



### Effect of Nutritional Substances\* on Work Capacity during Stay in a Subtropical Climate

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Through a recently performed experiment involving 90 Polish soldiers – divided into three groups during a stay in a subtropical climate – it was possible to demonstrate deterioration in physical and mental capacity during the period of adaptation. Administration of preparations containing pollen extracts and amino acids significantly improved physical performance, for example, in long-distance running, long jumping, the formation of lactate after exercise on a bicycle ergonometre, as well as concentration and subjective well-being.

As yet, no explanation can be offered for the effects observed.

In 1978, some Polish soldiers participated in the peacekeeping forces stationed by the United Nations at the Suez Canal following the Egyptian-Israeli conflict.

The region has a subtropical climate, with an average temperature approaching 30°C during the six months of summer. Past experience has shown that such temperatures normally affect people from more temperate climates. The result is that work capacity and physical performance are impaired over a fairly long period of adaptation. In addition, concentration and subjective well-being are adversely affected.

In order firstly to survey the extent of such changes and secondly to establish whether the changes could be affected by the administration of pollen extract and amino acids, 90 soldiers were subjected to a thorough examination before and during a 5-month stay in this region. The chosen method of therapy was partly based on an experiment by Jethon and others on weightlifters, in which these preparations were shown to affect significantly the weightlifters' physical performance.

#### Test Subjects:

90 Polish soldiers, with special training as drivers, were assigned at random to 1 of 3 companies to serve at the Suez Canal. Ages varied between 20 and 33 years, average weight was 66 kg and average height was 171 cm. All were in good health, and were mentally and physically fit.

#### Procedure:

Soldiers in two of the three platoons were given nutritional preparations, while the third served as a control group. One of the first two groups was given only pollen extract (Pollitab Sport – 4 tablets – daily, at mealtimes). The second group also received extra amino acids ("Stark-protein", 1/4 g daily), also at mealtimes. All groups had identical diets, duties and training programs.

The soldiers' physical performance was analyzed before their departure from Poland, then after 1, 2, 3, 4,

\*Pollen extracts and amino acids.   ks in the subtropical climate.

A number of measures of performance were used to evaluate physical performance, including running for various periods of time, press-ups, long-jumping and increases in the blood's level of lactic acid following

standard exercise on a bicycle ergonometre. Physical performance was measured at the same times of day, including by the Bourdon test of speed and mental efficiency, the Wiersma test of concentration, and subjective assessments of well-being on an analogue 7-point scale.

The results obtained were dealt with using normal statistical procedures and the Student t-test.

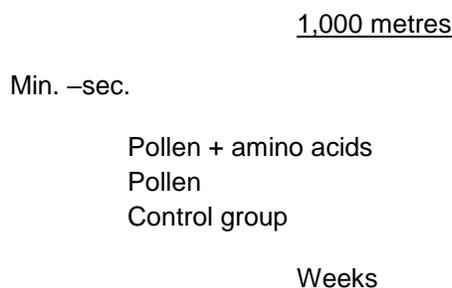
### Results:

Full results from the experiment were published in a doctoral dissertation (Dabrowski, 1980). The main positive findings are summarized below.

In practically all indications obtained of physical and mental performance, there was a significant, distinct deterioration during the first two to three weeks in the specific climate. This corresponds fully to findings from previous experiments (Falkiewics, 1966, 1971 and Galubinski, 1979). A gradual recovery was then observed during the 5-month long stay, but the degree of recovery differed considerably from individual to individual. In the majority of individuals and variable values, the recovery never matched the original values.

The interesting result of this experiment was the consistent and typical difference obtained for most variables throughout the three groups. Recovery in the control group was slowest and the least complete, while recovery in the groups given the nutritive was clearly fuller and more rapid. The recovery in performance was greatest in the group given the combination of pollen extract and amino acids. A comparison between the latter group and the control group revealed a significant difference ( $p < 0.01$ ) for 1,000 metres running, long jumping, lactate increase after exercise and tests of concentration and subjective well-being. (Figures 1-5).

### Figure 1



### Figure 2



Pollen + amino acids  
Pollen  
Control groups

Weeks

Figure 3

mMol/l

Lactate

Control  
Pollen  
Pollen + amino acids

Weeks

Figure 4

Concentration

Points

Pollen + amino acids  
Pollen  
Control group

Weeks

Figure 5

Well-Being

Points

Pollen + amino acids  
Pollen  
Control group

Weeks

Discussion:

This experiment clearly confirms previous findings – for example, by Jethon and others –that physical performance is improved by the administration of certain nutritional substances. It may also be said that the changes observed are remarkably substantial and it would be desirable for the results to be explained, for example, by metabolic change ( lactate formation during exercise, enzyme effect, etc.). However, such

an explanation cannot easily be offered without further research. Although amino acids make a valuable contribution to physical build-up and enzyme synthesis, the quantity of protein administered is too little, in comparison to a normal daily protein intake (70 g), to have any significant impact on the nitrogen balance. It is possible that administering a balanced intake of all the amino acids in this way could be beneficial, in comparison with intake via a normal diet. However, since both milk and meat formed part of the diet, this hypothesis does not provide an adequate explanation either. Similarly, it is hard to account for the effect of the pollen extracts. In previous experiments, it has been observed that these extracts had a “performance-raising” and roborant effect (Dubrisay, 1978). However, the problem here is that an extract knowledge of all the active ingredients in pollen extracts is not available. A number of different growth steroids with growth-stimulating effects in plants could be the active agents.

Nevertheless, considerably more research is needed in this area if these strong, but difficult to explain, correlations between nutritional preparation and performance are to be accounted for.

#### Summary:

Through a recently performed experiment involving 90 Polish soldiers – divided into three groups during a stay in a subtropical climate – it was possible to demonstrate a deterioration in physical and mental capacity during the period of adaptation. Administration of preparations containing pollen extracts and amino acids significantly improved physical performance, for example, in long-distance running, long jumping, the formation of lactate after exercise on a bicycle ergometer, as well as concentration and subjective well-being.

As yet, no explanation can be offered for the effects.

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