October 15.2010

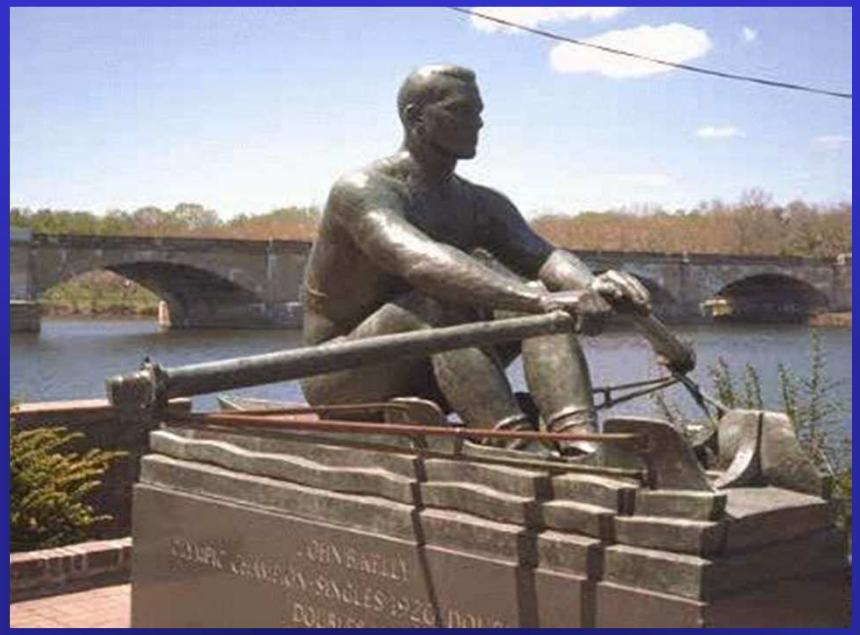
Rowing Coaches' Clinic

Block Periodization:
Scientific Concept and Implementation

Vladimir B. Issurin,
Ph.D., Professor
Israel

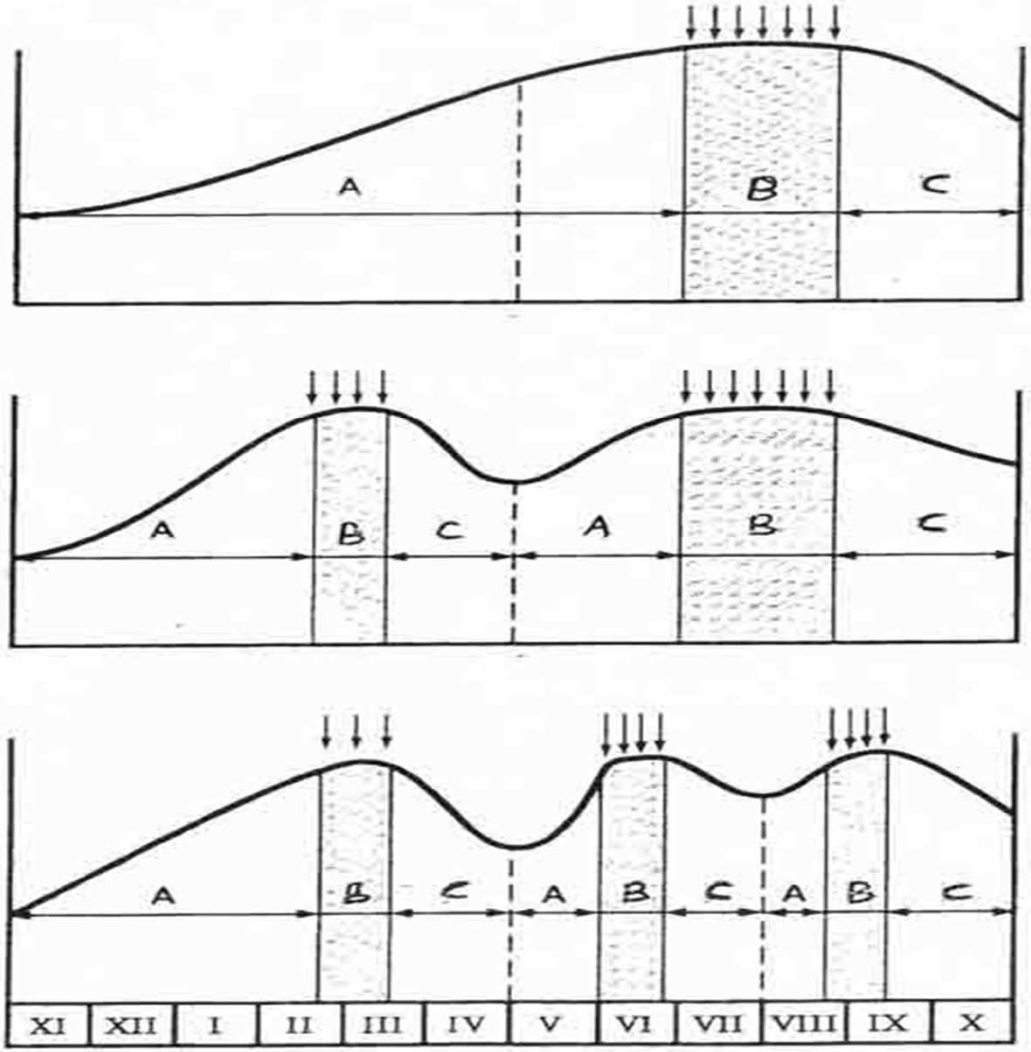
Plan

- Traditional theory – criticism and restrictions
- Alternative approach: basics and outcomes
- Biological background and conclusions



Traditional theory – scope and criticism

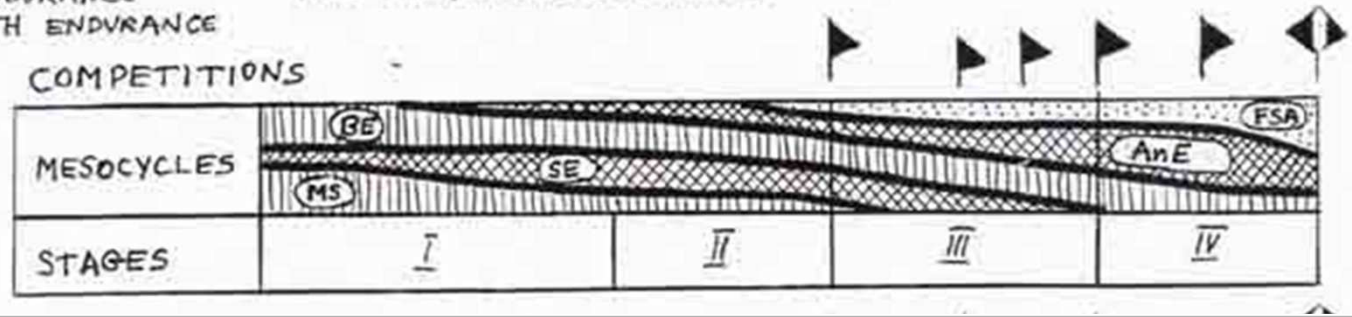
Classic version of annual periodization *(Matveyev,1964 et al.)*



MS- MAXIMAL STRENGTH
BE- BASIC ENDURANCE
SE- STRENGTH ENDURANCE

FSA- FAST-STRENGTH ABILITIES
AnE- ANAEROBIC ENDURANCE

A



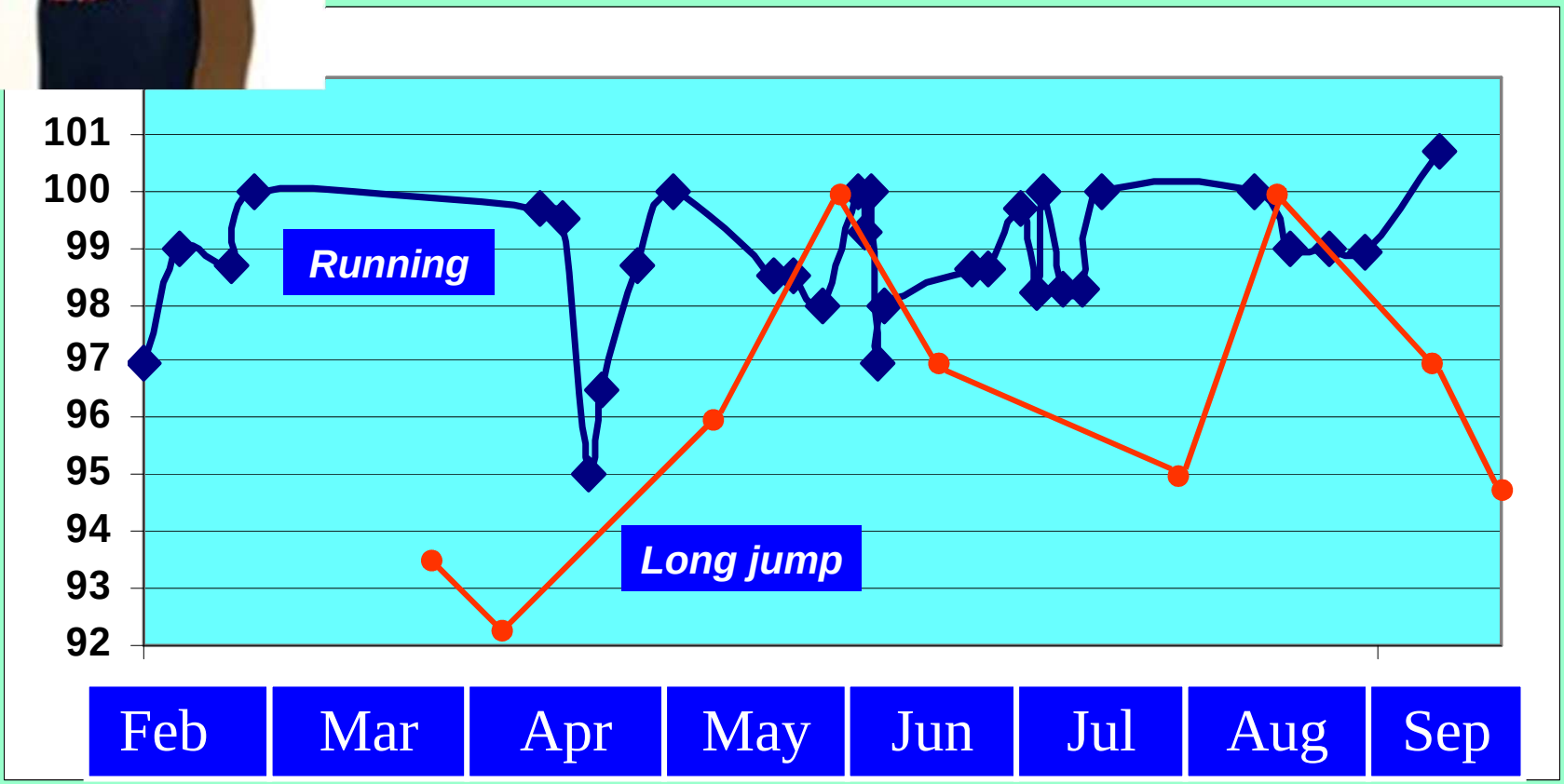
MONTHS	IX	X	XI	XII	I	II	III	IV	V	VI	VII	VIII
PERIODS	PREPARATIONAL						COMPETITIVE					

