

Journal club



BEADLE AND TATUM AND THE ORIGINS OF MOLECULAR BIOLOGY

It is now 75 years since the publication of the Beadle and Tatum experiment in *PNAS*, an underappreciated 'tipping point' in the development of molecular biology. Beadle and Tatum showed "that genes act by regulating definite chemical events". They used an organism (the fungus *Neurospora*) with simple nutritional requirements, whose genetics could be analysed, X-irradiated it and selected for mutants with novel requirements. Their method, which also works for studies of behaviour and development, permitted each nutritional requirement to be associated with a specific gene.

Analysing gene function by producing mutations and selecting for mutants with the desired characteristics was novel; we forget where it originated. The contribution of the Beadle–Tatum experiment was

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twofold. It provided a methodology that connected biochemistry and genetics, and it revealed a possibly simple relationship between genes and biochemical characteristics (traits). Before this work, there was no experimental way to approach this question: geneticists and embryologists studied systems too complex for the biochemistry of the day, and genetics was a science unrelated to physics or chemistry.

Why is the Beadle–Tatum contribution under-rated, notwithstanding the award of a Nobel Prize for the work? (The historian Horace Judson dismisses it with the comment that “using a mould that grows on bread, [they] first put to effective work Garrod’s realisation that what a gene does is specify an enzyme”). I suggest three reasons. First, their work was soon linked to the hypothesis of ‘one gene, one enzyme’, and this view has been modified with time. As a result of this linkage, their role in the methodological innovation of mutation induction followed by selection was neglected, as was their contribution to the revolutionary idea

that gene function could be described in straightforward biochemical terms. Second, Beadle cultivated the image of a Nebraska farm boy, apparently a non-intellectual, and he turned to administration soon after his discovery. Finally, the current view of the pre-eminence of the elucidation of DNA structure in the development of molecular biology has the advantage of flamboyant personalities and talented authors. There is a lesson here.

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