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Section IV – Book Review

NEW TENDENCIES IN SPORTS TRAINING – A REVIEW OF THE MONOGRAPH BY ISSURIN INTITLED „THE BLOCK PERIODIZATION OF SPORTS TRAINING"

by
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According to the author, the main concept of "The Block periodization of sports training" is the result of research, conducted with the support of many eminent scientists, concerning the block periodization, which were effectively applied by prominent coaches from different countries like Canada, Switzerland, Latvia, Moldova, Italy, Estonia. Among all the people to whom Issurin expresses his gratitude, there are such scientists as Zatsiorsky (USA), Tenenbaum (USA), Viru (Estonia), Bondarczuk (Ukraine), Kauffman (Israel), Lustig (Israel) and, what is worthy to be emphasized, Szopa (Poland); among the coaches – Kawerin (Moscow), Tureckij (Russia, Switzerland, Australia), Perri (Italy), Carmichael (USA); and among the athletes – Popow (Russia), Klementiev (Lithuania), Kolganov (Israel), Żurawski (Moldova).

In the foreword to the Russian edition (the monograph has been also published in the USA and Japan), Issurim reveals that the idea of his work has long since arisen and is directly connected to the sport in the period of the Union of Soviet Socialist Republiscs when, regardless of many shortcomings, a dominant sports training classification was the one of Matweejew (Problema periodyzacji sportiwnoj trenirowki. Moskwa: Fizkultura i Sport, 1964). Its main disadvantage were excessive training loads which were unjustified[4]. At the beginning of the 1980s, with the cooperation of the Soviet national canoeing and kayaking team coach, Kawerin, the author came up with a new concept which consequently has formed the basis for the reviewed work, which consisted in the idea that in elite athletes**,** the interest should not concentrate

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[4]The book has been published in many countries from all over the world and it still presents the main approach in the preparation of elite athletes.

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on developing numerous motor abilities and technical skills. „Such training exhausts the athletes and creates a situation where it resembles a fight for survival". Hence, the authors created different types of training loads developing motor abilities, as well as technical and tactical skills) localizing them in specialized training cycles, so called *blocks*. Issurin places the emphasis on the fact that the block periodization of sports training was successfully applied in canoeing.

The book contains the answer to a following question : "how to improve the athletes preparation to their efficient participation in competitions?". As it has been already mentioned, the basis of the training theory was set a long time before, when a level of knowledge differentiated significantly from nowadays. Moreover, the level of training loads and expectations of the final outcome were much more elevated. Creation of the training process periodization aiming at the division of the whole program into the periods, i.e. preparatory, competitive, transition and cycles, i.e. mezocycle and microcycle, was applied as the only correct approach to the planning and analysis of sports preparation program. "Although, the development of sport arose a conflict between traditional training classification and the best coaches and athletes desire for change". In the course of time, the results permitted to formulate an alternative concept and, as a result, "a renewed approach to sports training called « the block periodization » ". The main idea consisted in the application of mezocyclical specialized blocks in definite order, in which highly concentrated training loads were directed at the development of minimal amount of motor abilities, as well as technical skills. As opposed to the traditional approach where the focus was put on the development of a large number of technical and tactical skills, the block periodization of sports training proposes a successive influence on "carefully selected preparatory components of fitness". Such methods were applied in many kinds of sport and led to outstanding results. Therefore, the aim of this book is "to present the block periodization of sports training as a general concept and a basis for a current approach of sports training planning".

The book is targeted specifically at coaches. Its aim is to prove how the application of theory may create some new valuable experiences and how, on the basis of gathering the results of performance, new concepts may be formed. Issurin recommends his work to athletes who gain the opportunity of "in-depth understanding why the training should engage all their interest and how to act rationally". The author's intention is to make the book useful for scientists and coaches who search for new concepts of training programs. After getting acquainted with the book's content, we do agree with the author's concept suggesting that it may actually stimulate their creative abilities.

Finally, the monograph is undeniably valuable for students "of whom the majority

doubt the application of results of scientific research".

The book consists of three parts connected by the concept of the block periodization. It contains the scientific theory as well as practical advice on constructing new sports training programs.