A- TRADITIONAL APPROACH **B**- NON-TRADITIONAL APPROACH

ALTERNATIVE SCHEMES OF ANNUAL CYCLE TRAINING

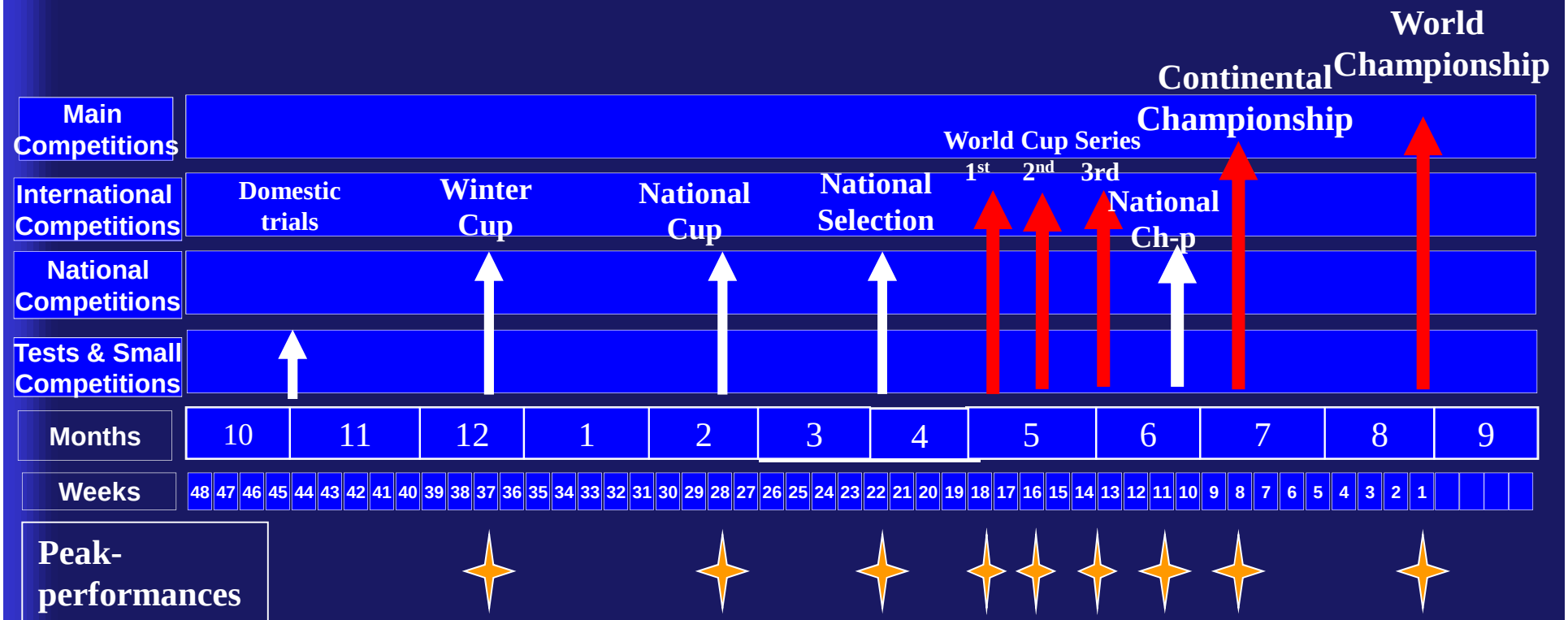
Annual performance trends of great athletes

Marion Jones: Performance trend in season 1998

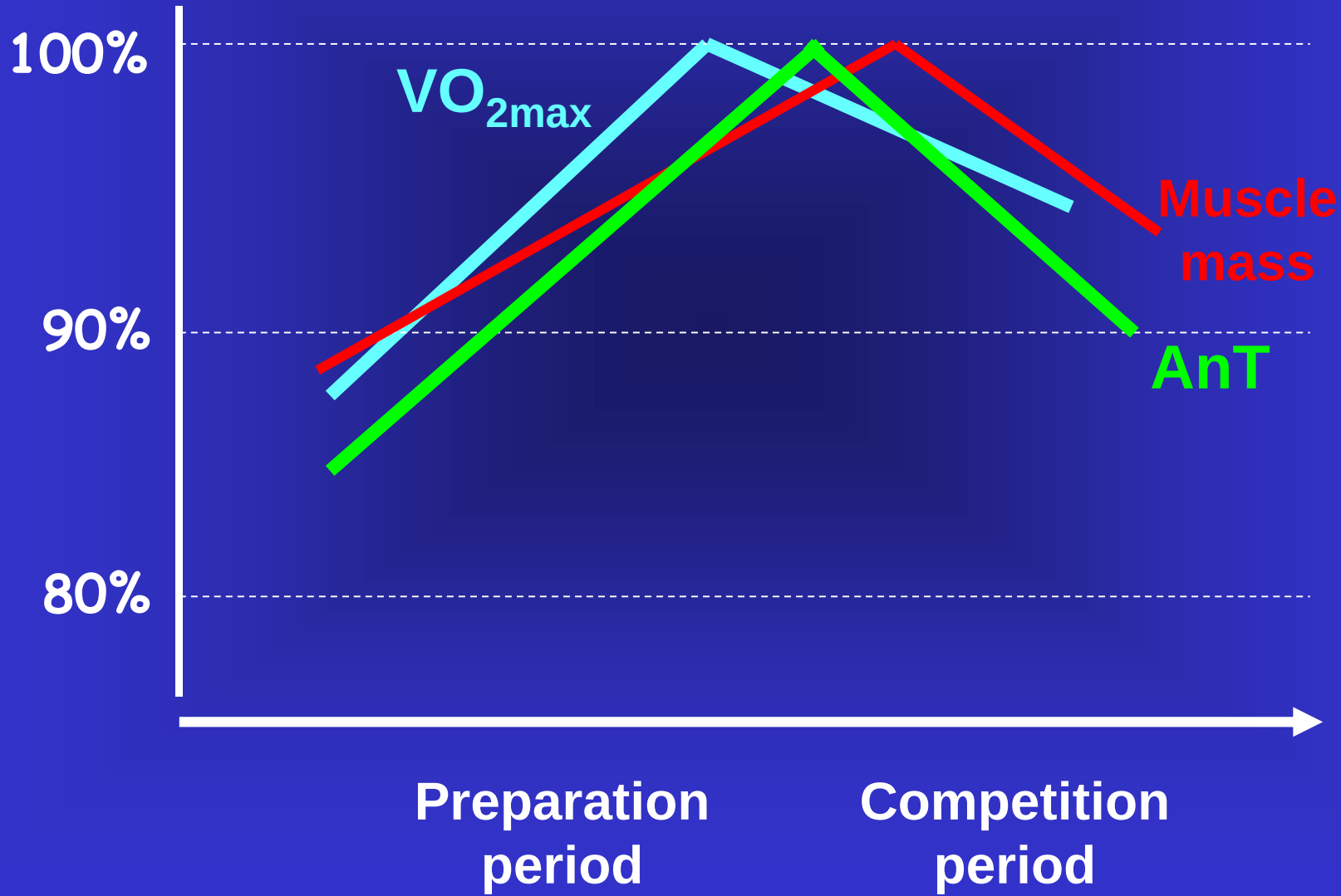


Source: Suslov, 2003

Typical multi-peak preparation of high-performance canoe-kayak paddlers



Traditional Model – Typical Changes



Multi-targeted “mixed” training – sad outcomes:

Excessive workloads,

Accumulated fatigue,

High stress indices,

Conflicting physiological responses,

High risk of overtraining

“Mixed training produces mixed results”

Stegeman,1981

Question

- Should many abilities be trained at the same time?

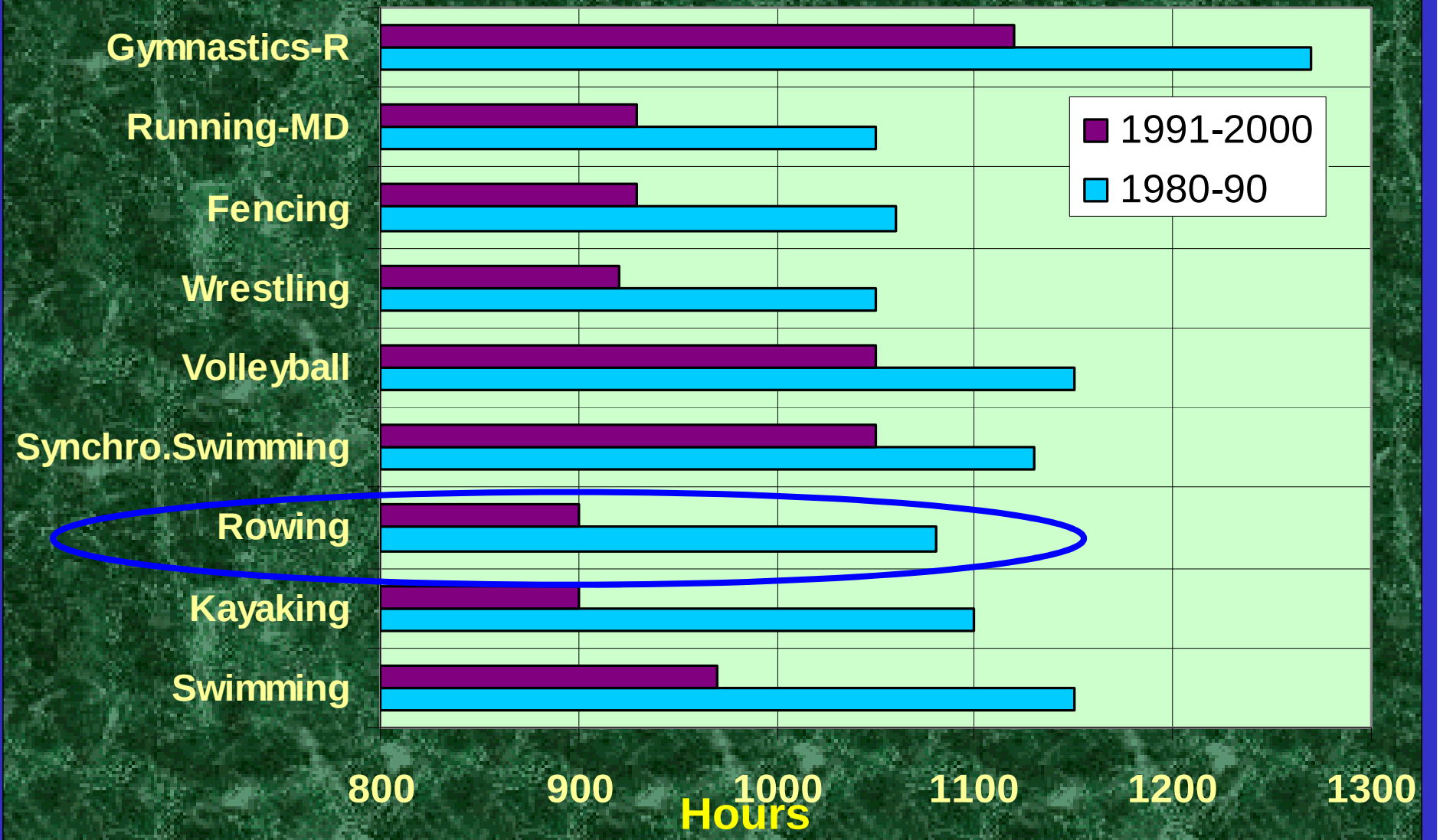
Facts:

- Simultaneous development of many abilities decreases effectiveness of training

- Body cannot simultaneously adapt to many training stimuli

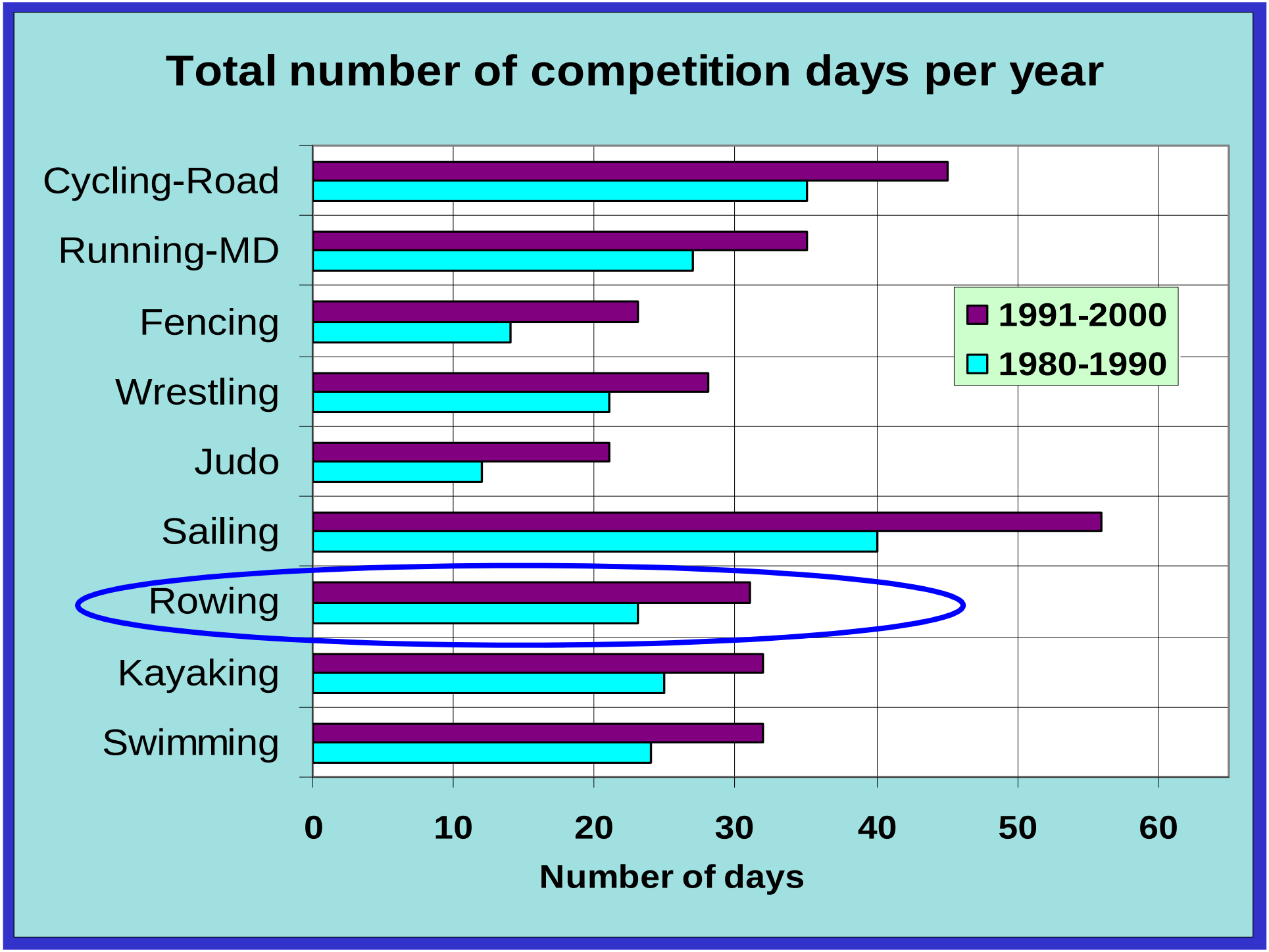
Past and Present in High-Performance Rowing

General volumes of annual preparation



Annual volumes of exercises in endurance sports (thousands km)

	1980-90	1995-2009
Swimming	2.5-3.5	2.0-2.5
Kayaking	5.5-6.3	4.5-5.3
Rowing	6.3-7.3	5.5-6.5
Cycling-R	35-45	30-35


Total number of competition days per year
Cycling-Road
Running-MD
Fencing
Wrestling
Judo
Sailing
Rowing
Kayaking
Swimming
1991-2000
1980-1990
0
10
20
30
40
50
60
Number of days

Past and Present in High-Performance Training

	Past	Present
Competitions	less	more
Total workloads	more	less
Pharmacology	liberal	hard limitation
Development	mainly	mainly
	simultaneous	consecutive

Basic limitations of traditional model

Low stimulation producing by “mixed” training

Conflicting physiological responses

Excessive fatigue accumulation

Inability to take part in many competitions

Alternative approach: blocks and stages

Terminology

Block – training cycle of highly concentrated specialized workloads

Earliest attempts to implement

Block Periodized Training

Anatoli Bondarchuk, track and field, hammer throwing

Block Periodized system that includes:
developmental mesocycle,
competitive mesocycle,
restoration mesocycle;
duration of training stage – 9-10 weeks

Preparation outcomes - gold-, silver-, and bronze-medals attained at the 1988 and 1992 Olympic Games

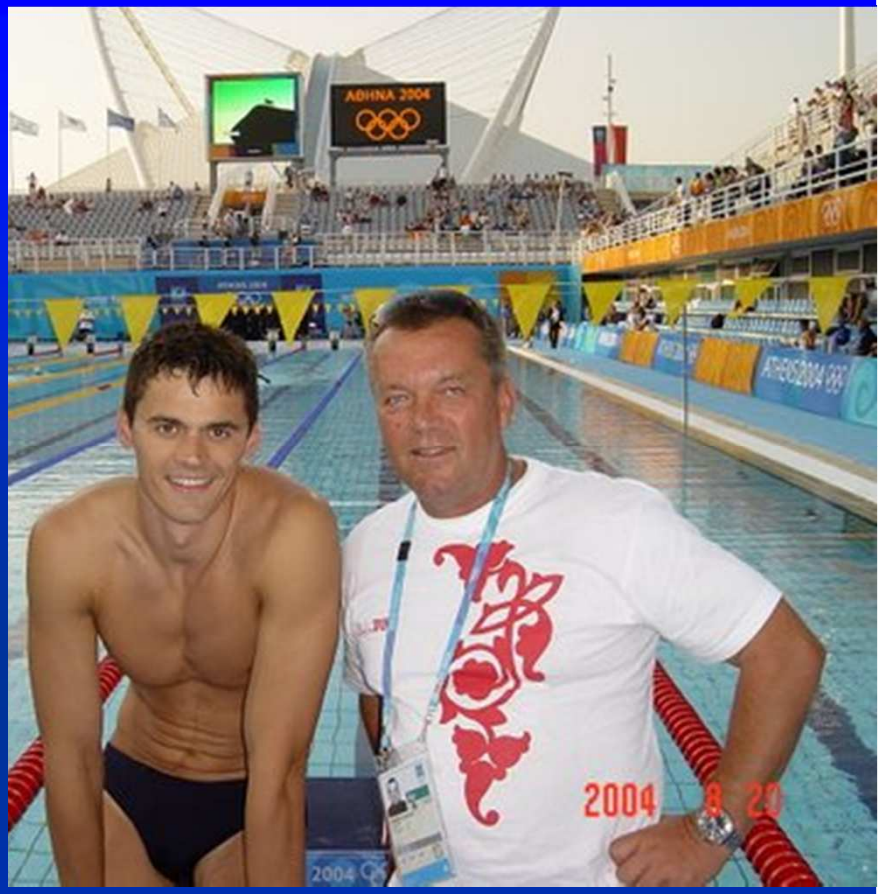
Publication: *Bondarchuk, 1986,1988*

Gennadi Touretski,
swimming

Block Periodized system that includes: general, specific, and competitive mesocycles; duration of training stage – 6-10 weeks

Preparation outcomes – numerous gold medals of Alexander Popov and Michael Klim attained at the Olympic Games and World Championships

Publication: ***Touretski, 1993, 1998***



Igor Koshkin

Swimming

Block Periodized system that includes: speed/technique, strength, aerobic conditioning, taper and competition, restoration;
duration of training stage –10 weeks

Preparation outcomes – three gold medals of Vladimir Salnikov; numerous medals attained by other swimmers in European and World Championships

