ABSTRACT OF THE DOCTORAL THESIS BY MS. GABRIELA SZABO

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TITLE THESIS: **CONTRIBUTIONS TOWARDS STUDYING ENDURANCE CAUSES AND EFFECTS FOR MIDDLE DISTANCE AND LONG DISTANCE ATHLETICS RACES**

The doctoral thesis was worked out within the framework of the INTERDISCIPLINARY RESEARCH CENTRE of NATIONAL ACADEMY OF PHYSICAL EDUCATION AND SPORTS

Topic Justification:

The purpose of the chosen topic is to provide further knowledge specific both to physical education and sport field and especially to athletics. Theoretical knowledge about endurance physiologically contends that the easiest way to develop this driving quality is training. Also, the results are foreseen to be useful to the Romanian Athletics Federation and to the Institution Organizing PhD Studies, taking into account that the author of this PhD dissertation has a very detailed record of both the results and the training programs, of the associated biological conditions and of other causes and effects of endurance development. At the same time, the author of this research is the main subject of the research as well, investigated both by own senses, conditions and observations and by scientific methods.

Topic Importance:

The training process must no be characterised exclusively in terms of concatenations of macro cycles having certain contents. It is a unit having a staged character, and with various systems of the sportsman being developed, resulting in objective succession and plaiting, from reactive changes up to stabile adaptations.

It is the training of aerobe capacity that has most repercussions upon all performance factors. The following aspects must be considered as objectives in the training process: continuous increase of body capacity to consume

oxygen; development of possibilities to maintain maxim oxygen consumption for a long time; increase of velocity for respiratory process development up to maxim values; development of cardio-vascular apparatus capacity to transport oxygen to tissues.

Performance and training condition each other. They are always tightly connected in forming a global process from theoretical and practical points of view.

Topic Novelty:

In this dissertation I would like to share my practical experience acquired over the years, without considering this as a taboo item. I express my gratitude and respect for those that year by year succeed in facing adversity and in writing new pages in the Romanian Sport Golden Book. I have special deference for those people behind performance who feed its base by new generations of talents and values and, at the same time, by means of passion and dedication create optimum working framework in sports complexes and units.

Scientific knowledge is validated by practice, and sometimes practice is in front of science, this is why we believe that personal experience exposed by presenting reasons, with its successes and failures, can be important for the next generation of athletes, but particularly for their trainers and for sports performance.

Purpose and objectives:

In this dissertation we try to scientifically emphasise the idea that no valuable performance can be realized without specifically knowing the requirements – the ways to direct training – for each sport discipline. There can be no performance without technique which is as close to perfection as possible, there can be no perfect technique without well established potential of driving quality development, and these training requirements cannot be fructified unless trainer's creative thinking applies most adequate moment or situation tactics during competition.

The causes generating exceptional endurance, especially within athletic middle distance and long distance race disciplines are multiple and are in the area of muscular effector energetic mechanisms, tightly connected with neuro-muscular order processes, psychical aptitudes, ATP contribution and re-synthesis and, generally with all great physiological functions involved in tiresome efforts. The effects of exceptional endurance are complex, of course, some of them refer to morpho-functional changes, maybe even to personality and social

relationships changes, however, and they are not fully elucidated. In this research we try to contribute to clarifying the systemic relationship causes – process – effects related to endurance. We base both on scientific data unspecialised literature we architecturally synthesize in an original way, and on personal experience and own record of the training process. We try to present scientific reasons that exceptional endurance, as owned by Olympic or World Champions and record men, is not only the result of assiduous training, and as well of vocation, predisposition, or said in a different way, of talent.

Research premises:

It is well known that if premises are wrong, then conclusions become uncertain as well, and acceptability is disputable. New information occurred in endurance study, part of these pieces of information even contradictory to classic knowledge, therefore wording the premises becomes difficult. It is certain that endurance is a natural driving quality or aptitude, which can be educated and improved to a higher extent than the other ones, considered as "basic". Own experience and intensive documentation practiced allow us to consider this assertion valid for regular levels only, and not for high performance, at Olympic level. Exceptional performance requires exceptional body, which overruns the idea of talent associated with assiduous training. In order to use synthetic language, we word this idea as a premise:

- *High performance in middle distance and long distance race disciplines in athletics is vocational.*