The first part, which consists of three chapters, presents the basic training goals and main concepts of sports preparation, of which citations are essential for the full comprehension of the concept and the discussion conducted within the book. The first chapter contains some basic terms, methods and training process rules. The basic mechanisms of physical fitness improvement as well as characteristics of planning of the preparatory process are explained there. In the second chapter, the interesting and mainly new material concerning the specificity of direct, extended, cumulative, long-term and permanent training effects was presented. The third chapter contains a short review regarding the phenomenon of trainability in the aspect of modern sports genetics, long-term athletes preparation, gender differences and individual organism reactions to the training.

In the second part, which consists of four chapters (IV – VII), it is explained how to structure training programs. The fourth chapter is called by the author as the key one, since the criticism of the traditional approach and the bases of the alternative block periodization are presented. The next four chapters describe some general training goals and bases for the training program structuring. The fifth chapter discusses planning and the content of an individual training unit : types of training, their structure, consequences of the application and compatibility of diverse kinds of exercises (aiming at developing numerous motor abilities as well as technical and tactical skills). The sixth chapter allows to understand planning different types of microcycle, i.e. a microcycle developing aerobic capacity and strength, a microcycle containing highly intensive anaerobic loads, a microcycle enhancing explosive strength by means of complex coordination exercises, a precompetitive microcycle and so on. This chapter also presents an in-depth analysis and specific features of mesocycles such as cumulative, transforming and basic. In its last part, it was revealed how to prepare a separate training phase on the basis of three consecutive mesocycles, where the phase duration depends on each mesocycle's length and it oscillates between 4 and 10 weeks. To some extent, the training phase represents the whole annual cycle which allows to develop basic motor abilities (as in the preparatory period), specific for the discipline (as in the competitive period) and integral preparedness for the tasks characteristic of the competitions. In the seventh chapter, the author explains the bases of the long-term preparation (annual training preparation cycle and the four year Olympic cycle) also considering problems regarding the long-term preparation planning for youth and adult athletes. He also

emphasizes the significance of the problem of searching and protection of young talented athletes. The chapters from V to VII are of important utility for the athletes and coaches.

The third and the last part of the monograph consists of two chapters (VIII and IX). The first of them contains original data concerning planning, assessment and realization of training process. The model is considered at three different levels : as a competition model in individual and team sports, as a model of specific for one discipline abilities and as a training programs model. There are two basic variants of modeling which take into consideration the preparation of team models for a group of athletes as well as the preparation of individualized models suitable for separate athletes. The ninth chapter discusses altitude training. With all the details, it is described how to prepare an optimum training program according to the concept of the block periodization, which takes into account organizing training camps in the mountains. All the rules formulated by Issurin are derived from the experiences of the long-term preparation altitude training of elite athletes.

Each chapter of the book contains a short summary which facilitates memorizing of the presented material, as well as separate references.

At present, we would like to closely analyze some concepts discussed within the book, which we do perceive as particularly valuable, appealing and innovative.

In the second chapter, referring to the works of Zatsiorski (1995), the author presents the types and characteristics of training effects in sport (Table 1). The detailed description permits better understanding, more conscious planning and controlling of training results. In this connection, by means of figures and tables, the book presents the changes in an athlete's body while performing a single exercise (direct training effect), within one training cycle or one training day (extended training effect), as well as the changes resulted in a series of cycles (cumulative training effect). Cumulative training effects allow to observe the scale of progress in elite as well as in young and talented athletes. "These effects are of great importance when the final outcome is not satisfying". Issurin emphasizes the significance of table 2 where it is shown that, regardless of the sports discipline, the improvement of the final outcome oscillates between 1 and 1.07% as long as elite adult athletes are concerned. "In reality, with the course of time, adult athletes reach their limits and further progress becomes impossible, what does not mean that they cease their training".

All three types of training effects which were discussed above, are well known to the scientists, although the other two, i.e. long-term training effects and permanent effects, are less considered in the relative specialist literature, despite the fact that they are of great significance as well. The long-term training effect, which was defined for the first time by Wierchoszanskij (1988), results in the delayed adaptive changes

which determine whether progress was observed. In other words, in this case, the training effect and better results appear not in the final stage of the training program, but after some period of time, the so-called delayed transformation phase, which is essential for morphological and physiological changes. According to Issurin, the long-term training effect is particularly important in motor abilities development which depends on a fatigue level and where the final performance requires accurate neuro-muscular coordination of movement. It also relates with optimal combinations of coordinarion abilities of speed, maximal strength and explosive strength. The delayed transformation intervals range from one to four weeks.

