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Bignami G. Selection for high rates and low rates of avoidance conditioning in the rat. *Anim. Behav.* 13:221-7, 1965.
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This paper describes the first five generations of selection that led to the establishment of the Roman High and Low Avoidance strains of rats (RHAs and RLAs). Large differences in two-way (shuttle-box) avoidance learning developed quite rapidly, and maternal effects seemed to be small or absent. [The *SCI*⁵ indicates that this paper has been cited in over 90 publications.]

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Around 1960 I started working in a psychopharmacology research program under the direction of Daniel Bovet, then head of the Therapeutical Chemistry Department at this institute. This program was aimed at assessing drug effects on animal learning and used a variety of positively and negatively reinforced tasks. My work was mainly with two-way (shuttle-box) avoidance and, of course, white rats. However, the large interindividual variation in the acquisition phase made it much more difficult to assess treatment effects on learning than those on performance of pretrained animals.

In my previous brief career as a reproductive pharmacologist-toxicologist, I had often heard that litter factors can influence several physiological variables, due to genetic and/or maternal effects. Therefore, I raised a number of all-male litters and found that within-litter variation in avoidance learning was substantially less than between-litter variation. (This, incidentally, led to the adop-

tion of the split-litter method in several drug studies.)^{1,2} At this point the temptation was too strong for an Italian neophyte brainwashed with the magnificent deeds of selected strains, such as the Californian Tryon Maze Bright's and Dull's.

Working overtime and imposing daily logistic miracles on our animal caretakers, I started a selective breeding program that produced large avoidance differences after the initial generations. Part of the credit for this work should have gone to Bovet, both for his previous efforts to refine the two-way avoidance paradigm and for his help and advice given during the selection experiment. However, a preliminary paper in French signed by both of us went unnoticed.³

In 1964 I left on sabbatical, and an agreement was made to entrust the strains to a well-known behavior geneticist, Peter Broadhurst of Birmingham (UK). Besides playing an essential role in subsequent developments, Broadhurst sent breeding nuclei to several laboratories. Since then the Roman strains have been used in a wide range of research projects in genetics, behavioral processes, neurochemistry, physiology, endocrinology, pharmacology, and toxicology.⁴⁻⁶

Why this success? First, automated shuttle-box avoidance is a (dangerously) convenient method that requires little labor and money. Second, the selection was luckily started at a time when some experts had spoken in favor of maintaining heterozygosity in such an experiment; therefore, I decided not to inbreed. This minimized (1) reproductive difficulties, (2) confounding of genuine and spurious correlative effects of selection, and (3) confounding of inbreeding and selection as a cause of strain differences in responses to various treatments.

Due partly to the scarcity of personnel and logistic resources, my later research was mainly on topics that did not require the use of selected strains.⁷ Consequently, our cosmopolitan migrants never had a chance to return to their home place, which sometimes makes me uneasy. In fact, I feel that a number of critical behavioral experiments are still missing from the RHA-RLA literature, and this probably detracts from our understanding of the mechanisms of aversively motivated responses.

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