decrease of body temperature. At high atmospheric temperatures loss of heat from the body by radiation is little or nothing; but loss of heat by evaporation is very great, and this prevents body temperature rising above normal. At low atmospheric temperatures, although heat loss by radiation is very great, heat loss by evaporation is little or nothing, and consequently body temperature does not fall below normal.

If, however, by natural or artificial humidification the drying power of warm or hot air is reduced, the complementary relationship between loss of heat by radiation and loss of heat by evaporation is upset, loss of heat by radiation is reduced by the high atmospheric temperature, and loss of heat by evaporation is impeded by the reduced drying power of the air, and therefore body temperature rises. On the other hand, if, by natural or artificial desiccation, the drying power of cold air is increased, loss of heat by radiation is increased by the low atmospheric temperature, and loss of heat by evaporation is increased by the increased drying power of the air, and body temperature falls.

Heat Loss by Conduction and Convection.

The rate at which heat is being lost from the body by conduction and convection depends on the rate of movement of the air, or, which has the same effect, of the body. Loss of heat from the body by conduction and convection is increased by movement and impeded by stagnancy of the air. Hence if air is stagnant as well as hot and damp, loss of heat by conduction and convection is impeded, as well as by radiation and evaporation, and body temperature must rise. Hence also if air is moving as well as cold and dry, loss of heat by conduction and convection is increased, as well as by radiation and evaporation, and body temperature must fall.

In my first observation the body temperature of a healthy man was raised from 36.7° C. (98.2° F.) to 37.5° C. (99.6° F.) in thirty-eight minutes by going from a moving atmosphere having a dry-bulb temperature of 56.0° F. and a drying power of 17 grains per 10 cub. ft. into a stagnant atmosphere having a dry-bulb temperature of 77.0° F. and a drying power of 37 grains per 10 cub. ft. In this observation heat loss from the body by conduction and convection was reduced by going from the moving atmosphere outside the glass house into the stagnant atmosphere inside. Heat loss by radiation was reduced by going from the outside atmosphere having a dry-bulb temperature of 56.0° F. into an atmosphere within the glass house having a dry-bulb temperature twenty degrees higher—namely, 77.0° F. The impediment to loss of heat by conduction, convection, and radiation produced by this hot stagnant atmosphere caused the body temperature to rise to 37.5° C. (99.6° F.) in thirty-eight minutes, notwithstanding the fact that the drying power of the air, and consequently loss of heat from the body by evaporation, was increased by 20 grains per 10 cub. ft. In other words, the reduction of heat loss by radiation and conduction and convection caused by the hot stagnant atmosphere was greater than the increase of heat loss by evaporation due to the greater drying power of the air within the glass house, and consequently body temperature rose 0.8° C. (or 1.4° F.) in thirty-eight minutes.

As previously stated, I think that bodily discomfort begins as soon as the body temperature begins to rise above 37.2° C. (99.0° F.), from impediment to heat loss. To say briefly what are the lowest degrees of heat and humidity combined which give rise to this bodily discomfort is not so easy. Professor Haldane's statement that body temperature begins to rise above normal when the atmospheric temperature, wet bulb, rises above 70.0° F. approaches nearest to an accurate answer. And yet I suppose he does not intend to convey that this always holds good. If he does, then residents in hot climates would suffer from pyrexia more frequently even than they are known to do. When the dry-bulb temperature is, say, above 90.0° F., would a wet-bulb temperature of 70.0° F. cause the body temperature to rise above 37.2° C. (99.0° F.)? I think not.

In order to formulate an answer to the Secretary of State's question, it seems to me that it would be necessary to take into consideration three factors of the atmospheric environment found within the cotton-weaving sheds. These are, first, the dry-bulb temperature of the air, for by

the difference between this and the normal temperature of the body is regulated the rate at which heat is being lost from the body by radiation. Secondly, the drying power of the air at such dry-bulb temperature, for by this is regulated the rate at which heat is being lost from the body by evaporation. The drying power of air can be ascertained from Glaisher's tables if the dry-bulb temperature, and either the wet-bulb temperature or the absolute or relative humidity of the air are also known. And, thirdly, the rate of movement of the air, for by this is regulated the rate at which heat is being lost from the body by conduction and convection.

It should be remembered that in my observations the men were at rest. If, like the weavers in the cotton sheds, they had been doing hard, continuous work during the exposure, it is to be presumed that body temperature would have risen still higher.

As regards the danger to health involved by continuous hard work in a hot, damp, stagnant atmosphere, I think it is sufficiently obvious. Any one who sees a body of men, women, and children who have been exposed to a hot damp atmosphere, natural or artificial, cannot but be impressed by their anaemic appearance. In a higher degree it may be observed in troops returning to England after a few years' service in a hot climate. In a lower degree it may be observed in the workers in certain industries, such as the cotton-weaving sheds, who carry on their work in a hot, damp atmosphere. There is only a difference in degree. The troops in hot climates live for many months of the year in a hot, damp atmosphere from which they cannot escape. The workers in the hot damp atmosphere of the humid cotton-weaving sheds escape from it from 6 o'clock p.m., when work ceases, until 8 o'clock a.m., when work begins, and at intervals during the day for meals, etc.