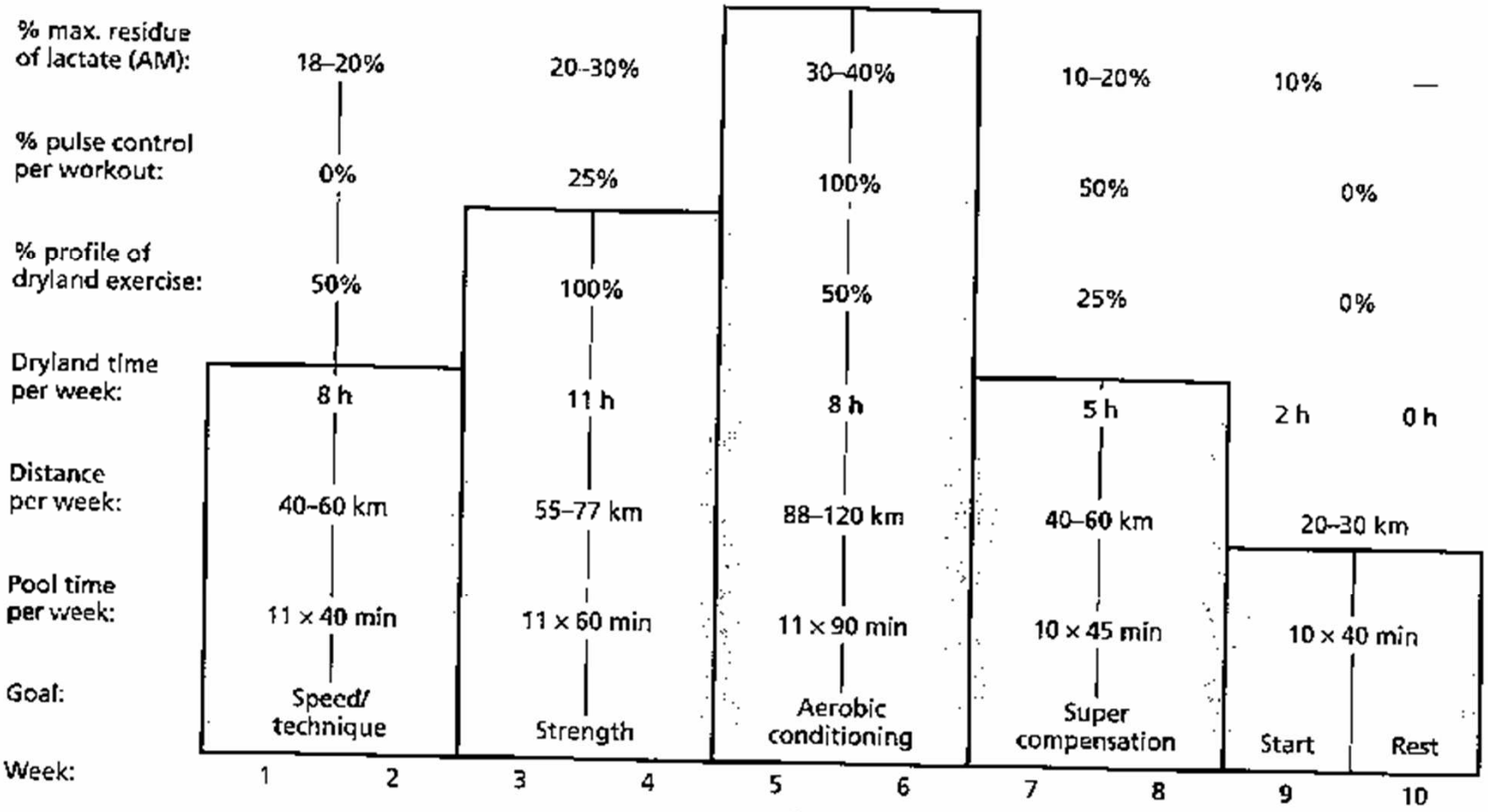


Fig. 55.4 Coach Koshkin's basic training pattern for 1500-m swimmer Salnikov and other Soviet top swimmers. The pattern is repeated five times a year in 10-week cycles. From Koshkin (1984).

Adopted from Gullstrand, 2001

Vladimir Issurin & Vassili Kaverin,

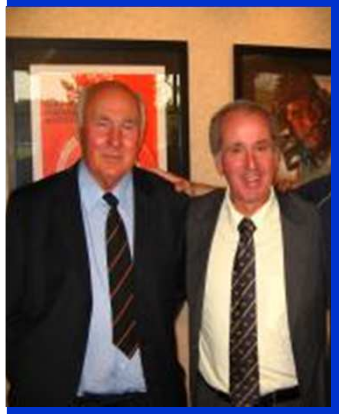
Canoe-Kayak

Block Periodized system that includes: accumulation, transformation and realization mesocycles;
duration of training stage – 6-10 weeks

Preparation outcomes – 3 gold and 3 silver medals of USSR National Team at the Seoul Olympic Games; 8 and 9 gold medals at World Championships of 1989, 1990

Publication: ***Issurin, Kaverin, 1985,1989***

The principal methodic demands to BP training were almost identical:



1) mesocycles-blocks where focused on minimal number of targets;

2) the total number of proposed blocks is relatively small;

3) the single mesocycle-block's duration ranges within two-fore weeks;

4) joining of single mesocycles forms training stage;

5) a number of training stages forms annual cycle

Block Periodization vs. Traditional Theory

TT	BP
Simultaneous development of motor abilities and skills	***Consecutive*** **development of motor abilities and skills**
Medium (low) concentration of training loads	***High*** **concentration of training loads**
Focus – training periods	**Focus –** ***blocks*****-mesocycles**
Background – cumulative training effect	**Background – cumulative and** ***residual*** **training effect**

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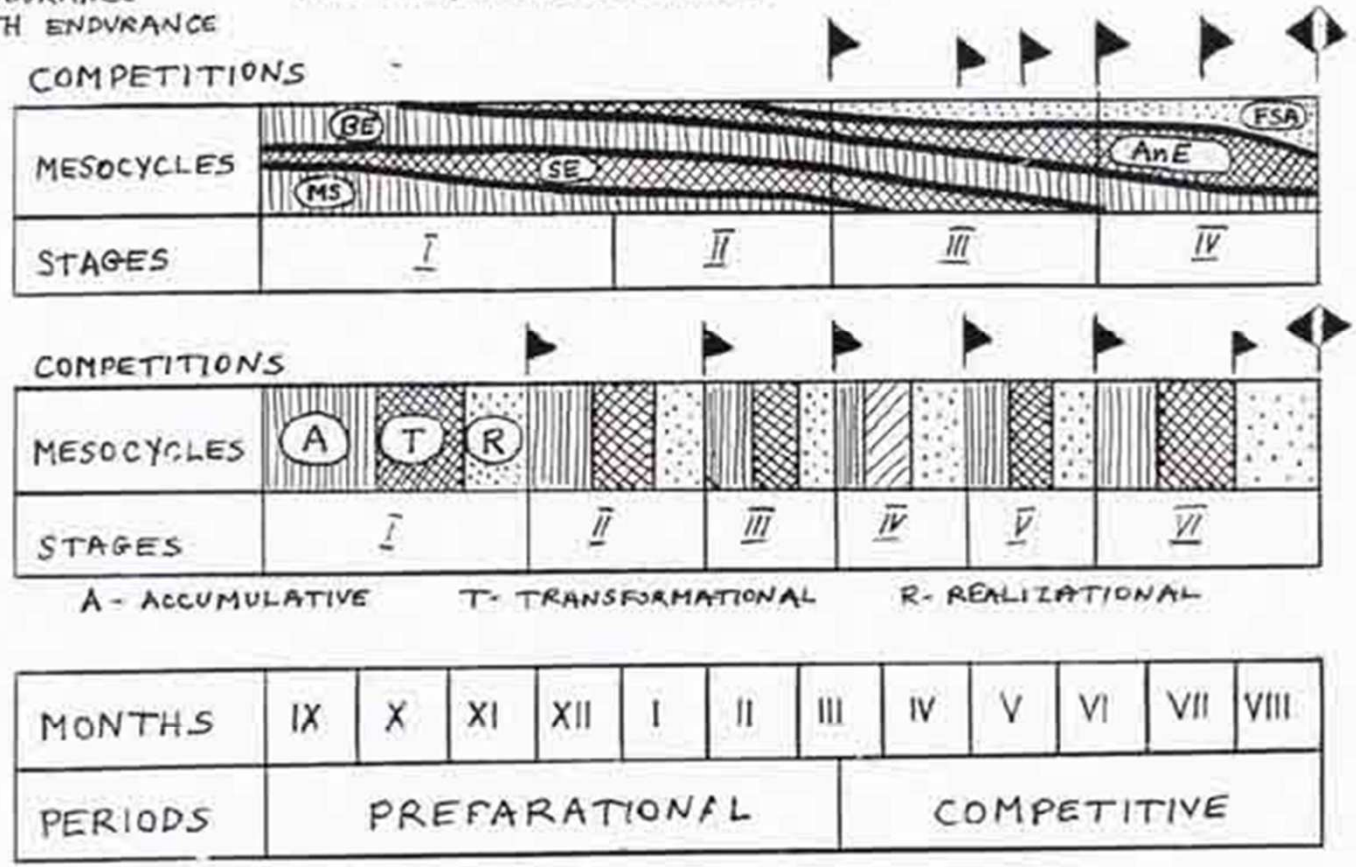


A- TRADITIONAL APPROACH **B**- NON-TRADITIONAL APPROACH

ALTERNATIVE SCHEMES OF ANNUAL CYCLE TRAINING

Basic principles of BP

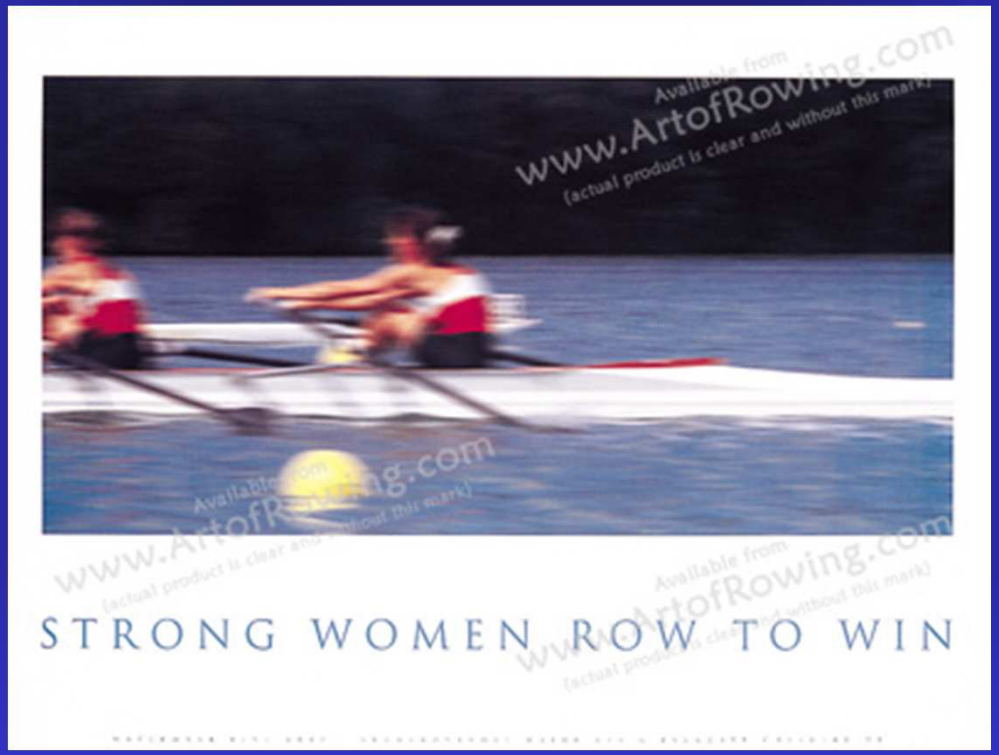
- **High concentration of the training workloads**
- **Minimal number of abilities-targets within single block**
- **Consecutive development of many abilities**
- **Compilation and use of specialized mesocycles-blocks**

