peripheral wedge-shaped corpuscles, which he obtained from this pus. Robin also gave very accurate descriptions. In cattle, the first observations upon the organism are said to be those by Perroncito in Italy in 1863, published in 1875. Another Italian, Rivolta, in 1868, in a paper upon a "sarcomatous" tumour of the jaw of an ox, described the characteristic bodies. He was followed by Hahn, of Munich, in 1870, and Hahn was the first to make the suggestion that these were a species of mould.

The fullest study and the one that established the existence of this condition of actinomycosis, showing that it was not sarcomatous or tuberculous, or simple chronic inflammation, was that of Bollinger, of Munich. He gave a most full study of the condition, described the nodules or tubercles; described, further, the organisms within these nodules, and maintained that they were true fungi and the cause of the condition. He found that the disease was very common among cattle of some parts of North Germany—in some cases as many as fifty per cent. of the animals being affected. He was unable to gain cultures, as also to convey the disease by inoculation. Only in 1885 did Johne and Ponfick independently succeed in communicating the disease to other animals, and Ponfick it was who demonstrated that the disease in man was identical in its characters with the disease in cattle.

Up to this point the attempt to make cultures had failed. Bostroem in 1888, in his remarkably full study upon the disease, was the first to cultivate the Ray fungus. This he did from five cases in animals and from one in man. Bostroem was also the first to throw doubts upon the relationship of the actinomyces to the hyphomycetes or mould fungi. For myself, I have never quite recognized the force of Bostroem's argument. It is true that the filaments are very much smaller than those seen in the moulds we are most familiar with, true also that there are no highly developed aerial fructifications or conidia, and, certainly, it is characteristic of the filaments of the Ray fungus that, while branch-ing, as do the true moulds, later the threads divide up into rodlike sections, and these, again, may give rise to or separate up into coccoid little bodies. There is, indeed, in these segments a striking re-semblance to bacilli and cocci, and the appearances closely resemble those described by Cohn in the Streptothrix Færsteri. But, because Cohn includes this streptothrix among the higher bacteria, that does not, of necessity, make it such. The very characteristic true branching of the Ray fungus, the formation of an equally characteristic felted mycelium when grown outside the body and within the tissues, the general appearance of the cultures, all strongly recall the true moulds, while the break-