The coaches and athletes should also be interested in how long the achieved level of diverse motor abilities remains after the training cessation. This high level's preservation over the defined period of time after cessation of training is called the permanent training effect and all changes occurring in the athlete's body are long lasting. They may be long-term, caused by many years of training, or short-term, describing changes in the athlete's body triggered by previous training sessions (Table 3).

According to Issurin, taking into consideration the training effect concept is of great importance in sports practice when the block periodization is applied as it results in the enhancement of sports preparation which becomes more predictable, hence easier to be controlled.

In the third chapter, the author analyzes the trainability phenomenon which was often underestimated and approached intuitively. He explains the trainability concept in connection with three general conditions such as the sports classification, heredity and gender. The heredity issues are illustrated with the data gathered during the research concerning the champions dynasty, as well as with a large range of biological factors which consis of somatic features, physical abilities and the reaction to the training program. The inclination to specific sports disciplines is explained on the basis of the presence of optimum somatic features combination of which some of them are significantly conditioned genetically. Recapulating, some kinds of reactions to training loads (aiming at maximal speed and glycolitic anaerobic power) depend more on heredity and are endowed with the genotype, while others (oriented towards maximal strength, aerobic power, coordination and flexibility) are more trainable. It is worth emphasizing that among the cited authors who address the issues concerning heredity of somatic features and motor abilities, the author names Polish scientists (Szopa, 1985, 1999; Mleczko, 1992).

Explaining the correlation between trainability and sports performance improvement, the author presents the theory why elite athletes are less susceptible to the training effects than their younger and less experienced counterparts.

Thus, he formulates two recommendations for sports training, i.e. the number of effective exercises decreases with the course of time when the athletes achieve the championship level (the so-called « crater effect ») and the volume of exercises specific for a particular sports discipline should increase proportionally to the champion level achieved by athletes. According to the individual tempo of developing some specific abilities, the athletes could be divided into groups with strong, normal or weak adaptive reactions. Only the athletes from the first group are characterized by high trainability, which is just one of many indicators applied in the process of talent identification in sports.

The chapter concerning trainability issues in the context of gender dimorphism is also highly recommended. The material is analyzed in connection with the best sports performance, the physiological traits, motor abilities and cumulative effects of a systematic training process. The advantages and disadvantages of the block periodization compared with the traditional sports training classification theory are discussed in the fourth chapter. The block periodization is based on the application of three types of specialized mesocyclical blocks i.e. cumulative, transformning and basic (their basic features are presented in Table 4). The rational connection of these blocks is based on the permanent training effects which consist in the preservation of the changes resulted in the sports training after its cessation (Table 5). These effects are of high significance, specially when the athletes develop their motor abilities consecutively and not simultaneously (as recommended in the traditional model of sports training periodization). In Issurin's opinion, the mesocycle blocs presented in Table 4, form a training phase which is the most important component in the block periodization concept. It does not conform with the traditional theory of Matwejew, where the focus of interest is set on the training period.

The author also emphasizes the fact that the traditional approach dominates the preparatory training of athletes at the average and low level. The complex application of training loads aimed at the development of many skills and abilities finally results in the diverse, attractive and emotionally charged training. The improvement of less-developed sports skills does not require highly concentrated training loads, hence the little volume provides the athletes with a sufficient training stimulation.

The opposite situation occurs in elite athletes preparatory period, where much larger volume of highly specialized exercises is required to cause appropriate training stimulation. Basic differences between the traditional and alternative training scheme are presented in Table 6.

