

## 16. ON THE INFLUENCE OF THE EXERCISE UPON THE EXCITABILITY OF LOCAL SWEAT GLANDS IN HUMAN SUBJECTS.

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We have experimented how the individuals local sweat glands are stimulated by movement.

We have measured the local sweat gland stimulation by the iodine-starch method of Wada and Takagaki. This is done by injecting various concentrations of adrenaline cutaneously on the dorsal surface of the forearm and the threshold of sweating can be obtained by the minimal effective concentration of adrenaline. We began our experiments when no sign of spontaneous sweating could be seen. We experimented on 18 males and 23 females with the ages between 16-45.

(1) As reported before the minimal effective concentration of adrenaline is balanced and has little influence by the season, so we observed the difference in day and night. The temperature varied but 14 males and females had no change and one had change so it can be thought that there was hardly any change in the day and night.

(2) By contraction and extension of the arm we had the persons make a 4kg weight move 1 meter using a pulley for 40-50 times per minute for five minutes. They all had no difference in the contrast left arm.

(3) The effects of running are as given on the table. Running 100 meters there could not be seen any marked changes in the stimulation of the sweat glands like exercise of one arm. But running 500 meters there could be seen a one to two figure decrease in the threshold value, in other words an increase in the stimulation. If the amount of exercise increased this increased also. But in people who are used to exercise the recovery of the sweat glands stimulation seems to be faster.

## 17. MEDICAL CLIMATOLOGY OF MOUNTAIN CLIMBING

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Mountain climbing as a recreation or sport not only has muscle exercise and mental liberty effects, but the surrounding climate changes also has effect on the living body. Recently the number of people climbing mountains has increased and also there are many accidents too. The main reason people die is because of the violence of the weather. We have studied the atmospheric phenomena and 2-3 body changes when climbing mountains.

We took Mt. Hakuba which is rather popular for our test. The first day we went as far as Shirauma-jiri 1572 meters high and camped there. On the second day we

reached the top 2933 meters and from here we went to Oike 2400 meters around 18:30 and stayed over night. People tested were girl university students. A carrying 16 kg and B carrying 14 kg. On the way down it was a little lighter but this did not have to much difference.

The difference in temperature between Tokyo and Matsumoto was about 2 degrees C., Matsumoto being the lower (one year average) and having mountain climate. When we reached Matsumoto at 0:800 on the 27th the temperature was 32° C. From Matsumoto we got a train and it was 26.5 C at the end of the line at 11:39, with the temperature difference of 6° C in 2 hours. From here we got a bus and next started climbing and reached 1570 meters at 12:00. At this point the temperature was 17.5° C. a decrease of 9° C. An hour and 50 minutes later the temperature dropped 13° C. at this point. On the second day (28th) we got up at 0.500 and left camp at 0.620. At 5:15 the temperature was 13.5° C. As the graph shows the temperature went up with the sun to 0:900. From 0:900 to when we reached the top 13:35 "b" point in 4 hours and 30 minutes the temperature dropped 7 degrees C. and during this time we climbed a severe slope of 833 meters. From this point we started climbing down and as "c" shows the temperature decreased, but the sun became low so a marked difference couldn't be seen.

On the day we climbed, the daily temperature difference in Tokyo was about 7° C. The climbers experienced over 10° C. difference in about 2 hours and also the daily temperature difference was about 17° C. in a few hours. When we compare this with the temperature of one year it is equivilant to the difference of April to August or August to the middle of October and the climbers experienced this in nearly a day or two.

On the other handt he radiant heat was very strong during the day. (29°-41° C.) Radiant heat was always higher than Tokyo and the humidity was always lower. In these two atmospheric phenomena, a mountain climber is using heavy muscular exercise and perspiring a great deal. The streams varied at places with the temperature between 12°-3° C. and this gave the climbers spirit.

Climbing does not require the moment starting power like other sports, but the pulse rate was 1.5-2.0 times of that of during rest time. When climbing a severe slope it was over about 3 times. This kind of pulse beating can't be found in other sports very often. Running 100 meters (19 seconds), running 2 minutes, having a 14kg burden and going up and down a 10 inch stool 5 minutes the pulse rate finally became about 2 times of that when standing up still. Also after these exercises the pulse beat took 20 minutes to become normal so climbing with only 10 minutes rest means that it had not got to normal before climbing again.

The production of heat is very large when climbing, but the surrounding condition makes it easy for the heat to radiate so the body temperature does not rise.

## 18. SOME CHEMICAL AGENTS EXCRETED IN SWEAT CONCERNING THE TEST FOR FATIGUE

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After perspiring, if a large amount of water is taken there is a large difference