

Yale University

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Dear Mr Gaisford,

I am writing to you in respect of our discussion about the issue of tuberculosis in African wild animals in the consideration of dissemination of the disease by the export of their carcasses to other countries.

My comments are based upon an in-depth study of the history of medicine with a special interest in the spread of disease and the evolution of therapy.

As I understand it bovine tuberculosis has been introduced into the African lion population by feeding them with the carcasses of animals that have tuberculosis. Furthermore the African lion population is not decimated by disease as a consequence of eating cattle contaminated with tuberculosis. An additional fact that you provided points to the development of not only pulmonary and gastrointestinal tuberculosis in the Lions but a widespread involvement of their bones and joints. As a consequence of the TB these animals are unable to acquire their natural food by killing and become extremely ill both from the tuberculosis and the starvation consequent upon their inability to hunt effectively. These tuberculosis-ridden animals thus die prematurely. A further issue that was raised is the observation that with the abolition of the ivory trade the current most desirable material that is used for medication in the Orient has become lion bones. From our conversation, I understood that the lion bones are sold intact to a variety of vendors in the Far East. The bones are then rendered into powder and developed into a medication which is believed to have positive healthcare benefits or improve the recipient's quality-of-life. The statements are scientifically dubious but nevertheless represent a well-established and extremely popular form of homeopathy in the Far East.

The area that has initiated my concern and which I write to you about is the question of disease transmission. The tubercular bacillus has throughout history proved notoriously difficult to manage. The species has developed very effective means of conservation that is untouched by standard forms of antibacterial activity and procedures. Furthermore the bacillus is extremely difficult to eradicate and can survive extremes of temperature as well as moisture. In the past the way in which the backs of this was most commonly passed from person to person was by the ingestion of contaminated milk. Thereafter human sputum and coughing as well as inadequate environmental standards were responsible for the widespread nature of the disease and the inability to eradicate it effectively.

The situation that you describe is a re-creation of problems that were encountered in the last century or two. In principle it involves a vector to transmit the infection to a susceptible population. When the lion bones are converted to medication the first steps would involve sawing the bones and converting them to powder. The inhaled bone powder would contain tuberculosis bacteria and would be widely disseminated in any factory or room where the individuals were working with this material. It is indubitable that many such individuals would inhale the

tuberculosis bacillus and become infected. Given the fact that such medication factories generally do not involve sophisticated resources that would protect the workers the likelihood of exposure is extremely high. A secondary form of contamination in the environments in which such medications are produced would likely be the contamination of the workers hands and the transmission from their hands to other objects in particularly ingested food. In a population which has not been widely vaccinated for tuberculosis or does not have an immune system that, has previously explained exposed to the strain of tuberculosis the risk of disease acquisition would probably be very high.

A further issue relates to the fact of treating infected individuals. The disease is difficult to identify in its early stages and by the time an obvious diagnosis is made the individual would certainly have had the opportunity to contaminate many other individuals that he/she would be in contact with. Under the best circumstances the treatment of tuberculosis involves a long, arduous and highly expensive therapeutic strategy which requires considerable medical management and a high level of patient compliance. These two requirements often not present in some of the areas where powdered bone medications are considered to represent an important component of healthcare.

I would be extremely constant based upon the information you relayed to me that the export of infected lion carcasses would represent the potential for inducing a tuberculosis epidemic in a group of individuals working with the material. Such individuals would become the unwitting vectors for the distribution of tuberculosis imported from one country and then distributed in another. Sadly, the disease would not be selective for only those individuals ingesting the powdered bone but all those healthy persons that they were inadvertently in contact with in the normal course of their daily in family life.

I would urgently suggest that this issue be explored at the highest level by individuals with the appropriate expertise to recognize and prevent the dissemination of a disease that has been regarded as one of the great scourges of mankind. Indeed until quite recently tuberculosis was regarded as one of the most major of all health threats to the public.

Yours sincerely

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