Table 4

Basic characteristics of three types of mesocycle blocks (Issurin 2003)

Basic variables	Type of the mesocycle		
	cumulative	transforming	basic
Quality - aim	Basic qualities: aerobic endurance, muscular strength, Basic coordination	Qualities particular for a given sport discipline: special endurance, strength endurance, technique specific for a given sport discipline	Readiness to competition: model realization of competition exercises, maximal speed, tactical mouvement reflexes in a given sport discipline
Volume - intensity	High volume, decreased intensity	Decrease of volume, increase of intensity	Volume from low to average, high intensity
Fatigue - recovery	Rational rest ensuring morphological adaptation	Lack of the possibility to ensure full recovery, accumulation of fatigue	Full recovery, athletes should be well rested
Control variables	Level of the basic abilities' development	Level of specific for a given sport discipline qualities and movement reflexes	Maximal speed, specific for a given sport discipline technical and tactical variables

Table 5

Duration and physiological results of permanent training effects for different motor abilities after cessation of the forming program (Issurin 2003 based on Lustig 2004)

Motor ability	Training results duration, in days	Physiological results
Aerobic endurance	30 ± 5	Increase of the number of aerobic enzymes, mitochondria, muscular capillaries; increase of the oxygen capacity in blood and of the stock of glycogen; higher level of the fat exchange
Maximal strength	30 ± 5	Improvement of neural mechanisms; muscular hypertrophy, mainly due to the increase of muscular fibres
Anaerobic endurance (glycolytic)	18 ± 4	Increase of the number of anaerobic enzymes; enhanced buffer capacity and increased stock of glycogen; possibility of an increased lactate accumulation
Strength endurance	15 ± 5	Muscular hypertrophy, mainly of slow twitch fibres; increased number of aerobic / anaerobic enzymes, improved local blood circulation and resistance to acidosis
Maximal speed	5 ± 3	Improved neuro-muscular interaction and movement control, increased stock of phosphocreatine
Coordination motor abilities	5 ± 3	Enhancement of control processes based upon neurophysiological mechanisms of reception, processing, stocking and dispatching of information; improvement of psychological components of movement activities' regulations : activating, orientationsl (perceptional, cognitive, mnemonic) and control
Flexibility	5 ± 3	Improvement of flexible capacities of ligaments and muscular apparatus in connection with the modification of a bone form

Summarizing, the book proves the supremacy of the block periodization in sports training over the traditional approach, which is supported by the following arguments:

1) Since the general volume of training loads could be smaller, the percentage of overtrained athletes decreases.
2) Multi-peak training scheme allows to participate in many competitions during one season.
3) Due to a significant restriction of the number of motor abilities and skills, of which the development is to be assessed in every mesocycle, the general control could be much more effective.
4) The diet and recovery program could be modified acoording to the prevailing type of training.
5) Multi-stage annual training plan creates the conditions which allow to achieve best results during main competitions.

In the fifth chapter, the author presents an in-depth analysis of training planning from the perspective of its structure, tasks and training loads. He poses a question concerning training structure and its planning as a starting point in the concept of block periodization where he emphasizes the importance of some training aspects which so far have been underestimated.

Taking into consideration a correlation between the training aim and applied training loads, Issurin proposes to distinguish three training types : 1) developing training which provides an athlete with stimuli essential to make progress; 2) sustaining training which aims at form stabilization; 3) regenerative training where the focus is put upon the athlete's recovery after previously applied training loads. The suggested scale of five levels (Table 7) allows coaches of any sport discipline to evaluate effects when applied training loads are considered. According to Table 7, the first level corresponds with a minimal training load and the fifth with a peak training load. Profiting from the eminent coaches experience, Issurin formulates and explains the term of "key training" which consists in major developing training which determines the main directions of training process.

The author analyzes the concept and content of the introductory and final training part. He emphazises the significance of the warm-up in increasing exercise metabolism and an athlete's approach towards technical execution of an exercise, as well as mental preparation and injury prevention.

