

Abstract Submitted
for the MAR15 Meeting of
The American Physical Society

Power laws and extreme values in antibody repertoires
SEBASTIEN BOYER, DIPANWITA BISWAS, NATALE SCARAMOZZINO,
ANANDA SOSHEE KUMAR, Laboratoire Interdisciplinaire de Physique - CNRS
& Université Grenoble Alpes, CLÉMENT NIZAK, ESPCI ParisTech/CNRS,
OLIVIER RIVOIRE, Laboratoire Interdisciplinaire de Physique - CNRS & Uni-
versité Grenoble Alpes — Evolution by natural selection involves the succession of
three steps: mutations, selection and proliferation. We are interested in describing
and characterizing the result of selection over a population of many variants. After
selection, this population will be dominated by the few best variants, with highest
propensity to be selected, or highest “selectivity.” We ask the following question:
how is the selectivity of the best variants distributed in the population? Extreme
value theory, which characterizes the extreme tail of probability distributions in
terms of a few universality class, has been proposed to describe it. To test this
proposition and identify the relevant universality class, we performed quantitative
in vitro experimental selections of libraries of $> 10^5$ antibodies using the technique
of phage display. Data obtained by high-throughput sequencing allows us to fit the
selectivity distribution over more than two decades. In most experiments, the re-
sults show a striking power law for the selectivity distribution of the top antibodies,
consistent with extreme value theory.

Sébastien Boyer
Laboratoire Interdisciplinaire de Physique -
CNRS & Université Grenoble Alpes

Date submitted: 06 Jan 2015

Electronic form version 1.4