Specialised literature draws attention to a multitude of factors determining the progress rate of endurance and implicitly of performance in middle distance and long distance race disciplines. Among these, trainer's intuition, talent and erudition seem underestimated. We base on the following premise:

- *"Exceptional" trainer is the key to exceptional performance.*

Generally, for high performance female athletes, the training methods, the effort dosages and iterations in training, but especially supporting effort both nutritionally and by adjuvants are hardly accessible information or even "professional secrets". We believe that in our research we benefited from honest and generous support from performance colleagues in Romanian athletics, precisely in order to try by means of biological knowledge and personal experience as well to contribute to maintaining the fame and prestige held by

feminine athletics in Romania. In order to say it differently, we base on the following premise:

- *Research subjects are a priori considered as cooperative and they represent a casuistic called:"world class female athletes".*

Research hypotheses:

In modern scientific research, the beneficial effects of endurance are evaluated indirectly by means of sport performance, amended by the quality of the technique and tactic used, by the condition of the psychical factor etc. Thus, systemic treatment extends endurance causality behind sport training, including it in effort biology.

- *Exceptional endurance, meaning ability to obtain exceptional sport performances, can be the effect of complex sportive training, which is long term and judiciously managed, applied to an over gifted body in this respect.*

Exhausting efforts are based of effector's capacity to efficiently use energetic reserves and to re-synthesize macro energetic molecules. This process is conditioned by the condition of the biologic factors involved in effort, especially of the psychical one, and by the neutralization of metabolic products, considered as toxic. Hypothetically, a "disputable" factor" is added, when prohibit doping substances are used, but which can be naturally accessed by over gifted bodies. In simple words, we can say that "where endurance (or resistance) ends, physiological tiredness occurs, which is hard to bear and is accompanied by movement distortions", but certain female athletes can surpass the exhaustion "barrier", being genetically gifted for that.

- *Natural access to energy reserves during exhausting efforts based on endurance can be a decisive factor for performance in middle distance and long distance race disciplines.*

Reasonable prediction of performances is usually based on extrapolation of progress rate for previous results, phased for few years and corroborated with the evaluation of the work volume achieved during decisive training stages. We believe the method is fallible if the natural characteristic, specific to each female athlete, to dimension biomechanical energy provided in maximal regimen is not taken into account. In simple words, this ides refers to the product between race average speed and race duration, which is constant for each female athlete, as

effort characteristic which is more genetic than acquired by assiduous training. In this research, we suppose that:

- *The power to predict sportive results in athletics middle distance and long distance race disciplines should also be based on the individual characteristic of muscle power debit.*

Naturally, any long term overstraining of the body produces accommodation, and sometimes adaptation as well, in beneficial sense of heterostasy, but it can also cause irreversible micro trauma or injuries. Secondary effects caused by body overstraining, by biologic wear inherent to sportive training intensive etc., are visible on long term, regularly after ending sportive career.

- *Endurance training practiced at extreme level, in order to obtain exceptional athletic performances can also generate undesirable secondary effects, visible especially after ending sportive career.*

The hypotheses above represent provisory answers to problem question, which can be deducted from dissertation title, and they are indissolubly connected with the research purpose and conclusions.

Research Subjects:

Taking into account that the research is an observational – interpretative one, the subjects of the research shall be considered as being part of a representative casuistic for performers' elite in the middle distance and long distance race disciplines in feminine athletics. For this reason, statistic, grouping or dispersion calculations are not adequate. All subjects are undoubtedly representative in order to appreciate endurance causes and effects in this research, being unanimously recognised as high performance female athletes, dignified representatives of Romania in large European and world competitions and in Olympic Games.

Practical Ascertainment and Interpretation Methods

The following methods have been used in order to perform the research:

❶ Directed observation,
❷ Interview methods,
❸ Questionnaire and poll methods,
❹ Logical and deductive analysis of the training methodologies

