

stance, as the vesicles upon Master H. were most superb, and the lymph, when taken, clear and beautiful, but it did not propagate itself.

The growing frequency with which varioloid disease and true small-pox are observed in vaccinated persons has been adduced as an argument by some writers. The greater success attendant upon re-vaccination of adult subjects than formerly is another argument—fewer failures and better results. The experience of re-vaccination in the Prussian Army has been appealed to. This extends to 45,000 operations annually. The statistical results are given from 1833, when the proportion of successful results was 33 per cent. and afterwards gradually increased as follows: 39, 42, 46, 49, 50, 51, 54, 57, 58, 57, 57, 58, 60, 64, 64, 64, 61, 64, 69, 69, 69, 69, 70. The last proportion of success being more than double the first of the series. Dr. Ballard, referring to these statistics, says: "There can be only two explanations of this remarkable fact, the one, that the virus has degenerated in its protective power, as the result of frequent human transmissions; the other, that there has been a steadily progressive carelessness in the mode in which the primary vaccinations have been performed, and that this carelessness has resulted, as I have shown it may result, in a deterioration of the virus." He gives as the *best evidence* of the deterioration which vaccine virus undergoes in the course of frequent human transmissions that obtained "by comparing the effects produced by selected lymph which has undergone numerous human transmissions with that produced by lymph recently derived anew from the cow, or after having passed through only a small number of human generations," and gives a number of comparisons that should convince the most skeptical. My own observations with Longue Pointe lymph in this regard has been this: The period of latency is greater; no sign of taking is seen before the 6th day, in some cases not before the 8th, and I have had it as late as the twelfth day. The vesicles are small, circular, firm, well elevated, having from first a depression in centre, very distinct, but, where a number appear together, will coalesce, retaining their distinctive outline throughout. They mature usually on eighth day, in the later part of which the areola usually begins to appear, and is well formed by the 9th. There is a good deal of restlessness and fever after the appearance of the areola, which is at its height on the tenth day, after which it and the areola decline together and are usually gone on the 12th day. From this time the

pustule, which on the eighth day is full, tense, white and shining, and if pricked yields abundant lymph, clear as water, begins to dry and look dull, a brownish crust takes the place of the *bluish* central depression, and by the 18th to 21st day a thick circular, somewhat conical, mahogany colored, well defined crust falls off, leaving a depressed cicatrix full of fovea or pin-pointed depressions. I have observed after a few removes from the animal that the whole progress becomes more rapid, the crusts more spread out, flat and irregular, so that I say when the crust begins to be as large as a *pants button* it is time to go back to the animal virus, which gives you again the small circular elevated vesicle, resembling a bead of pearl upon a ground of rose pink colour.

Taking the possible degeneracy of vaccine by human transmission to be proven, it is necessary that this degeneracy should be prevented as much as possible by care on the part of the propagator in the selection of the vaccinifer (which should be the young bovine animal) and the pock. On this point Dr. Ballard says:—"The vaccinifer (if human) should be "robust, not cachectic, the pock selected should be "perfect in character, and the lymph should be "taken at a period *prior to the appearance of the* "areola. The principal causes of bad and un- "protective vaccination are *the use of lymph taken* "at too late a period in the course of the disease, "taking lymph from vesicles badly developed or "imperfect in character, the use of dry lymph or "scab instead of limpid lymph. The lymph for "vaccination," he continues, "should never be taken "after the areola is formed. When the areola is "formed the lymph ceases to be limpid, is imper- "fect in power, and apt to give rise to imperfect or "modified pustules. According to Sacco and Eichorn "the lymph is distinguished for energy on the fifth "or sixth day, or while the nascent vesicle is still "undeveloped. When the vesicles on the vaccinifer "are small and poor they are apt to reproduce their "kind, and in this way a supply of lymph may "degenerate in quality." In producing humanised vaccine, direct from animal lymph, I select the most scrupulously healthy children, of robust, healthy parents having perfectly developed vesicles. From these I prefer to take the lymph when it has attained its greatest perfection, which one has to be on the *qui vive* for, and always before the areola has appeared; after this the lymph becomes purulent and opaque, and is very subject to oxydation and decomposition, as Schonbein has shown, probably more rapidly in some conditions of the atmosphere