Table 6

Rules of discernment in training schemes based on the traditional approach and the block periodization (Issurin 2003)

Characteristics of training schemes	Traditional model	Model of block periodization
Dominant rule of training loads combination	Totality of applied training loads of different kinds, oriented towards the development of many abilities	Application of concentrated loads oriented towards minimal qualitative aims
Planning of training effects	Cumulative training effects	Cumulative and permanent training effects
Temporal relation in the development of qualitative aims	Main, simultaneous	Main, consecutive
Basic planning component	Preparatory period: initial, competitive, transition	Preparatory phase including combination of three types of mesocyclical blocks
Participation in competition	Mainly in competitive period	Mainly at the end of every stage
General physiological mechanism	Adaptation of parallel training loads oriented towards the development of many qualitative aims	Overlapping of permanent training effects caused by highly concentrated loads in different mesocyclical blocks

Table 7

Training range: classification according to the aim and training loads (Zatsiorsky 1995, mod. Issurin 2003)

Aim of training	Level of training loads	Recovery time, in hours	Assessment of training loads, range
Development	maximal	> 72	5
	important	48-72	4
	significant	24-48	3
Sustainability	average	12-24	2
Recovery	not important	<12	1

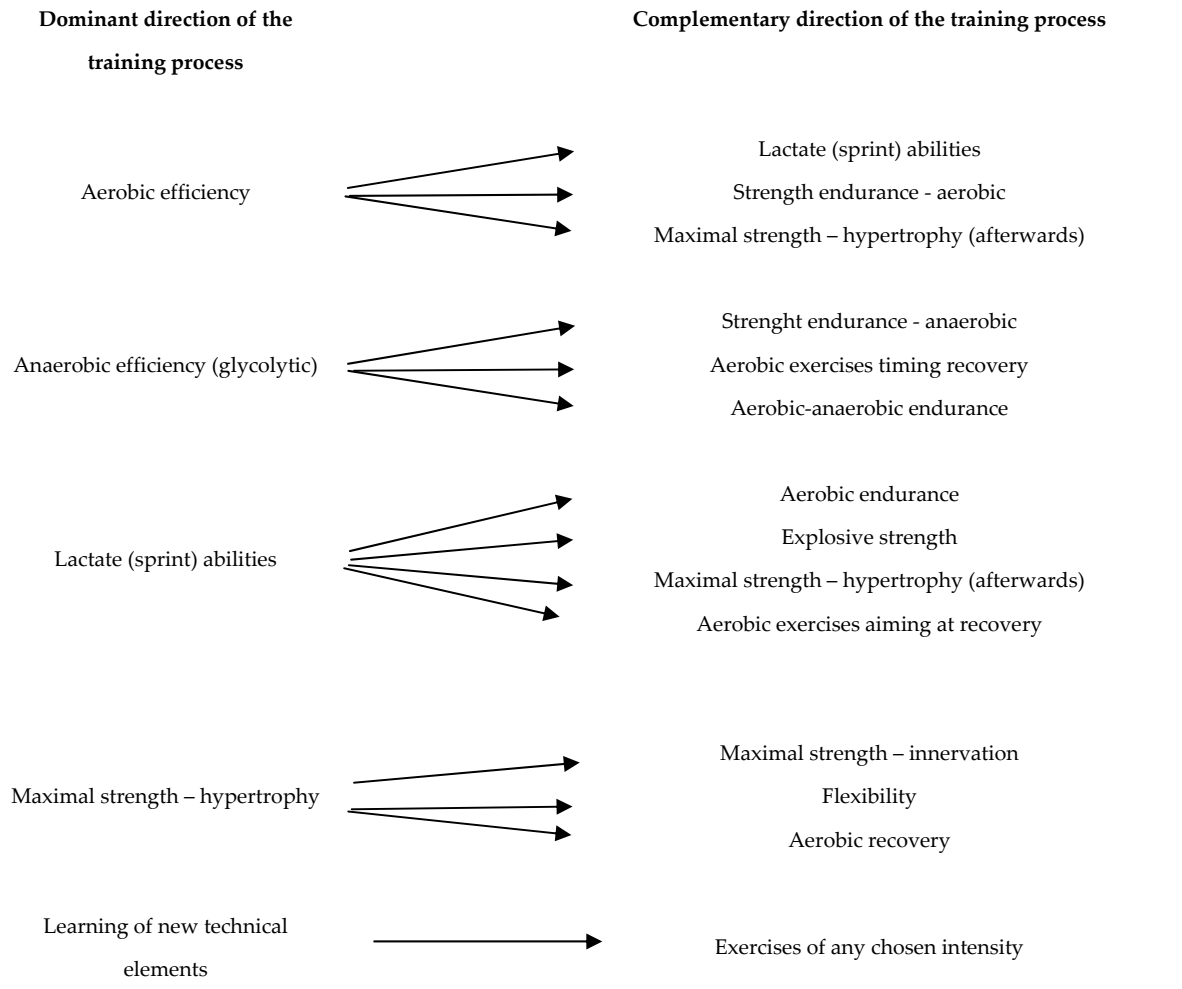

Fig. 1

A compatible combination of the dominant and complementary directions of the training process.