Important

The cornerstones of Block Periodization

- high training loads' concentration
- residual training effects
- consecutive development
- training blocks taxonomy
- peaking

High training loads' concentration

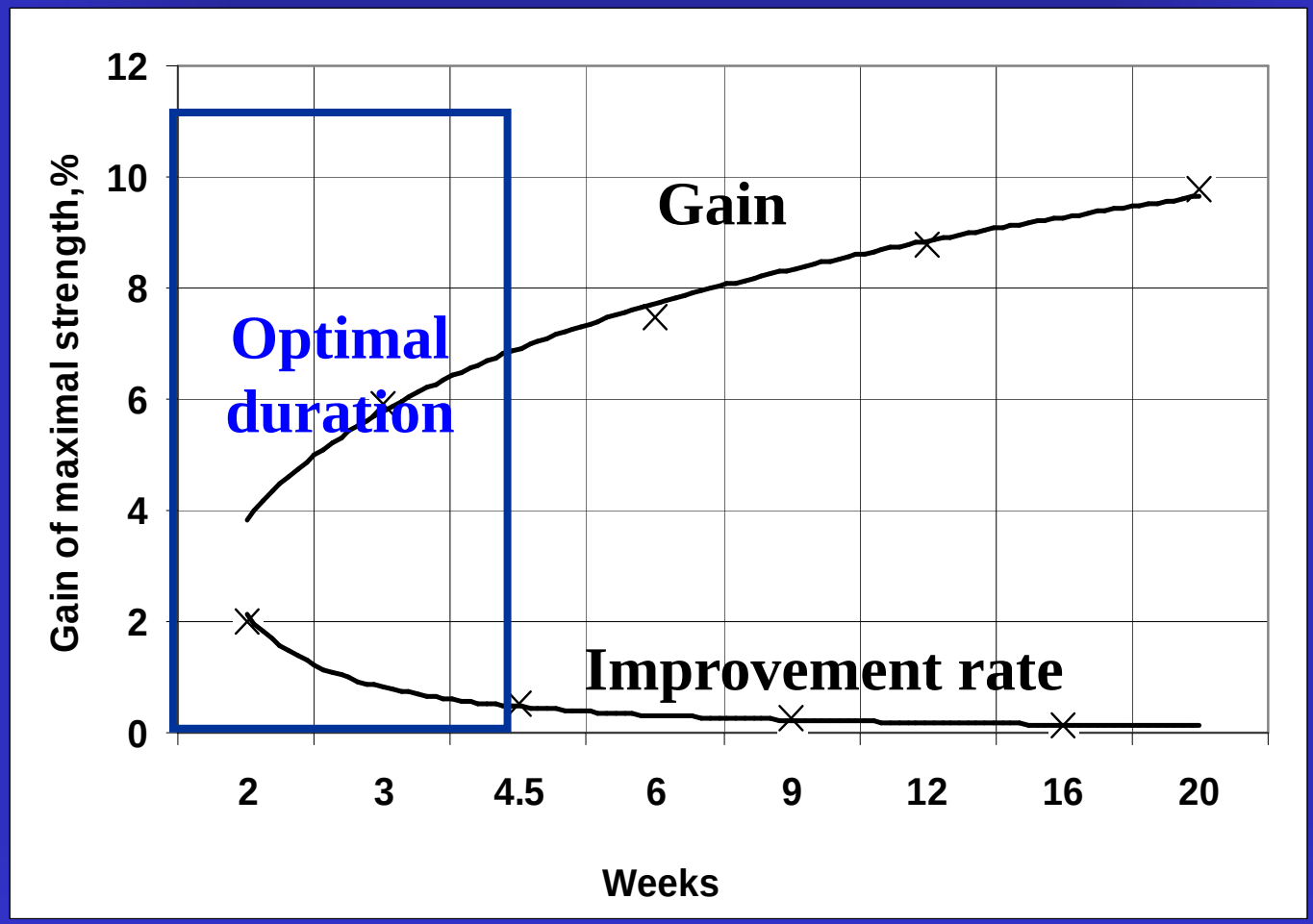


Facts:

In qualified athletes highly concentrated training loads only provide sufficient training stimuli

In elite athletes 60-70% of total training time is devoted to minimal number of targeted abilities

Typical gain and improvement rate of the maximal strength



Residual training effects

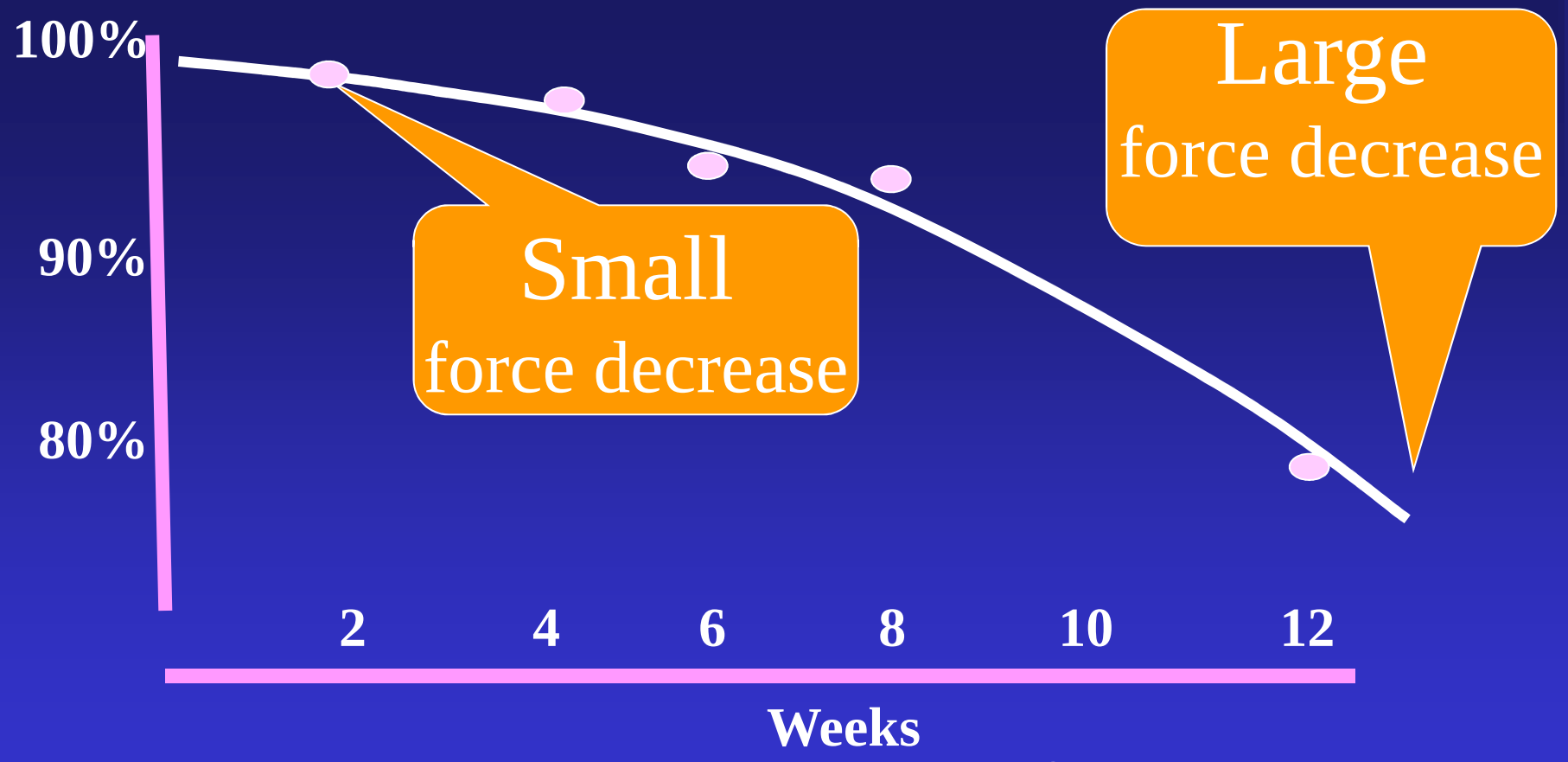
Prof. James Counsilman – great coach and scientist

Terminology

Residual training effect:

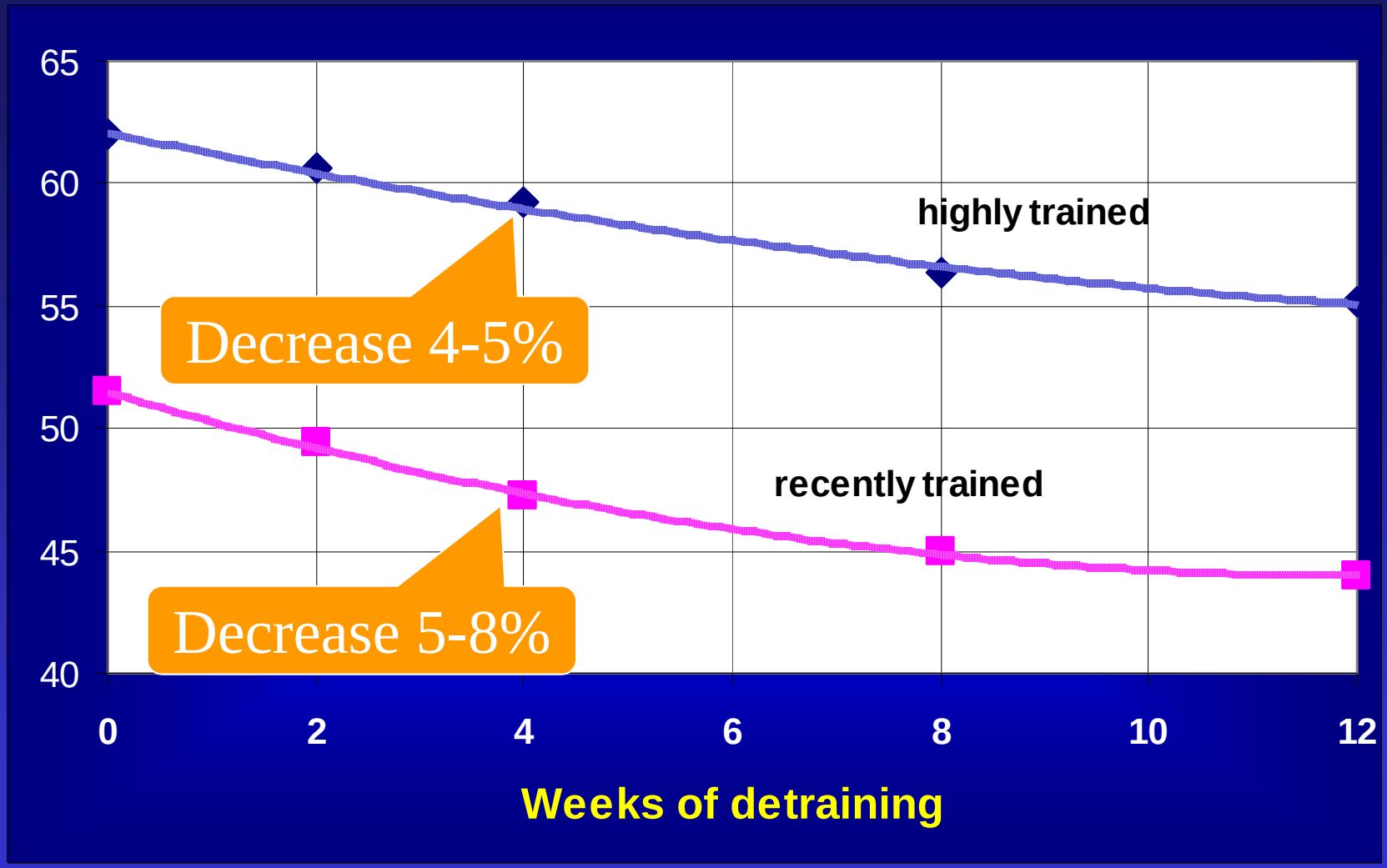
- retention of changes in the body state and motor abilities after the cessation of training beyond certain time period

