Contributed Papers
Communications libres
(Org: **Jason Levy** (University of Ottawa))

DALE GARRAWAY, Eastern Washington University
Relational Sheaves

We show that a sheaf for a *quantaloid* ($\mathcal{Q}$) is an idempotent suprema preserving lax-semifunctor $F : \mathcal{Q}^{co} \to \mathbf{Rel}$ (*a relational sheaf*). This implies that for a Grothendieck topos $\mathcal{E}$, a sheaf is a relational sheaf on the category of relations of $\mathcal{E}$ and thus $\mathcal{E}$ is equivalent to the category of relational sheaves and *functional transformations*. The theory is developed in the context of enriched taxons, which are supremum enriched semi-categories with an added structural requirement.

ARASH JAMSHIDPEY, University of Ottawa
Moran model with i.i.d. and a.s. convergent fitness functions

We study the path behaviours of some stochastic population dynamics such as the measure-valued Moran model with mutation and selection when the fitness function is random changing in time. Suppose there are individuals $1, ..., N$ each carrying an allele from a compact type space E at each time. The process evolves as a Markov jump process for which resampling, mutation and selection happen at independent Poisson times. Suppose $\chi : \mathbb{N} \times I \times \Omega \to (\varepsilon, 1 - \varepsilon)$ is the haploid fitness function where $0 < \varepsilon < 1$ and $\chi_n(a)$ is a random variable indicating the fitness function of allele $a \in I$ at the nth selection event. When the nth selection event happens on an individual carrying type a the fitness function $\chi_n(a)$ can be considered as the probability that the selection arrow works. Continuing this for all selection events we construct a random measure on the boundary of the infinite binary tree corresponding to all possible scenarios for selection events during the process. When the fitness function is deterministic the induced measure on the boundary also is.

Suppose either $\chi_n(a)$ is i.i.d. or $\chi_n(a) \to \chi(a)$ $a.s.$ for all $a \in I$. With some extra conditions we prove that the random measure arising from the random environment on the boundary of infinite binary tree is absolutely continuous w.r.t. a deterministic measure arising from a convenient deterministic environment on the same boundary. This implies the same properties in the random environment as those in the deterministic environment.