

because there are still those who believe that, as in tetanus, infection with the cowpox germ is rendered much more certain (perhaps, even possible only) when the resistance of the tissues is lowered by the action of auxiliary organisms. Whatever the truth may be in regard to that point much time and money are being spent to-day with the object of providing a lymph which shall contain no pathogenic germs which we recognize as such except those of vaccinia itself. The early history of vaccination demonstrates that Jenner's great merit lay in his observation that cowpox could be passed from one human being to another directly, and so introducing arm to arm inoculation. It was comparatively seldom that vaccinia in cattle was discovered and apparently purposive propagation from animal to animal was not thought of seriously, if at all. Moreover, the effects of bovine virus came to be considered much more severe than those of the humanized. Practically the same steps which we see in the evolution of inoculation with variola appear in that of vaccination. The Chinese inoculated with crusts or scabs of smallpox inserted in the nostrils; the Turks with matter from the pustules, and it remained for Sutton to show that by taking fluid from the vesicle at an earlier stage in its development, the disease might be communicated with less danger of severe infection. Scabs and pus were both used in vaccination, to be replaced later with clear lymph taken from the infant's arm at a definite time after the operation. Quills, ivory points and glass capillary tubes, were all made the vehicles of its carriage, and the scab done away with. The chief advantage which humanized lymph possesses over bovine is the easiness with which it may be obtained. Its great disadvantage lies in the fact that it may convey disease, *e.g.*, syphilis, which the well prepared bovine cannot. Both lymphs give protections against smallpox.

The credit of establishing animal vaccination on a sure footing is due to Italy. "After this method had been temporarily tried by Galbiati and Feola, it was brought to a high grade of technical perfection by Negri, of Naples, 1849. Pure bovine vaccination, *i.e.*, the employment of a vaccine virus that has been obtained from a case of original cowpox and transmitted artificially from cow to cow, is consequently still known to many by the historic name of the Neapolitan Method." (Nothnagel.)

At the present day there are in all civilized countries establishments, some private, some under government auspices, for the propagation and supply of cowpox lymph obtained from cattle-directly. In Germany, since 1885, vaccination with bovine lymph has been the only legal method.