Force decrease after strength training cessation



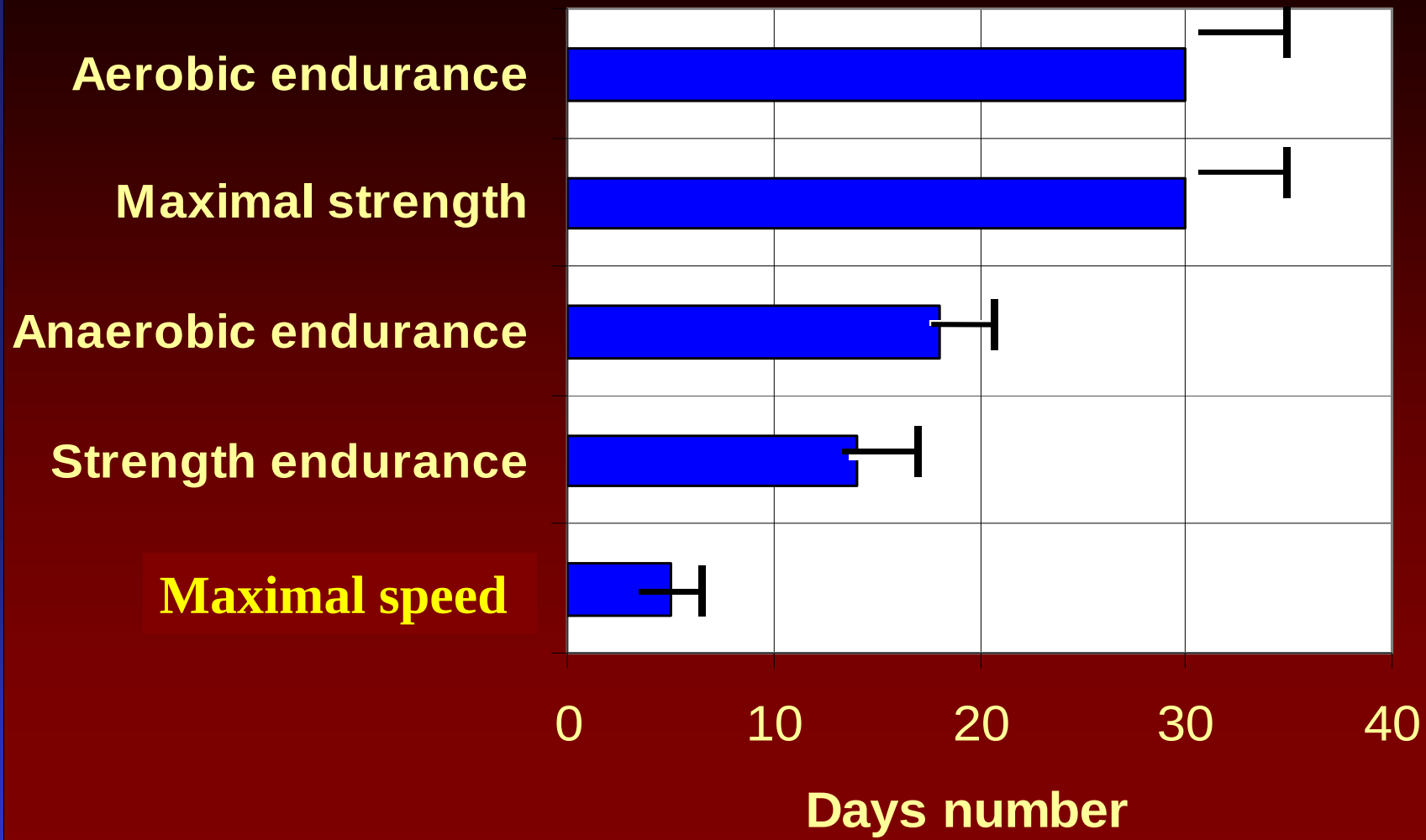
Adapted from Mujika & Padilla, 2000

VO_{2max} decrease after endurance training cessation



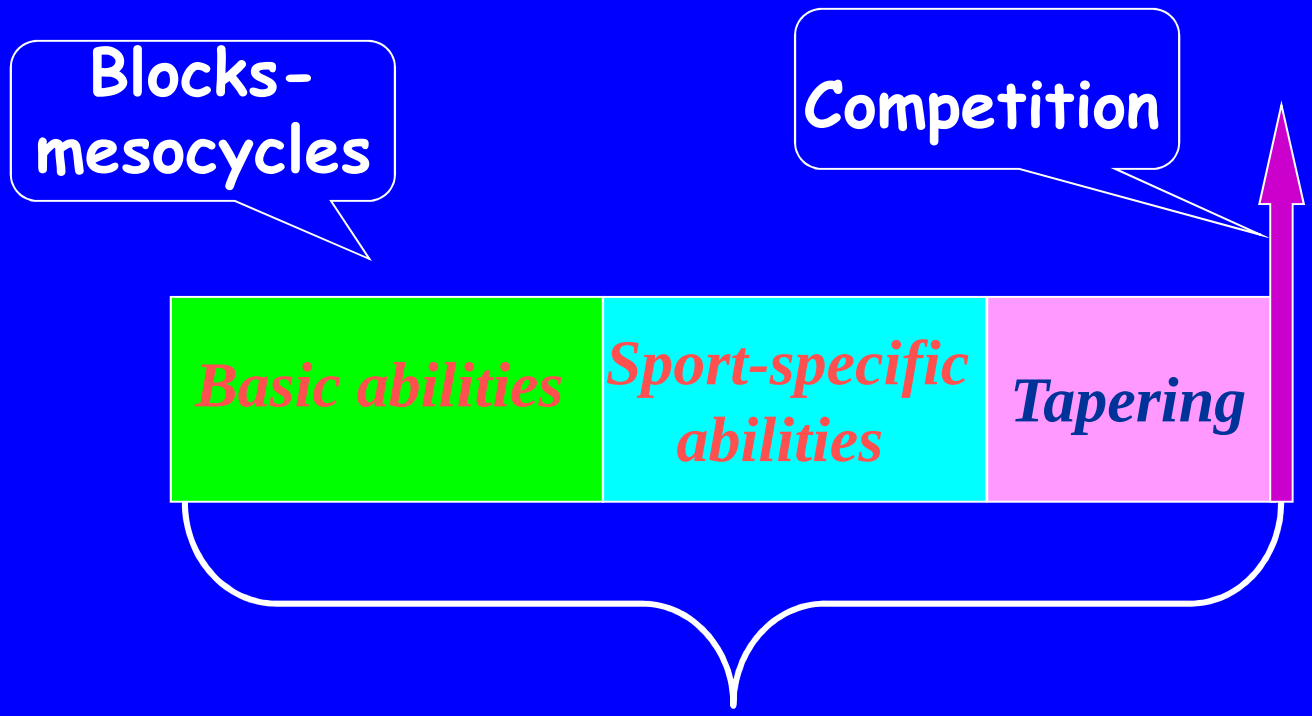
Adapted from Allen a.o.,1989; Coyle a.o.,1985; Pivarnik, 1986; Wibom a.o.,1992

Residual training effects



Consecutive development

Sequencing of training targets



Training blocks taxonomy

Type

Accumulation

Abilities-Targets

Basic motor and technical abilities:

aerobic endurance,

muscular strength,

basic coordination…

Type
Transmutation

Abilities-Targets

<u>Specific motor and technical abilities:</u>

anaerobic endurance,

strength specific endurance,

proper technique…

Training of rowers before world championships

JUERGEN M. STEINACKER, WERNER LORMES, MANFRED LEHMANN, and DIETER ALTENBURG

Abteilung Sport- und Leistungsmedizin, Medizinische Klinik und Poliklinik, Universität Ulm, 89070 Ulm, GERMANY; and Deutscher Ruderverband, 30189 Hannover, GERMANY

CONCLUSION

This review confirms that the critical borderline to long-term overtraining in adapted endurance athletes seems to be 2 and 3 wk of intensified prolonged training of about 3 $h \cdot d^{-1}$. Sufficient regeneration is required to avoid overtraining syndrome. The training principles of cross training, alternating hard and easy training days, and resting days reduce the risk of an overtraining syndrome in rowers.

