In this paper we present some remarks, of a methodological nature, on the interpretation of plethysmographic data, recorded on the simplest and most widely used model, the Mosso-Novitsky plethysmograph. A number of the remarks may also be applicable to other types of the instrument.

Many authors, using the plethysmograph with a constant level of fluid in Tube 1 (Figure 1), find different values for the amplitude of the pulse oscillations in different subjects. Some authors consider the amplitude of the oscillations to be one of the quantitative indicators of vascular tonus. All other factors being equal, the magnitude of these oscillations is a function of the ratio between the external pressure exerted by the column of water in the tube and the internal pressure of the blood in the vessels of the extremity. It will be greatest when the external pressure approaches the average arterial pressure, as is shown by the tracings of Figure 1, b, in which (from below up) $P_1 < P_2 < \text{average} \ P > P_3$. Following from this, it would seem to us to be more rational to use the instrument at a constant physiological, rather than physical, level, choosing the pressure at which the pulse oscillations are maximum for a given individual, using any other type of plethysmograph. The instrument is under such conditions more sensitive to variations in the volume of the extremity, if the vertical Tube 1 is replaced by Tube 2, inclined at an angle of $30-40^\circ$ (see Figure 1). Apart from this, with correspondingly equal
changes in the volume of an extremity, the latter is less subject to the effect of the external pressure exerted
by the column of water.

Fig. 2. Movements of the stylus
during development of a direct
and a return reaction.

Fig. 3. Example of spurious asymmetry, in the reaction to counting from 20 to 1. Explanation of curves (from above down): plethysmogram, from the left hand, from the right hand, pneumogram, signal showing time and duration of action of the conditioned and unconditional stimuli (the former act over the whole duration of the latter), time signal (5 second intervals). Upward deviations from the initial level indicate, respectively: on the plethysmogram, diminution in volume of the extremity; on the pneumogram, expiration; downward deviations similarly indicate: on the plethysmogram, increase in volume of the extremity; on the pneumogram, inspiration. The graduations of the ordinate axis are each 1 cm, and of the abscissa, 5 second intervals.

In examining a plethysmogram, we pay particular attention to the height of the waves, to their velocity of
development, and to the symmetry or lack of symmetry of the reactions. However, plethysmograms do not al-
ways give a correct picture of the changes in volume of the extremity concerned. Comparisons of the magni-
tudes of different reactions are usually based on the amplitude of the fluctuations in volume, without taking
into account that the relation between the displacement of the stylus and that of the water in the plethysmo-
graph tube is not a linear one. It is for this reason necessary to calibrate the instrument so as to determine the
dependence (expressed graphically) between the displacement of the water level in the plethysmograph tube and the displacement of the stylus. The comparative evaluation of the magnitude of a reaction should be based
not on the amplitude of the oscillations seen in the tracings, but on the corresponding changes in the level of
the water column in the plethysmograph Tube 2, as derived from the calibration curve. Calibration gives one
the possibility of comparing data obtained from different instruments.

The above remarks on the magnitude of the reaction also apply to the speed of development of the direct
and return reactions. A precise assessment of the speed of development of a reaction is complicated by the cir-
cumstance that the vertical movements of the stylus are along an arc, and not along a straight line (Figure 2).
For this reason, the frequently applied method of assessing time as being the point of projection of a curve on
the abscissa axis gives an incorrect value; for example, in Figure 2 the return reaction is completed not at