

immunity but, unfortunately, at the same time he perpetuates a long-standing error of nomenclature by using the term *protection test* in reference to the demonstration of *in vitro* neutralization of virus by antibody. Apparently, this usage stems from the earliest tests for humoral antibody in which monkeys were protected by antiserum given separately from the virus.

The evolution, preparation, and use of yellow fever vaccines, of which there are two importantly different types, is then described. Durieux from the Pasteur Institute in Dakar, alone and with Koerber, speaks for vaccine made with the mouse-fixed French neurotropic strain of virus. Evidence is presented for excellent sero-immune response to such vaccine administered by scarification (often combined with vaccinia) and for satisfactory persistence of immunity with 82 percent or more of positive serums 7 to 12 years later.

Production and use of the less neurotropic 17D virus, grown in the chick embryo, in Brazil is described by Penna. For anyone concerned with mass application of injected vaccines, the detailed lists of equipment for field use should be of interest. G. W. A. Dick then describes the use of 17D vaccine by scarification with attendant advantages of simplicity and reduced cost of application. Curtois discusses immunity following 17D virus, citing evidence for its onset within 10 days and persistence for as long as 12 years; however, he quotes inaccurately from my own published work, particularly in discussing the possible relation of age to response and persistence of immunity.

Mass application of both types of vaccine is then considered. According to Durieux, 56 million vaccinations with Dakar vaccine had been made through 1954 in a French African population of about 25 million, accompanied by near elimination of reported cases of yellow fever. Manso reports on 22 million vaccinations with 17D virus in Brazil through 1954 and with no adverse effects since 1941 but is unable to muster data to show a decline in yellow fever morbidity, presumably because man is not involved in the jungle cycle of virus spread.

The longest section, by Stuart, considers the controversial question of post-vaccination reactions. Excluding allergic reactions and the serum hepatitis resulting from the now discontinued practice of incorporating "normal" human serum in the 17D vaccine, chief interest relates to the delayed, encephalitic reactions owing to the vaccine virus. For 17D virus this problem, never very serious, was resolved by choosing on the basis of a field trial a substrain of minimal encephalitogenic potential and "freezing" it at the passage level tested. However,

recent reports suggest that in infants under 1 year of age encephalitis may still be induced. As for the Dakar vaccine, all agree on the hazard of using it in persons under 2 years of age. However, whereas encephalitis is rarely reported from French Africa, the same vaccine in Nigeria and Costa Rica gave rise to an alarming incidence with a high case fatality.

In final sections by Bonnel, international regulations are discussed, and a very excellent selected bibliography is presented.

All told, this monograph is a definitive presentation of the general and technical aspects of yellow-fever vaccination. It should interest the worker and teacher in microbiology and everyone concerned with problems of local and international public health.

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(Inquiries concerning these publications should be addressed, not to Science, but to the publisher or agency sponsoring the publication.)

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