

**An Experiment****HOW TO KEEP FIT**

By DON BRAZIER

"An evaluation of some methods of improving muscle strength" is the title of a paper given by Dr. W. K. T. Josenhans of the Dept. of Physiology to the Canadian Federation of Biological Sciences.

This paper was the result of experiments made in order "to achieve the maximal gains in strength within a given time". The main overall purpose of the experiments, commented Dr. Josenhans, is the "progress you can achieve in a given period with various types of training procedures".

Dr. Josenhans came to Canada in 1958 and has been associated Prof. of Physiology since January 1960. He was born in Wildbad, Germany, in 1922. His decision to enter the medical profession was no innovation to the Josenhans family, his father and his grandfather both having been doctors before him. Following his graduation from medical school at Tübingen he did research at the Institute of Physiology at Bonn. While there he published his first paper entitled **Respiratory Physiology**. Since that time he has published 31 papers, the latest one of which is to appear in a special edition of the **Revue Canadien de Biologie** (University de Montreal Press) entitled "An International Symposium Issue on Progress in Muscle Research"; this paper is the result of experiments carried out following the presentation of the paper on muscle strength.

Research into the effects of muscle contractions is by no means new. Dr. Josenhans notes that no less than 22 workers in the field have published papers on the subject. The most famous and the most publicised study to date has been made by Hettinger at the Max Planck Institute. "However," said Dr. Josenhans, "Hettinger made claims that I could not substantiate". It was Hettinger's claim that one maximal contraction per day of 6 seconds is optimal. Hettinger's results have gained notoriety, primarily because of their advocacy by Phil Rizzuto, formerly short stop of the New York Yankees, in an article, "How to keep fit in 36 seconds a day", in which Rizzuto shows that by performing 6 exercises daily for a time of 6 seconds one can achieve a state of complete physical fitness.

Dr. Josenhans' apparatus for his experiments consisted of "water-filled hot water bottles in canvas bags. The muscle force-created by the subject's pressing the free end of a limb against the bag—was converted into water pressure and this was simultaneously recorded with a standard pressure gauge". Said Dr. Josenhans, "The highest value of four recorded contractions at one sitting was considered to be the maximal muscle force . . . a later analysis revealed that the increase in muscle force was significantly related to the number of contractions. It was found that the muscle force of normal muscles is augmented by each contraction; however the effect of each contraction becomes smaller . . . the more contractions are performed per unit time".

In discussing the conclusions that can be gathered from his experiments Dr. Josenhans stated that the results help to "explain some discrepancies in the literature and they may be useful for arranging the training of healthy people". Hettinger and his co-workers found that the amount of tension used in training is of prime importance. "We" commented Dr. Josenhans, "do not agree. We agree, however . . . in stressing the importance of the **number** of contractions in a given period". Dr. Josenhans experiments not only have the virtue of demonstrating the fallacies in the Rizzuto-sponsored (the lazy man's way of exercising) Hettinger-Muller exercising, but they also have the virtue of suggesting the way in which one could arrange a more trustworthy set of exercises

**In Muscle Tension**

For the athletically inclined, here are Dr. Josenhans' conclusions summarized.

(1) Each muscle contraction increases the muscle strength when at least 25% of the muscle forced is used.

(2) When contracting more than once per day there is further gain in strength but the gain per contraction decreases with the increasing number of contractions per day.

(3) The gain in muscle force increases when the same number of contractions is spread over a longer period of time.

(4) The duration of the contractions is of relatively minor importance.

(5) The motivations of the subject is of prime importance.

(6) When one trains for an increase in muscle strength an increase in muscle endurance follows automatically.

(7) When within a given period of time a maximal increase of muscle force must be obtained, it seems advisable to exercise as often as possible, making use of open competition.



**SIR RUDOLPH PETERS**, noted British biochemist and leader of the group which discovered BAL, an arsenical war gas, is presently in Dalhousie's Pharmacology Department, where he will lecture and undertake research on carbon-fluorine compounds. His three-month visiting professorship was sponsored by the Canadian Medical Research Council on the suggestion of Dr. Aldous and Dr. McCarter. He has been interested in the compounds, which become lethal when converted to metabolic products, since 1947. He has also worked extensively on thiamine, nutrition, and burns. He is a graduate of Cambridge University and is on Honorary Fellow of Gonville Caius Colleges, Cambridge, and of Trinity College, Oxford. He was Professor of Biochemistry in Oxford University for 31 years. He is now retiring President of the International Council of Scientific Unions (ICSU).

**WHAT PRICE? . . .****Education: B A**

By PAUL McISAAC

The motives which lead an individual to embark upon a university education are familiar enough, ranging from bright idealism to cold practicality. Whatever the goal, however, the problems of remaining in university and of securing the necessary amount of credits must be faced constantly. All students alike, from the girl in search of a wedding band to the student in pursuit of a doctorate, somehow must manage to maintain a standing good enough to justify continuation of attendance in the face of problems peculiar to the modern university.

Chief among these problems is the increasing lack of individual contact between professor and student, the result of continual enlargement of classes as admission standards become easier to satisfy. Faced by a class of enormous size, both student and professor must either seek to resolve the dilemma as satisfactorily as possible or allow themselves to be defeated by the apparent impossibility of the situation. The professor hires assistants and recommends tutors, both generally from the ranks of advanced or graduate students. If he is wise, the professor establishes a contact with his class that is both general in its application and individual in its approach: he expects as much of himself as he does of his students. The student, on the other hand, either works as diligently as possible, availing himself of the aids available, or he cheats, by hiring another, apparently more intelligent and perceptive individual to evaluate the examination possibilities and to feed the answers to the probable questions to him.

Two recent articles in **MacLean's Magazine** discuss the implications of overcrowding and the lack of personal contact on the student's university career. One article is the self-expose of a "ghost student" named John James who makes his living by guaranteeing, for a fee, passes for the students who choose to give up hope of ever accomplishing anything by individual effort and seek his services. The other article, by Hilda Neatby, evaluates the situation which encourages enterprises such as James'.

The system described by James in his article discourages individual initiative and celebrates the profits to be gained from dishonesty. James' attitude to his chosen line of business is somewhat like that of the executioner to his profession. The occasional weak dose of rue never really neutralizes the distaste one feels on reading the success story of an intelligent man who wilfully contributes to fraud at a going rate of seventy five dollars per course. Although he claims to "dislike fraud," James is quite content to carry on with it so long as his source of income is assured of stability by the conditions which continue to prevail in the university he patronizes.

Dr. Neatby, in a reply to James' article, chastises the man but reserves stronger criticism for the university system, itself. Dr. Neatby contends that the large size of the freshman and sophomore classes has resulted in the reduction of the individual student to the level of a cipher. The process of learning has become "production-line education," she contends. The blame she lays squarely on American influence on Canadian education, and her solution is serious consideration of the present admission standards with an eye to improvement and complete overhaul. Dr. Neatby does not approve of the practice of hiring other students to mark the essays and efforts of their less advanced fellows, but appreciates the difficulty for the professor who must regularly set and have marked student projects. She realizes the problem of the student, as well, who must have the work done, and who, in desperation, may turn to a John James for help.

Dr. Neatby's article implies that under the present system the mediocre to average student cannot learn much even if he wants to, while James' position is aptly summed up in one of the mock ads which introduce his article: "You don't have to learn anything." The situation appears hopeless. Unless the words of people such as Hilda Neatby are heeded, it seems that fraud will quietly flourish on Canadian campuses at a profit for the "ghost students" and at a loss for the coming Canadian generation.