environmental temperatures of 0° and 25°C subsequent to the aerodynamic study. Six male, middle distance runners performed 30 minute runs on a treadmill at a pace requiring approximately 75% of maximum oxygen uptake against a fan generated wind of 4.2 $m.sec^{-1}$. Oxygen uptake kinetics, heart rate, sweating rate, core and skin temperature and perceived exertion were recorded. At 25°C, the K suit retained 23.5 and the B suit 9.1 times as much sweat as SS apparel ($p<.05$). Both suits were intolerable to running beyond 22 and 25 minutes, respectively ($p<.05$) at the designated speed. At 0°C, subject tolerance for all apparels exceeded the criterion time. In the cool (0°C) condition the comparatively high air permeability of the L suit resulted in a significantly lower core temerature increase ($p<.05$), compared with the other apparels. Even in cool conditions, the K suit retained significantly more sweat than the other apparels ($p<.05$) however subjects favoured the K suit over the B suit due to its lighter weight and greater stretchability. This research suggests that aerodynamic clothing may impact significantly upon running performance. In order to maintain efficient thermoregulation during extended wear in the hotter environment, future running suits should be developed from stretchable materials which have better vapour permeability.

Acknowledgements

This work was supported by the National Research Council of Canada. The authors are grateful to Fitz-Wright Company Limited (Canada) and Kuwata Rubber Company (Japan) for their assistance.

10 **The effects of local cooling on physiological responses and thermal comfort in resting man**

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Abstract not available at time of printing.

Session III
Protection Against Heat
Abstracts 11-18

11 **The measurement of clothing air exchange and its role in clothing design**

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Since the development of the trace gas technique for investigating the air exchange of the micro-environment of fishermen's clothing in the late 1960's, the technique has been used by a number of research groups. The designs and fabrics of a wide range of garments from ladies' skirts to survival clothing have been assessed using the technique. Sleeping bags have also been investigated using the method. The work on clothing using a trace gas will be reviewed and the technical aspects of the technique and investigative procedures discussed and assessed.

The basic principle of the technique and the equipment required is simple but the research worker has to ask how accurately it indicates micro-environment air exchange and how much the investigator can learn about garment fabrics and designs. The physiological significance of air exchange rates will be assessed and the methods of improving their value in this respect by measuring the micro-environment volume reviewed and discussed.