Taxonomy of blocks-mesocycles

Type

Realization

Abilities-Targets

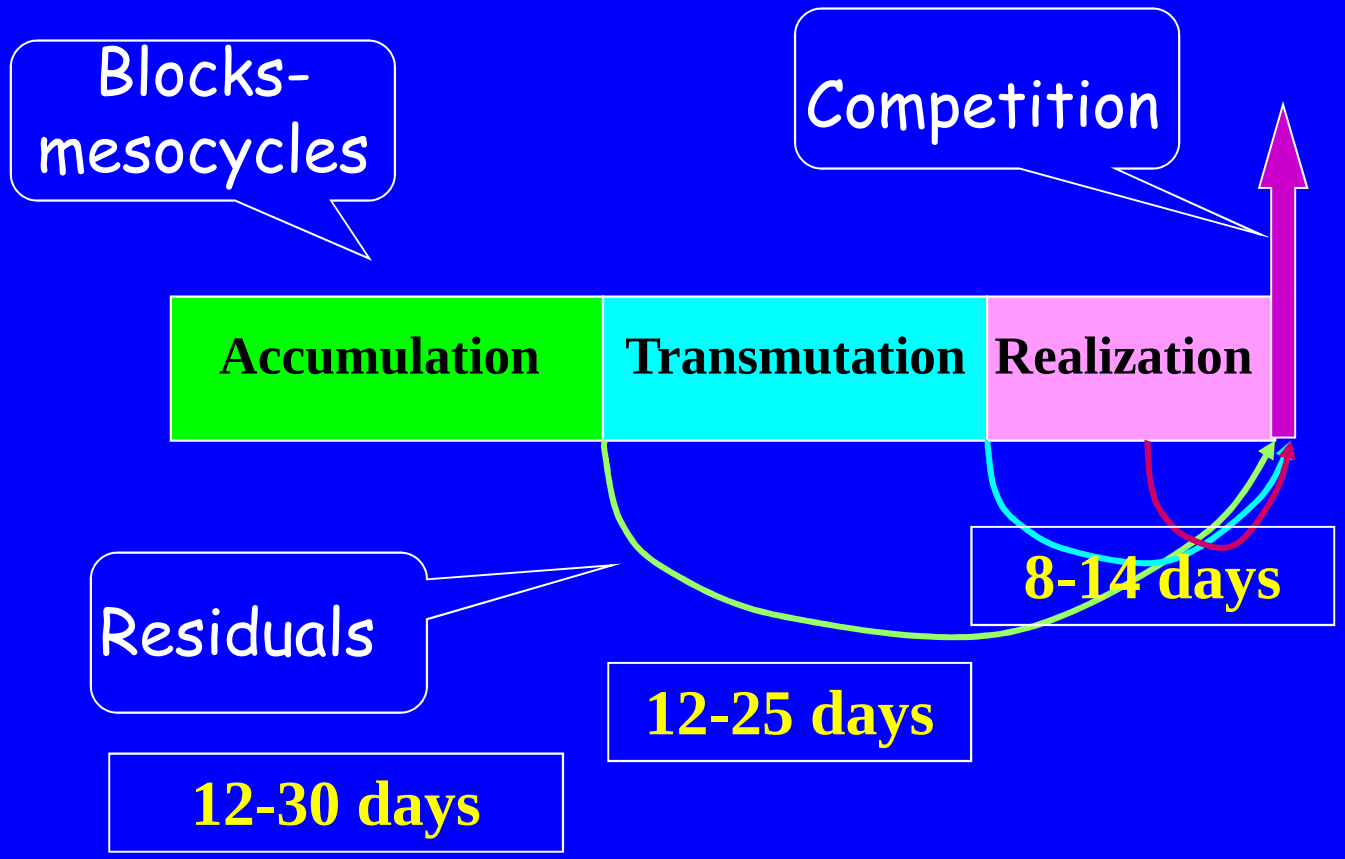
Tapering:
full restoration,
maximal speed and quickness,
event specific readiness

Peaking

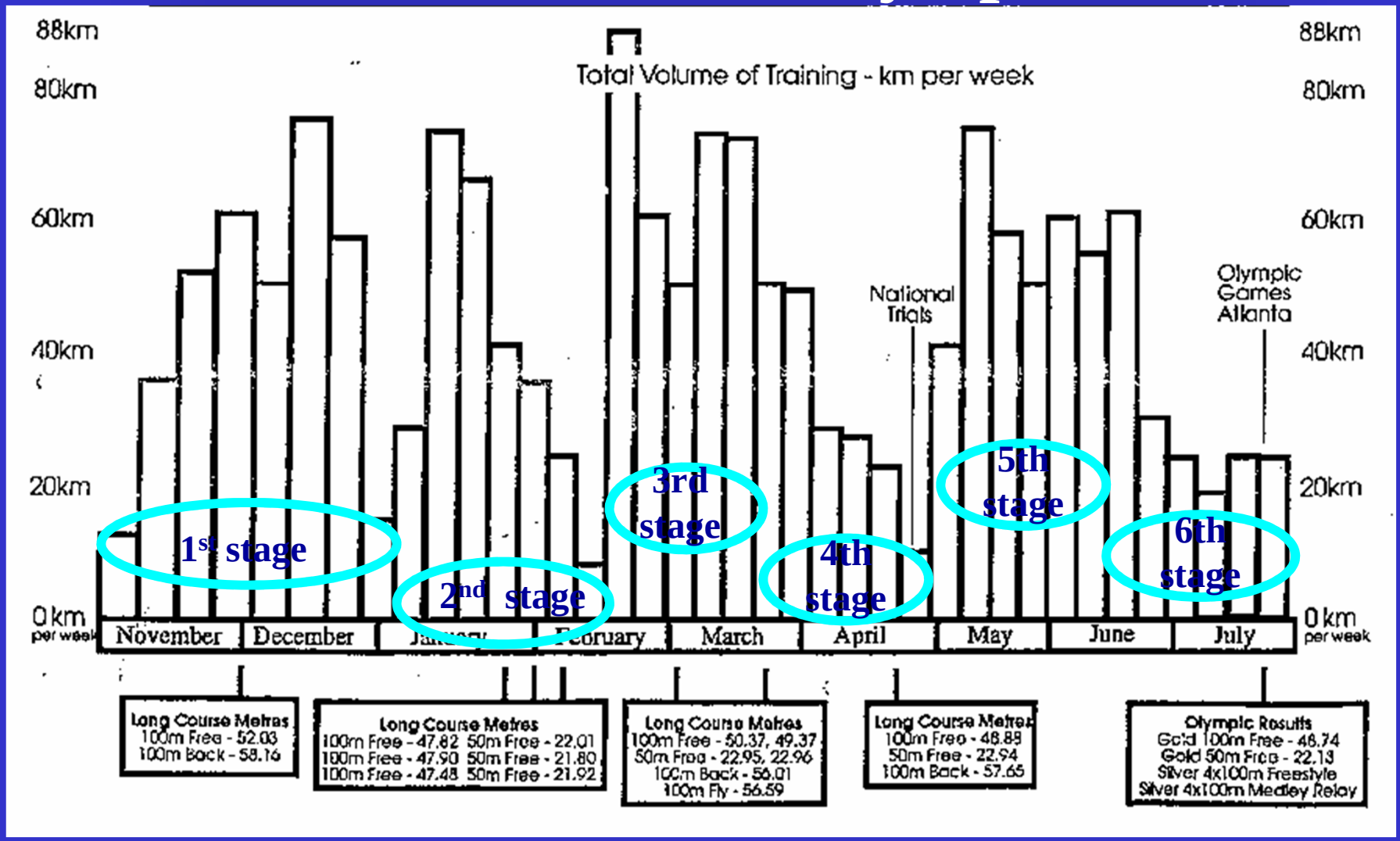
Terminology

Peaking - obtaining the best athletic conditions at a particular moment

Superposition of Residual Training Effects – Timing



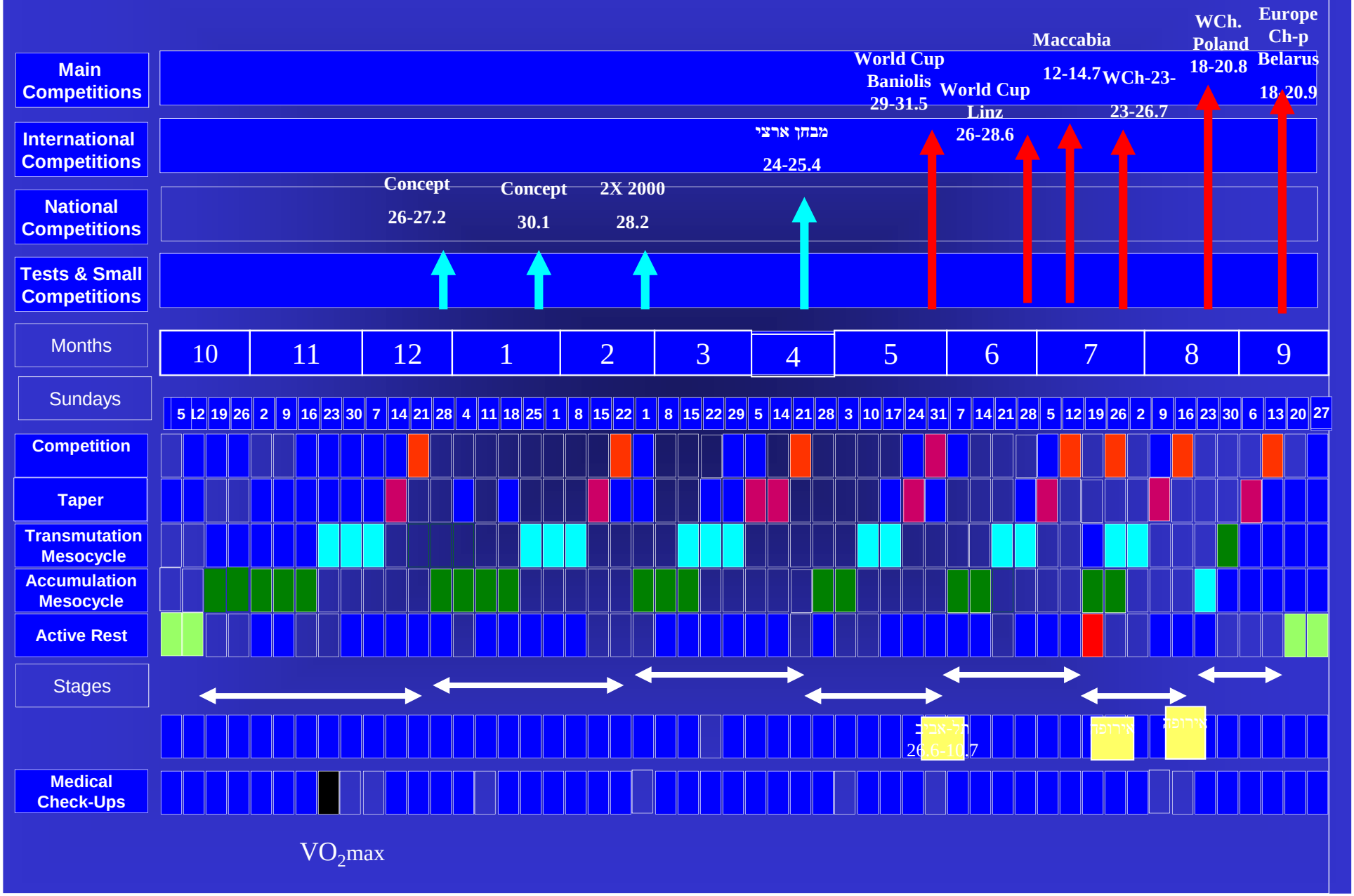
Annual preparation of Alexander Popov towards the Atlanta Olympic Games



By Courtesy of Gennadi Touretski

Annual Training Plan 2009
Rowing

Version from 24.10.2008



VO_2max

One more example of the BP training implemented

The 2006/2007 season was scheduled for macrocycle Traditional model 20-week (October-March) and Two ATR until the World Championship in Duisburg in August. It was the first time in the Spanish canoeing executing a program with ATR and I had serious problems to convince the technical direction and management of sport to achieve the macrocycle ATR. The results in Duisburg 2007 were not spectacular but I used to learn a lot about the Block Periodization and convince my Head coaches to program in the 2007/2008 season five ATR until the Olympic
Games.

