danger to other animals or human beings who may accidentally take up the poison. From this it follows that the temperature of the air and drying for a very long period determine the survival or death of the infective microbes. These points, therefore, require careful consideration and examination.

7. The temperature which is most favourable to the growth of the microbe is that of the ordinary heat of the body of a warm-blooded animal—namely, from 37° to 38° C = from about 98·9° to 100·5° Fahr.; but if the temperature falls to about 82° Fahr. such growth ceases. Though, however, cold prevents its development, it does not kill it, whereas if it be kept at a temperature of about 107·5° Fahr. for several weeks the organism gradually becomes exhausted and dies.

8. It is obvious from these facts that, if bacili or their spores be scattered on the ground or elsewhere at the ordinary temperature of the outer air in our climate, they will not grow, although they may fall upon a suitable soil. On the other hand they will not be killed, and, moreover, the temperature of some dairy-sheds in the summer may approach the point at which the development of the organisms outside the body would be possible. It is only, therefore, under these latter circumstances to be feared that in this country these tubercle microbes will grow and develop outside the body.

9. The other condition, drying, is, in the case of most microbes, a very important one, since few resist dessiccation. Numerous experiments, however, have been made upon expectoration containing the bacilli. Such expectoration has been dried during very considerable periods—namely, several months—and has also been successively dried and moistened for similar periods, and yet the bacilli have not been killed, and when inoculated into animals they have actively produced the disease.

10. It is abundantly evident, therefore, that the infectious discharges of a tubercular animal remain actively virulent in this climate for a long time after they have been cast from the body, and that stalls and sheds may thus become a source of danger unless thoroughly cleansed.

11. The bacillus, under ordinary circumstances, of course flourishes upon the living tissues of the animal it attacks, but its discoverer, Koch, showed that it could be cultivated artificially upon various purified, *i.e.*, sterilised, animal fluids, such as the serum of blood, &c.

12. The tubercle bacillus does not attack all domesticated animals equally. Arranging them in order of respective liability to the disease, they are as follow: Man, milch cows, fowls, rodents, pigs, goats, sheep, horses, carnivora, *i.e.*, dogs, cats, &c. (very rarely).

13. From this it appears that the organism grows most readily in those animals which are omnivorous or herbivorous.

14. In all cases the female sex suffers more than the male; and in certain forms of the malady, as is common to all microbe diseases, young animals are more sensitive and more easily attacked than adults.

15. Further, certain unhealthy conditions cause a predisposition to contract the disease and receive the poison. Such are—(1.) Starvation. (2.) Deficiency of oxygen by bad ventilation. (3.) Exhausting secretions, *e.g.*, prolonged lactation. (4.) Possibly hereditary (*vide infra*, modes of transmission of the virus, Art. 29). (5.) Certain foods (asserted, but very doubtful).

16. (1.) Of these, starvation is very important, since it causes degeneration of the tissues, and diminishes thereby their resistance to the growth of the parasitic microbes.

17. (2.) The deficiency of oxygen by want of ventilation has been for very many years recognised to be a fertile source of predisposition to tubercular infection, and to be very favourable to the transmission of the virus from one individual to another. This is so notorious that reference need only be made to the instances recorded in works on hygiene to substantiate the statement.

18. (3.) Exhausting production of milk can be easily understood to effect—as seen in the gradual emaciation, &c., of milch cows by the constant loss of the fat, albumen, and salts contained in the milk—just those degenerative changes which reduce the vital resistance of the animal. It is consequently very probable that the special proclivity of milch cows to contract the disease is, to a considerable extent, due to this factor as well as to that expressed in Art. 17.

19. (4.) The well-known influence of heredity in perpetuating tuberculosis among stock is attributed by some to the transmission from parent to offspring not of the actual virus, but of a condition of tissue which is peculiarly favourable to the development of that organism. This view is naturally but a hypothetical one. Still, as it is held by many authorities, it is here stated. See also Arts. 28, 29, 30, 31, 32, and 33.

20. (5.) Some foods, *i.e.*, grains, &c., have been imagined to favour the occurrence of tuberculosis, but this is extremely problematical.

Modes in which the Virus or Microbe enters the Body.

21. The *bacillus tuberculosis* has been proved to enter the body, and to kill the animal by causing the growth of tubercles, in the following ways: (1.) Inhalation into the air-passages and lungs. (2.) Swallowing into the alimentary or digestive system. (3.) Direct introduction into the subcutaneous or submucous tissue by means of a scratch, or cut, or sore in the skin or mucous membrane.

It is also supposed to be directly transmitted by (4) Heredity.

22. (1.) *Inhalation.*—Owing to the fact that the signs of disease are most commonly found in the lungs, inhalation would appear to be the commonest way in which the disease is contracted. This has been tested by comparative experiments, in which animals inhaled tubercular secretions so minutely divided as to admit of the bacilli being distributed in a current of air, thus closely imitating that distribution of the virus which occurs when a tuberculous animal coughs, &c. The results of these experiments have been almost invariably positive, the animals breathing such infected air rapidly succumbing to the disease.