find closed-form expressions for the first couple of terms in an asymptotic expansion of the multi-locus sampling distribution. These expressions are universal in the sense that their functional form in terms of the marginal one-locus distributions applies to all finite- and infinite-alleles models of mutation.

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