The rules of training program construction, which are proposed by Issurin, consist of the appropriate order and combination of diverse exercises (Figure 1). The exercises aiming at the development of maximal speed, explosive strength and maximal strength (from 1 to 3 repetitions), as well as at gaining new technical skills, require a relevant level of nervous arousal, hence the athletes should not be fatigued while performing such exercises. The exercises for the development of glycolytic anaerobic power and maximal oxygen uptake may by performed by athletes who are "moderately fatigued" and who are able to bear training loads at a specific metabolic level. The exercises for the development of strength endurance and aerobic endurance require athletes to make an effort despite increasing fatigue. Thus, these exercises may be

performed at the end of a training session. Issurin emphasizes that on the basis of the block periodization, the number of exercises aiming at the development of diverse skills should be limited. The first exercise should be dominant, the second one should combine with the main training goal and the third one should focus either on the technical and tactical improvement or the athlete's receovery. Summarizing, from 65 to 70% of the whole training cycle should consist of exercises aiming at the development of one or two specific skills. As it was already said, one separate training task combines many exercises directed at development of different skills (Figure 1). The author pays attention to the importance of one-day-series training which may contain from 2 to 6 types of exercises. In this case, Issurin takes into consideration such variables as order of loads, a set of exercises and a possibility of the athlete's recovery. Finally, he presents the rules how to structure series of daily training and most common combinations of the two following training cycles within such a series.

The fifth chapter is one of the largest. The author describes and evaluates there microcycles, as well as interprets 3 types of mesocycles and training phases. At the end of the chapter, specific training features while the Final Preparatory Phase (FPP) before the main competition are presented.

Looking at each detail, Issurin characterizes 6 types of microcycles which differ between themselves on the basis of the aim, the level of applied training loads, planning methods and permanency. He suggests to apply different types of training loads what could result in the fact that the athletes would be capable to follow the training plans containing a one-, two- or three-peak performances. In separate subsections of the monograph, the author analyzes microcycles directed at a) development of strength and aerobic abilities; b) improvement of explosive strength in complex coordination exercises; c) enhancement of anaerobic abilities; d) precompetitive preparation.

Three types of mesocycles are discussed from the perspective of the content, control and duration. The author takes more of an interest in the following mesocycles : cumulative, transforming and basic, with regard to the application of different microcycles, increasing fatigue which intensifies while transforming mesocycle, the choice of appropriate exercises and most adequate control methods for several mesocycles. Issurin emphasizes that coaches should take into consideration the athlete's self-evaluation of training loads which should be written down in a self-control register.

For this reason, subjective assessments of the level of intensity, fatigue, sleep quality and muscle pain within the range from 1 (very low or good) to 7 (very high or bad). The main aim was to prevent undue fatigue as well as overtraining.

According to Issurin, with some more mesocycles the miniature annual training cycle is formed, where training loads are at the beginning directed at the development of basic abilities. Next, the focus is put on some more specific abilities and finally, on the creation of integral readiness to perform a specific sports discipline task.

The Final Preparatory Phase (FPP) before the main competition concerns basic features influencing its effectiveness and content, which include : 1) anxiety and emotional tension during the FPP and the competition; 2) hormonal and metabolic changes related to emotional and physical tension; and 3) inadequacy of training loads. The global approach to the structure of the FPP program as a consequence of microcycles which serve to the realization of training loads, the recovery and the performance during the competition, was presented in Table 9.

