

These conclusions, however important in themselves, were only on lines of thought and investigation along which pathologists in many countries were working. Strauss¹² and Gamaleia in 1891 had pointed out many differences in culture growth, and pathogenic power for other animals between avian and human bacilli, and for some years it had been generally recognized that although Koch's statement was true that the disease tuberculosis, whether appearing in man, cattle, swine, birds, etc., is dependent upon a micro-organism which has in all cases the same general morphological characteristics and staining reactions, yet as found in each class of animal the bacillus appears to have more or less well marked distinguishing characteristics. It would appear, however, that we have not to deal with absolutely different species, but rather with mere variations acquired by the bacillus in its passage through successive individuals of one species (Adami). Nocard and Roux¹³ have shown that in the two forms regarded as most distinct, namely avian and human bacilli, one can by special methods of growth outside the body obtain eventually cultures of the two that are indistinguishable. They have also shown that by enclosing a culture of the human bacillus very carefully in a sterilized capsule of collodion, hermetically sealing this and placing it in the body of a bird, the bacilli thus protected continued to grow, nourished by the lymph which diffuses into the interior of the capsule; growing thus, the bacilli gradually assumed the characters of avian bacilli.

Thus it is shown that variations more or less pronounced may manifest themselves in bacilli by development in different kinds of animals, and it is generally considered that the passage of pathogenic germs through a series of animals of one species leads to those germs acquiring a maximum virulence for that species, and at the same time in many instances a marked diminution in virulence for certain other classes of animals.

An excellent clinical example, as Dr. Adami¹⁴ has pointed out, of this modification of a micro-organism by its passage through a succession of animals of one species, is afforded by what is now definitely ascertained in regard to the contagium of smallpox and cow-pox. For many years it was held that cow-pox in the cow and smallpox in man were two absolutely distinct diseases, an opinion due in great measure to the extreme difficulty that was experienced in inoculating cattle with the virus of human smallpox. We now know they are the same for many observers have shown that if we take matter from a smallpox vesicle and inoculate it with care into calves we obtain, not a typical vesicular eruption, but a few hard papules only. If these are