Commentaries

"Comparison of values for maximal oxygen intake obtained in cross-sectional and longitudinal studies," by Lars Hermansen and Kåre Rodahl (Institute of Work Physiology, Oslo, Norway). Maximal oxygen intake is perhaps the most widely accepted parameter for estimation of the individual's physical performance capacity. Most population studies describing the variation in maximal oxygen intake with age have been performed as cross-sectional studies. The aim of the present investigation was to compare the results obtained in cross-sectional and longitudinal studies of the same population. Altogether 308 subjects aged 10 to 16 years participated. Of these, 28 female and 30 male subjects were studied twice a year during the period from April 1968 to April 1970. The mean values for maximal oxygen intake were higher than in other studies reported in the literature. The mean values for maximal oxygen intake in the longitudinal study were approximately the same as those obtained in the cross-sectional study.

"Metabolic energy cost and terrain coefficients of walking on snow," by R.F. Goldman, M.F. Haisman, and K.B. Pandolf (US Army Research Institute of Environmental Medicine, Natick, Mass., USA). Terrain coefficients for light and heavy brush, swamp, and sandy level terrains were derived in a previous study (Soule and Goldman, 1972) as empiric co-efficients to fit the measured data to a basic treadmill energy cost prediction equation (Givoni and Goldman, 1971). The present study aimed to produce a terrain coefficient for snow of various depths. Ten subjects each walked at two speeds, 0.66 and 1.11 m/s (1.5 and 2.5 mph), on a level treadmill and on a variety of snow depths. Expired air was sampled, using a Max Planck gasometer, during minutes 4-9 and 10-15 of the 15 minute walks. Snow profiles (i.e., snow depth, footprint depression, density, temperature, and hardness) were constructed for the various walks. The ratio of the energy cost of walking at the same speed on the treadmill increased linearly with increasing depth of footprint. At a 17.0 cm depth of footprint, the energy cost roughly triples. Thus, at this snow depression, energy expenditure at 1.11 m/s with about 9 kg of clothing and respirometer weight had reached the rather high levels of about 900 kcal/hr. This is certainly well above the value of 425 kcal/hr ± 10% described as self-paced "hard work" for various terrains and loads (Hughes and Goldman, 1970). Clearly, greater snow depressions (>17.0 cm) should slow walking speed to below 1.1 m/s. The energy cost of walking on snow may also depend on the specific characteristics of the snow. Snowfalls with markedly different physical characteristics were encountered at approximately 16 cm snow depression, the hardness of one being about three times that of the other. At a speed of 1.11 m/s the energy cost of the harder and crusted snow was about 70 kcal/hr greater than that of the fluffier snow, despite similar footprint depths. The least fit (and also heaviest subject) could only complete 8 minutes of the walk at that speed at the greater hardness. Markedly different gaits were observed for these two conditions, with higher leg lift and more static work required at greater hardness. The energy cost of walking on snow in this study agrees fairly well with that reported by Ramaswamy et al. (1966) for Indian soldiers, but lies above the data of Heinonen et al. (1959) at a snow depression of 15 cm.