Table 8

Aim, level of training loads and specific features of different types of microcycles

Type of microcycle	Aim	Level of training loads	Specific feature	Duration
Introductory	Basic adaptation to required training loads	average	Increase of training loads	5-7 days
Cumulative	Increase of the level of preparation	significantly high	Application of higher and significant training loads	5-9 days
Striking	Increase of the level of preparation due to the application of maximal training loads	very high	Application of maximal training loads	4-7 days
Precompetitive	Direct preparation to competitions	average	Attitude towards upcoming competitions; application of some specific for a given sport discipline measures	5-7 days
Competitive	Participation in competitions	high – very high	Specific for a given sport discipline performance during competitions	2-7 days
Regenerative	Active rest	low	Application of a wide range of regenerative measures	3-7 days

Table 9

Content of Final Preparatory Phase before main competitions (cumulative, transforming, basic); general duration from 40 to 50 days

N°	Mesocycle	Type of microcycle, duration	Comments
1.	CUMULATIVE	Regenerative 3-5 days	Diverse training and regenerative measures, which may be applied to ensure psychological and physical recovery
2.		Cumulative 5-7 days	Increase of volume – decrease of intensity; preparatory program should be enhanced
3.		Cumulative 5-7 days	Continuance and next, cessation of aerobic and strength training program; further increase of volume
4.	TRANSFORMING	Cumulative 5-7 days	Initial microcycle of transforming mesocycle; high volume of intensive training loads specific for a given sport discipline
5.		Cumulative, striking 5-7 days	Highest volume of intensive training loads specific for a given sport discipline; prolongation of the microcycle should be exactly defined
6.		Precompetitive 2-4 days	Reduction of time of application of training loads; application of specialized imitative exercises specific for a given sport discipline; active recovery
7.		Competitive 2-4 days	Participation in control transition or test procedure; final enhancement of technical and tactical model applied in the competitive period
7a		Regenerative 2-4 days	This microcycle is to be applied when the competition causes some emotional tension
8.	BASIC	Cumulative 5-7 days	Specialized training program which includes some imitative exercises ensuring full recovery, which are specific for a given sport discipline
9.		Precompetitve 5-7 days	Application of specialized imitative exercises; achievement of readiness to competition

Table 10

General approach to the training program structuring in connection with the phases of altitude acclimatization (Issurin, Vrijens 1995).

Training process variables	Severe phase	Transition phase	Stabilization phase
Type of a microcycle	Initial	Cumulative	Cumulative and/or striking
Length of a microcycle	3-7 days	3-5 days	5-7 days
Number of microcycles	One	One	One – three
General volume of exercises	Usual or smaller about 10-20%	Usual or smaller about 5-10%	Usual
Volume of exercises of high intensity	Smaller about 40-60%	Smaller about 15-30%	Usual
Coordination complexity	Low	Not high	Usual

In the seventh chapter, the author discusses difficulties concerning planning of the annual cycle and four-year preparatory cycle for adult and young athletes. In the annual cycle planning, Issurin emphasizes the significance of setting aims and tasks, as well as determination of the following steps and general trends in changing training loads. The manner of calculating these changes within one annual cycle was also presented.

The specific planning of a four-year Olympic cycle is analyzed on the basis of elite athletes preparation. We are presented with the data how to alter training loads during the preparation of experienced athletes and their younger counterparts in the context of the length of career. It was indicated that more experienced athletes reach their biological limits, but even though, they continue to improve their final results, which results in the extensive application of motor abilities and physiological abilities, as well as creative potential, self-confidence and sports erudition.

The general approach to the long-term training resembles traditional theories which may be found in works of Russian, German and Polish scientists (L. P. Matwejew, W. N. Platonow, Z. Ważny, H. Sozański and others).

Issurin distinguishes four separate phases of long-term training : introductory (preparatory), initial specialization, deep specialization and a championship level. Each of them consists of a specific combination of such variables as duration of a particular phase, training unit's length, training frequency, annual training volume and other related features.

From the perspective of biological development, Issurin describes a scientifically common phenomenon concerning sensitive periods in youth athletes, when they are more susceptible to training stimuli. He emphasizes the importance of talent identification in youth taking into consideration the determination of the perspective and retrospective approach to talent indexes. For a practical purpose, he recommends to evaluate at the beginning the level of athletes' preparation for a specific discipline, which includes the assessment of the indices of athletes predispositions towards a specific discipline and a tempo of athlete's performance improvement during the period of basic preparation of sports abilities, which is perceived as the index of athlete's trainability.