The anaemia produced by the hot damp atmosphere in which work is carried on in certain industries is described by Malden in the *Journal of Hygiene*, 1907. He examined the blood of many workers in the aniline and nitrobenzin compounds works, and describes the results as follows:

1. The specific gravity of such blood is below normal.
2. The haemoglobin is reduced from 5 per cent. to 50 per cent.
3. The colour index is low.
4. Diminished polymorphonuclears.
5. Increased number of lymphocytes.
6. Reduced number of red corpuscles, which also show signs of degeneration and of imperfect development.

Malden apparently attributes these changes to the poisonous action of the dyes, but is it not plainly the result of the hot damp atmosphere in which the men work. And is it not exactly the same change which is found in the blood of those who reside in hot damp climates? Nay, more, is it not malarial blood minus the parasite? (See *Journal of Tropical Medicine*, March 15th, 1909.)

CLASSIFICATION OF CASES OF PULMONARY TUBERCULOSIS.

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A SIMPLE and easily-worked clinical classification of cases of pulmonary tuberculosis according to their gravity has long been a desideratum. Statistics comparing the results of different methods of treatment are of value only in so far as they deal with disease of the same degree of severity. A praiseworthy effort to secure the necessary precision led to Turban's classification, which recognizes three stadia or stages, as follows:

1. Disease of slight severity, affecting at most one lobe or two half-lobes.
2. Disease of slight severity, more extensive than first, but affecting at most two lobes; or severe, and affecting at most one lobe.
3. All cases of greater extent and severity than second.

This classification has the radical defect of fixing attention on what is not the most important aspect of the case—on its extent—the intensity of the disease

and its duration being left out of account. The modifications and improvements that it has undergone since it was first put forward diminish, but do not remove, the defect. The wide adoption of this anatomical classification, whether modified or not, seems to me to be responsible for a somewhat mechanical view of the disease, to the comparative disregard of its constitutional aspect.

Trudeau divides his cases into: (1) Incipient, (2) Advanced, (3) Far Advanced. In this classification the combination of local conditions and constitutional disturbance is recognized.

Nearly all the great clinicians—British, American, French, and German—of the past as well as of the present generation have classified cases as Acute and Chronic, with subdivisions based on the pathological condition, the pathological condition corresponding fairly well to the intensity.

Thus in the chief classifications of recent years the extent of the disease, its intensity, and its duration have served as principles of division. Alone, each principle of division can yield only distorted or inadequate results. While, as a joint principle of division, extent and intensity, not running parallel courses in pulmonary tuberculosis, must be forced somewhat in order to yield the rather rigid combination at present in vogue.

In the following classification I believe I have succeeded in allowing full value to each of the three aspects in question—Extent, Intensity, Duration—at the same time preserving their independence. This classification, while fuller and more exact, is also, I think, easier to apply than any previous scheme. In addition, I may say that it embodies a large amount of clinical experience.

The plan is to estimate numerically, according to the definitions presently to be given, the Extent, the Intensity, and the Duration of the disease, from 1, the lowest grade, to 5, the highest, except that the highest grade of Intensity must be taken to range from 5 to 10, so as to include excessively acute or fulminating cases. The sum of these figures will indicate the class in which the case is to be placed.

EXTENT.

Amount of Tubercle in Lung.

- E^1 = Not more than $\frac{1}{8}$ of the volume of one lung, whether in one spot (massive), or distributed throughout both lungs (scattered).
 E^2 = Not more than $\frac{1}{4}$ of the volume of one lung, whether in one spot (massive), or distributed throughout both lungs (scattered).
 E^3 = Not more than $\frac{1}{2}$ of the volume of one lung, whether in one spot (massive), or distributed throughout both lungs (scattered).
 E^4 = Not more than $\frac{3}{8}$ — $\frac{1}{2}$, or roughly $\frac{1}{2}$, of the volume of one lung, whether in one spot (massive), or distributed throughout both lungs (scattered).
 E^5 = Not more than $\frac{1}{2}$ — $\frac{3}{4}$, or roughly $\frac{3}{4}$, of the volume of one lung, whether in one spot (massive), or distributed throughout both lungs (scattered).

INTENSITY.

All the conditions named under one heading need not be present at the same time.

- I^1 = Sluggish, with little or no rise of temperature or other general symptoms. Only slight, if any, hæmoptysis. Physical signs of active disease slight, just detectable.
 I^2 = Slight pyrexia and night sweats; moderate loss of appetite and of strength. Physical signs of moderate activity. Bronchial catarrh, if present, slight in amount and restricted to the area of tubercle.
 I^3 = Moderate fever and night sweats; seriously impaired health; loss of strength and of weight. Hæmoptysis, if present, followed by continued pyrexia. Physical signs of softening or of cavity formation. Bronchitis, if present, more marked or more diffused than in I^2 . Recent tubercle, if elsewhere than in lungs, very slight.
 I^4 = Grave constitutional disturbance—more pronounced than in I^3 . Physical signs of greater activity. Bronchitis, if present, more marked or more diffused. Tubercle, if present elsewhere, more active than in I^3 .
 I^{5-10} = Very serious illness. Physical signs more active still. Bronchial catarrh more pronounced or more diffused. Acute or fulminating phthisis.

