Length of stride, stride frequency, "flight" period and maximum distance between the feet during running with different speeds.

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With 5 graphs in the text.

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Without any doubt running is the most fundamental branch of athletics. Nevertheless relatively little research work has been done in analysing running in its different elements. The present paper is an attempt to analyse running from a physiological point of view and if possible give a more realistic guidance for the training of different individuals.

In the present study the relationship between speed, length of stride, stride frequency and the "flight period" has been investigated during running at speeds between 8 and 30 km/hr. Even the relationship between length of stride and the maximum distance between the feet at different speeds has been analysed.

The length of stride is here defined as the distance between the foot marks on the track. Stride frequency is the number of strides per min. The maximal distance between the feet has been measured as the distance from the toes of the front foot to that part of the back foot which went furthest back (comp. fig. 1).

The "flight period" is the time when the body is clear off the ground, and "footcontact" occurs when one foot is of the ground during a stride.

Methods used.

All the experiments have been carried out in the laboratory on a treadmill, so that conditions remained exactly the same.

1. The measuring of stride and stride frequency at different speeds.

The treadmill was regulated to the required speed and the subject was given a short time to "get into his stride". The time was taken for 30, 20 or 10 double steps, the number depending on the speed. The length of stride was calculated from the speed and stride frequency.

2. The measuring of the greatest distance between the feet at various speeds (see fig. 1).
A thin sheet of cardboard was held vertically in front of the runner, so near that he almost touched it with his foot. A mark was made on a measuring tape on the floor to show how far forward the foot went (while in the air). In a similar manner a sheet was at the same time held behind the runner to measure how far back his foot went (while in the air).

3. The measuring of the “flight period” and “footcontact” at different speeds.

Two assistants lying on the floor sighted the point where the foot touched the treadmill and the point where it left it (compare fig. 1). Knowing this distance and knowing the time for a whole stride, the time for “footcontact” and even the time for the “flight period” can be calculated. At a certain speed of the treadmill a constant relationship between time and distance exists. Consequently the “flight period” can be calculated as percentage of the whole stride. If f.i. the foot travels 90 cm and the stride is 200 cm “footcontact” is \( \frac{90 \times 100}{200} = 45\% \) of the whole stride and the “flight period” 55\%.