In the eighth chapter, most pragmatic approaches to the application of modeling in the improvement of athletes preparation were characterized. The author presents a three stage model, where the highest level includes model descriptions of competitions : a planned result (for sport disciplines where the results may be measurable), optimum competitive indices, required technical and tactical parameters and behavior during competitions. The middle stage consists of some specific for a given sport discipline features, which are essential to achieve the planned objective. At the lowest stage, models

of training programs (general and partial volumes of training loads, a number of competitions, schemes of mesocycle blocs and others) are presented.

The last, ninth chapter focuses on contemporary data in regards to physiology and altitude training methodology. Issurin emphasizes that all information concerning altitude training presented in the literature is contradictory. In many works of sport physiology, it is said that altitude training does not compare favourably with traditional training when competitions at sea level are taken into consideration. Although, authors of works aimed at coaches consider the altitude training as an effective and approved tool to train elite athletes. Issurin explains partially this discrepancy by diversification of an individual reaction to altitude training (some athletes are more predisposed to such a type of training than others). He also presents potential advantages of altitude training which improve the athletes results at sea level competitions, which are the following : 1) improvement of muscular lactate transport; 2) increase of lactate muscular metabolism due to higher activity of aerobic enzymes and enhanced mioglobine concentration; 3) enhanced anaerobic capacity due to increased buffering capacity of blood and muscles.

In regard to the basic aim, altitude training may be applied in: 1) active recovery or personal training program diversification; 2) selection of athletes who react favourably to altitude training; 3) creation of altitude training program in accordance with accumulative phases; 4) planning of training programs after training camps in mountains with readaptation phases at sea level.

In accordance with three phases of altitude acclimatization (severe, transitional and stabilization phase), Issurin presents a training program (Table 10), where he specifies training cycle planning which includes training camps in mountains. The first part of such a program should consist of exercises of medium intensity which correspond to the accumulative mesocycle. In the second part, aero-anaerobic and anaerobic exercises of high intensity, which are specific for the transforming mesocycle, may be included. Participation in competitions could be planned for the period from the 14^{th} to 28^{th} day, as well as from the 36^{th} to 46^{th} day, thus the training phase may be adequately shorter or longer. According to Issurin, "the concept of training consists in improvement of oxygen carrying efficiency after altitude training, hence the annual cycle should comprise from 2 to 3 training phases which includes training camps in mountains".

Apart from traditional altitude training, where athletes live and train at the same altitude, Issurin analyzes the pros and cons of some other approaches, where : 1) athletes live at a high altitude, though they train below sea level; 2) they reside at high altitude, but they train at sea level; 3) they stay at sea level, yet train at high altitude.

In summarizing, we would like to cite some eminent scientists. Gennadij Tureckij, coach of many world and Olympic champions in swimming, i.e. Popow (Russia) and Klima (Australia), states that "during my career, I applied many concepts presented in the book, which contributed to the achievement of best results by the athletes. I do believe that this work will assist every person who seeks a new information source related to the improvement of the training process".

Klemejntjew (Lithuania), Issurin's student, Olympic champion and seven-time world champion in rowing, as well as an outstanding scientist, indicates that "the reader has never been presented with such a practical and effective set of information concerning the methodology of training and improvement of elite athletes abilities".

Kris Carmichael, author of „Carmichael Training System", coach of the seven-time champion of the Tour de France, Lance Armstrong (USA), points out that "Issurin presents an innovative approach to the periodization of sport training, which is the most effective way of athletes preparation to competitions. This many-sided study will be great help for scientists, athletes and coaches in their way to achieve sport perfection".

We do agree with such a high appraisal of the reviewed monograph. Nevertheless, we would be pleased to find in the next of the editions monograph some contemporary approaches to the preparatory system of elite athletes, presented by Russian (Ratow, Susłów, Szustin, Kolesow, Wenc, Razunowski, Nowikow), Ukrainian (Platonow, Bulatowa, Zaporożanov, Keller), German (Schnabel, Berger, Brode) and other scientists. Although we understand how difficult it could be for a single author to present such a range of concepts within one book.

At present, together with Issurin, we may express our hope that the monograph "meets the expectations of these readers who perceive training as an area for creative potential, self-realization and a kind of stimulation for the development of diverse human abilities".