Conclusions drawn from the observational-interpretative practical application

- The practical application confirms or presents satisfactory reasons for research hypotheses to a large extent. Our data, amounting to years of records and experience sustain the idea that exceptional endurance, meaning the ability to obtain exceptional sportive performances, can be the effect of complex, long term long term and judiciously managed sportive training, applied to an over gifted body in this respect. Selection of over gifted sportswomen for middle distance and long distance race disciplines remains still problematic, as, despite all scientific progress achieved clarifying the mechanisms generating aerobe power, their control and limits are not known.
- In the same context, we conclude that natural access to energy reserves in endurance-based tiresome efforts can be a decisive performance factor in middle distance and long distance race disciplines. Artificial access, by means of doping is forbidden not only for ethical sportive, but also for health protection reasons. This is true as it is well known that any obtrusion of the body"is paid", namely it produces undesired secondary effects. Perhaps natural access to energy reserves of the body, not only under emergency conditions, is a very rare individual attribute, depending on genotype and phenotype.
- We have enough factual basis to conclude that endurance training practiced at extreme levels, namely those for obtaining exceptional athletic performance can also generate undesired secondary effects, mostly visible after ending sportive career. For prevention, but especially in order to draw the attention of lot doctors, thinking about young female athletes intensively practising tiresome athletic disciplines, I consider useful to mention that during my sportive career, but especially after its end, I suffered from hormonal disorders. I could have thought it was a particular case or a case not connected with the effort provided if I hadn't found out from undoubted sources that this happened to numerous female athletes, although both I and the respective female women benefited from especially careful medical care. I also have to remark (which results from medico-sportive anamneses as well) other possible secondary effects, such as: headaches, dizziness and sometimes anaemia conditions, close to exhaustion. These situations are of medical competence; this is why I find it inappropriate to comment upon them in this dissertation.
- From my personal sportive practice, as well as from my accidental or systematic observations, I have identified a wide range of affective feelings, reactions to success and failure, which I believe any female runner, can have. I

believe a description of the range of affective feelings as regards my own sportive activity can be approached as well from the perspective of tiresome effort in middle distance and long distance race disciplines. Metaphorically speaking, I could remind a well-known remark: „*the loneliness of the long distance runner"*, situation under which affective feelings can be diverse and complex.

The information presented below may be considered as unscientific aspects; however, if we admit that psychology is the science of feelings and psychical manifestations, then my own harmonies or conflicts in this field can be useful for biological interpretations of tiresome efforts... Since my first sportive success I have felt with my entire being that I can be a winner that I have to perseverate in training to become aware of each stage in my training and to strive after reaching all proposed objectives. My way in performance can be compared to a stair having several steps. In order to step as high as possible, it was necessary to renounce numerous pleasures and comfortable activities, directing all physical and psychical resources towards performance. Apparently this is a sacrifice, but any distance run, any second won signified for me a victory and in this way I could anticipate a new success, a new satisfaction. My feelings, my expectations from any training increased my working power, my perseverance and fulfilled my aspirations. Over time I have learnt to control my feelings, to know my adversaries and to harmonize my expectations with my aspirations.

The runners dealing with 800 m, 1500 m or 3000 m races are considered complex runners. Although these disciplines are mainly aerobe, the ability to finish the race in optimal speed is given by the performance in the last part of the race, this aspect being the proof for good anaerobe capacity and specific speed. As resulted from training plans, the anaerobe capacity is developed by working in running rhythm for a level corresponding to anaerobe threshold, having intensity 4 and heart rate about 90% of the maximal one.

In my opinion, observing the following requirements can represent a condition for making progress in middle distance and long distance race feminine disciplines:

- The training plan should be developed so as in the proximal time period to be possible to increase load or intensity (potentially both of them). In other words, each training step needs to be a kind of preparation for the following step;
- To use a large number of diversified force-speed exercises all year long;
- To simultaneously exploit all training factors, all year long, each stage having a precise goal;
- To reach the exhaustion condition in base training (two per week) every time;
- To take the following rule into account: the higher the work volume and intensity in the mixed area, the more substantial the progress will be;

- To take into account that the number of kilometres run each week should neither decrease below 100-120, nor exceed 150-170;

- To give the necessary attention to the running technique, so as by efficient movements (adequate fully, with as high as possible energy saving etc.) to reach running the respective distance in an as high as possible speed regimen.

Proposals:

We believe the results of this study can be useful for the Athletics RF, for the training process specialists and for people practicing this sport, as well as for the teaching process within higher education athletics department. This is why I consider that general, not only personal successful experience can be a scientific argument in sports, especially as the purpose of the performance sport is the exception and not the average or other statistic indicators. I propose this observational-interpretative research to be published and opened to criticism, and if it resists criticism, to be taken into account by the team-work of the Romanian athletics lot.