

Fashioning the Immunological Self: The Biological Individuality of F. Macfarlane Burnet

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Abstract. During the 1940s and 1950s, the Australian microbiologist F. Macfarlane Burnet sought a biologically plausible explanation of antibody production. In this essay, we seek to recover the conceptual pathways that Burnet followed in his immunological theorizing. In so doing, we emphasize the influence of speculations on individuality, especially those of philosopher Alfred North Whitehead; the impact of cybernetics and information theory; and the contributions of clinical research into autoimmune disease that took place in Melbourne. We point to the influence of local experimental and intellectual currents on Burnet's work. Accordingly, this essay describes an arc distinct from most other tracings of Burnet's conceptual development, which focus on his early bacteriophage research, his fascination with the work of Julian Huxley and other biologists in the 1920s, and his interest in North Atlantic experimental investigations in the life sciences. No doubt these too were potent influences, but they seem insufficient to explain, for example, Burnet's sudden enthusiasm in the 1940s for immunological definitions of self and not-self. We want to demonstrate here how Burnet's deep involvement in philosophical biology – along with attention to local clinical research – provided him with additional theoretic tools and conceptual equipment, with which to explain immune function.

Keywords: History of immunology, Autoimmunity, Burnet, Biological individuality, Self, Clonal selection, Cybernetics, Whitehead

Reflecting on his first visit to the United States in 1944, the Australian microbiologist F. Macfarlane Burnet experienced a “new realization that an adequate scientific attack on almost any problem will provide a practical solution of it” (Burnet, 1944, p. 557). Like many Australians during World War II, Burnet had awakened to the brash American future, though fond memories of more homely England lingered. As he returned to Melbourne in that year as director of the Walter and Eliza Hall Institute, Burnet noted that in the United States “science is geared to the war effort” (p. 557), which prompted a “readiness to make large-scale human experiments when these seemed to be needed” (p. 558). Moreover, his travels impressed upon him “the great value of team work by men with training and ability in widely different fields” (p. 558). In particular, the connections of laboratory and clinic in North America seemed unusually enterprising and productive. Burnet lamented that in Melbourne, Australia, scientific research had “never been close enough to the actual clinical work and teaching of the hospital to provide the stimulus which one feels in the great teaching hospitals of England and America” (p. 561). And yet, the Australian scientist, always analytic and reserved, viewed some American developments with disdain. In his trip diary, Burnet observed how competition for funding often made scientists “subservient”; experimenters became dependent on elaborate equipment; and everywhere there was a “good deal of second order work.”¹ All the same, Burnet would recall in his memoirs, “those three months in America represented the most intense and rewarding period in my life” (Burnet, 1971, p. 56). He felt “the impression that America made on me was almost overwhelming” (Burnet, 1968a, p. 73).

During the 1940s, Burnet was intent on discovering the nature of the immune response, which meant at the time learning how and why the body produced antibodies. Distrustful of simple chemical or structural models, the virologist sought a satisfying biological explanation of immune function. The conventional idea that an antigen, or foreign substance, served as a template, or mold, for antibody production failed to excite him: it seemed biologically implausible. Rather, he came to wonder whether the body’s capacity to discriminate between self and other, or not-self, constituted the real significance of immunity, its true priority. Burnet was just as interested in discovering why we normally tolerate our own tissues as in explaining our ability to defend ourselves against pathogens. For him, recognition of self represented the fundamental biological problem. Through his struggles with the notion

¹ Notes on American Visit, 1943–1944, folder 11a, box 8, series 2, F. Macfarlane Burnet papers 1989/0034, University of Melbourne Archives [Burnet papers].