

Van Dyck, Rembrandt (two works), Heda, Hals, Ter Borch, and Van Ruisdael. The Italian masters are represented in works dating from the sixteenth century by Caravaggio (*The Lute Player*), Fetti, Tiepolo, Guardi, and Titian. Gainsborough's (*Portrait of a Lady*) comes from England and Cranach's sixteenth century *The Madonna of the Apple Tree* represents German Renaissance art. Spanish paintings include works by Zubaran, Velazquez and Murillo, plus two early works by Picasso. Art from France is displayed in paintings by Le Nain, Poussin, Claude Lorrain, Chardin, Fragonard and Boucher, with Cézanne, Gauguin and two works by Matisse illustrating nineteenth and twentieth century art.

The 12 examples of Russian art from The State Russian Museum of Leningrad date from 1773 to 1906 and include landscapes by Ivanov and Levitan and portraits by Repin (*Tolstoy* and *Anton Rubinstein*), by Kramskoy and by Bakst (of the choreographer *Sergei Daighilev*).

The exhibition tour marks an important development in the growing cultural relations between Canada and the U.S.S.R., under the terms of the General Exchange Agreement signed in Ottawa by Prime Minister Trudeau and Premier Kosygin in October 1971, and the Final Act of the Conference on Security and Co-operation in Europe signed in Helsinki in August 1975.

### Military association centennial

Canada's oldest military confederation marks its hundredth anniversary this September 17 when the Royal Canadian Artillery Association celebrates its centennial in Ottawa.

Events in honour of the occasion will be held across Canada by regular and militia artillery units throughout the period from September 3 to 20.

Formed in 1876 by Major-General Thomas Bland Strange, the association set as its original aim "the development of gunnery skill, and the dissemination of artillery knowledge throughout the Dominion of Canada".

The Artillery Association now forms part of the national Conference of Defence Associations, which provides various service groups across the country with a forum for presenting

their views and recommendations regarding defence policies to the Minister of National Defence and to the Chief of the Defence Staff.

Among dignitaries and prominent artillery figures scheduled to attend this year's meeting will be Field Marshal Sir Geoffrey Baker of Britain, Brigadier-General E.M.D. Leslie, Colonel Commandant of the Royal Regiment of Canadian Artillery and Major-General H.A. Sparling, the regiment's past Colonel Commandant.

### Athletes — born or made?

Dr. Vassilis Klissouras, a physiology and education professor at Montréal's McGill University, has carried out studies on some 200 sets of twins to determine the relative importance of heredity and environment in a human being's functional capacity, particularly in regard to athletic ability. He concludes that physical training can increase individual capacity but only within the limits of genetic make-up.

The professor decided in 1968 that the study of twins was the best way to tackle the question since identical twins have the same genetic make-up; therefore, any differences between the two can be ascribed to events which are not hereditary. Fraternal twins, on the other hand, have different genotypes and can be viewed as siblings of the same age. Some 50 per cent of the twins studied were identical, the others non-identical.

### Method

To gauge the functional capacities of the participants, Dr. Klissouras measured their maximal oxygen uptake after they had exercised to exhaustion on a stationary bicycle or treadmill. Air containing a measured amount of oxygen was fed to the subject to breathe through one apparatus while the exhaled air, containing oxygen and carbon dioxide, was collected in another. Computations could thus be made of the amount of oxygen being picked up from the bloodstream by the body tissues. The oxygen uptake reaches its maximum when the subject is close to exhaustion since the tissues then crave oxygen. The test is based on the principle that the higher a person's maximal oxygen uptake per kilo-

gram body weight, the better the functional capability and thus the athletic ability.

### Other experiments

Dr. Klissouras has undertaken a number of different types of experiment. In an early study, for example, he worked with 25 pairs of twins — 15 identical and ten non-identical. The subjects, who ranged in age from seven to 13 years, were each asked to perform a series of runs on a treadmill. Measurements were made of maximal oxygen uptake and of maximal blood lactate concentration, which is an indication of anaerobic (non-oxygen) functional capacity. The results showed a much greater difference between the uptake values for non-identical twins than for identical twins. In fact the differences between individual identical twins were so minimal the researchers concluded that heredity accounts almost entirely for differences in functional capacity.

### Follow-up study confirms

Because the subjects in this experiment were young, it could be argued that environmental influences, had some influence on maximal oxygen uptake. Dr. Klissouras therefore did a follow-up study to determine whether the small differences between identical twins and the marked differences between non-identical twins persist throughout life. Thirty-nine pairs of twins (23 identical and 16 non-identical) of both sexes ranging in age from nine to 52 years were used as subjects.

The results of this follow-up study confirmed the conclusion that heredity was the overriding factor.

### Effects of training

These two studies illustrate the importance of heredity rather than environment in functional capacity. However, they do not take into account the potential effects of training on athletic ability.

To obtain some insight into this, Dr. Klissouras tested a pair of identical twins over one-and-a-half years. One trained as an athlete, the other did not. The untrained twin had a maximal oxygen uptake of 35.9 millilitres per kilogram body weight, whereas his trained