DURATION.

- D^1 = not over 3 months. D^4 = not over 3 years.
 D^2 = " 6 " D^5 = over 3 years.
 D^3 = " 1 year.

CLASSES.

- I = 3 IV = 10-12
 II = 4-6 V = 13-15
 III = 7-9

EXAMPLES OF CLASSES.

$$\begin{array}{l|l} E^1 + I^1 + D^1 = 3 = \text{I} & E^3 + I^5 + D^4 = 12 = \text{IV} \\ E^2 + I^3 + D^1 = 6 = \text{II} & E^4 + I^4 + D^5 = 13 = \text{V} \\ E^2 + I^3 + D^3 = 8 = \text{III} & E^2 + I^{10} + D^1 = 13 = \text{V} \end{array}$$

Extent, Intensity, and Duration are to be understood as indicating the extent, intensity, and duration at the time of examination. The disease may begin with I^5 and end with I^1 or arrest. Similarly in a case that is undergoing arrest the extent may have been E^5 ; but by the removal or transformation of the diseased tissue, the volume of actual tubercle may have diminished to E^1 . Likewise in regard to duration there may have been a previous attack in which complete healing took place, only fibroid tissue or a cavity remaining as evidence of the former tubercle. In such a case a fresh attack would be marked D^1 for the first three months, and so on.

By this notation the fluctuations in Extent and in Intensity are readily and exactly shown; but a seeming difficulty is presented by the Duration, which would continue adding to the gravity of the case. Within certain limits this corresponds with the clinical facts; but in regressive or healing cases some correction may be needed. The correction is required only when the higher grades, 4 or 5, of Duration coexist with rapidly vanishing Extent and Intensity. The simplest way of making the correction is, I think, by deducting instead of adding a point for the Extent or for the Intensity when the grade of either has fallen to 1 from some higher grade within the previous three months. In the case of D^5 , where both E and I had fallen to E^1 and I^1 within the previous three months, two points would be deducted. This could be expressed as follows: $E^{-1} + I^{-1} + D^5 = 3 = \text{I}$.

A CASE OF ACUTE LUPUS ERYTHEMATOSUS.

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Not alone the rarity of the following case—Mr. (now Sir) Jonathan Hutchinson, with whom we were able to discuss it, having declared it to be unique in his experience—but also its apparent purity and freedom from complications, and the presence of symptoms not previously recorded, justify the publication of these notes.

A young lady, aged 15, had been out of sorts for some days before medical advice was sought. She complained at that time (the beginning of April, 1908) of headache, loss of appetite, and a little nausea. In a little time these symptoms abated sufficiently to permit her to return to school; but after a few days they reasserted themselves, and she took to her bed. At that time, too, slight evening rises in temperature were noted—from 99° to 99.5° F. Generally a bright, high-spirited girl, she now lay in bed, pale, listless, with eyes closed, but keenly alive to all that was going on around her. The pulse-rate was not increased. She rather shunned the light, and was unusually sensitive to cold. The conjunctivæ were slightly injected. The tongue was moist, furred, broad, indented at the edges, and, what attracted particular attention, was very tremulous. There were no sordes; the lips and gums were pale. The breath was somewhat offensive, and on further examination of the mouth we were surprised to find two ulcers on the hard palate, one on each side of the raphe, each nearly 1 in. in length and $\frac{1}{2}$ to $\frac{3}{4}$ in. wide, dusky red, with irregular, flat edges, and bleeding readily on touch, but not tender. There was a similar but smaller ulcer on the posterior wall of the pharynx. The patient was quite unconscious of their existence, and had made no complaints respecting her mouth. No glands could be felt.

A remarkable appearance was presented by the hands and feet. The skin over the back of the second and third phalanges of each finger and toe, and over the terminal phalanx of each thumb, was thin, as though tightly stretched over the bones, yellowish-white and waxy in appearance. Around each nail this colour changed to a reddish-purple mottling, and the skin was shrivelled. Around the nail of each little finger the skin was very superficially ulcerated, and as though worm-eaten. The palmar surface of each finger-tip was similarly discoloured and shrivelled. On the hypothenar eminence were splashes and dots of purplish-red, not raised above the level of the skin, and a few delicate patches were also seen on the ball of each thumb. The finger-tips were a little tender, the toes distinctly so. The lobes of the ears were slightly swollen, dusky-red, and scaly. These changes were symmetrical, but rather more pronounced on the left side. They had been noted by the mother some four months before, but no special notice was taken of them, the