Carlos Perez and Saul Craviotto had no qualification for the Olympic Games and we had to get it in the European Championship in Milan. They had not ever done K-2 until January 2008. In May they were 2º place in Europe Championship in Milan and in August were **Olympic Champions**. The Block Periodization had been helpful, two peaks so high in so short time.

Jesus G. Pallares
National Canoeing Coach

Saul Craviotto and Carlos Perez (ESP) -
Olympic Champions

Biological background of Block Periodization

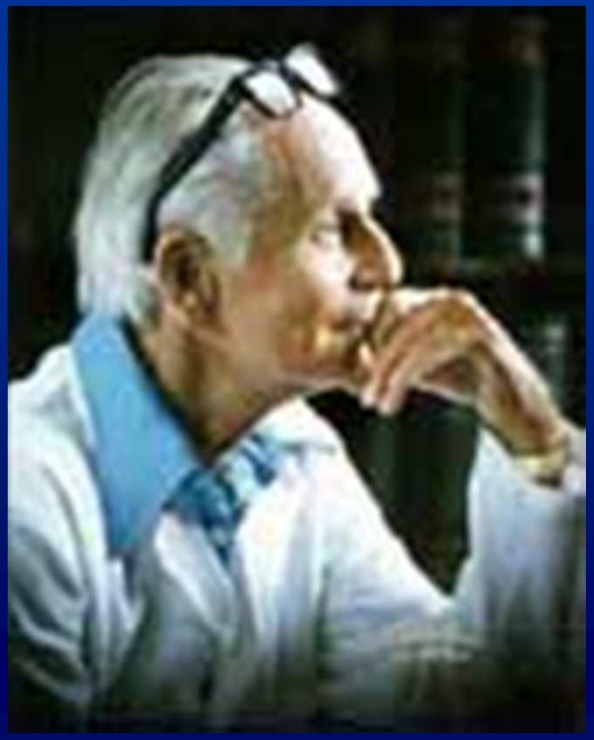
Claude Bernard

Classic theory of homeostasis – maintaining the constancy of body's internal milieu

Walter Cannon

Homeostatic regulation is a predominant mechanism for developing basic sport abilities like *cardiorespiratory fitness, general neuro-muscular coordination*, and *morphological and organic adjustment of the musculoskeletal system*. Therefore, homeostatic regulation serves as a dominant mechanism of adaptation to training in the early stages of long-term athletic preparation and for developing of basic motor and technical abilities in high-performance athletes.

In terms of BP these cycles are specified as *accumulation mesocycle-blocks*.



Hans Selye

Classic theory of mechanisms of stress and general adaptation

" Another major pathway involved in the stress mechanism is carried through the *catecholamines* liberated under the influence of an acetylcholine discharge, at autonomic nerve endings and in the adrenal medulla"

The Nature of Stress
by Hans Selye

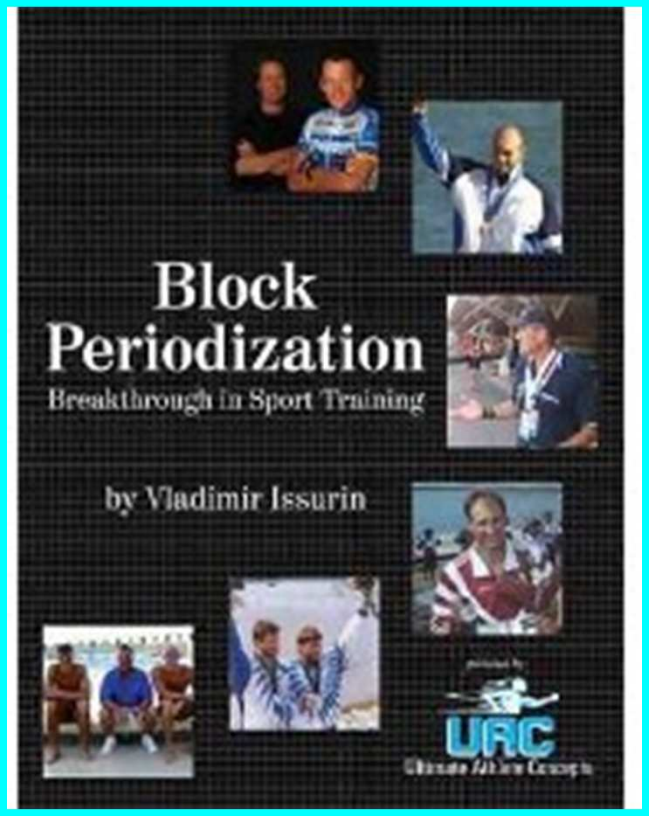
The strong training stimuli elicited by workloads of high intensity mobilize the athlete's energy resources in amounts that exceed the metabolic level necessary for homeostatic response. These increased demands trigger off profound endocrine responses, i.e., the secretion of stress hormones. Thus, highly intensive anaerobic glycolitic exercises produce a pronounced catecholamine response *(Viru, 1985,1995),* and the rapid secretion of cortisol, corticotropin and β –endorphin *(Lehman, Keul,1981*) .

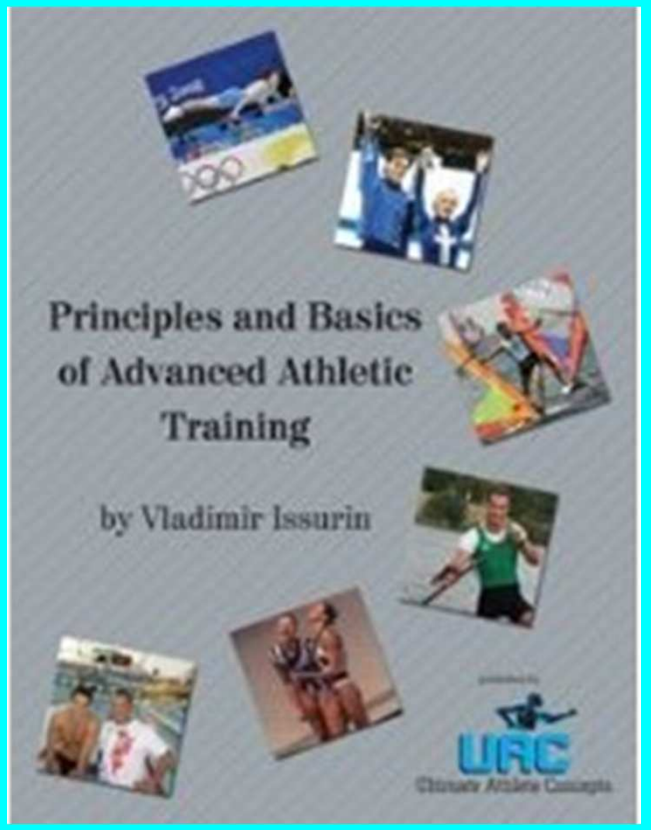
In terms of BP this training specified as *transmutation mesocycle-blocks*.

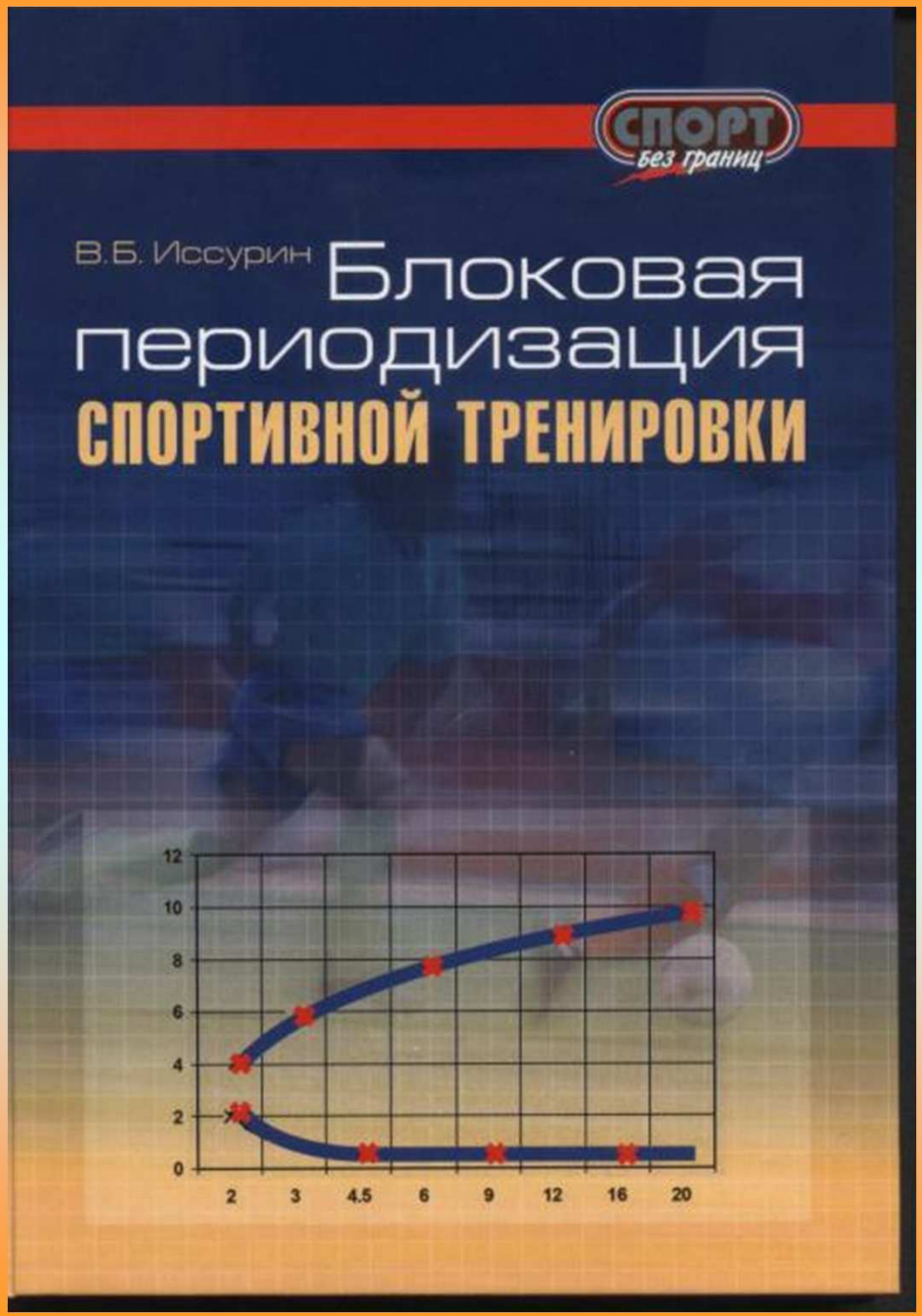
Preparation that entails the use of both types of training concurrently demands energy needs that surpassing the limits of homeostatic regulation. Correspondingly, stress reactions become stronger. This more strained metabolic and hormonal body environment *suppresses* homeostatic responses and has a *deleterious effect* on workloads intended to develop basic athletic abilities. Such conflicting responses, which are typical of mixed training among high-performance athletes, lead to a decline in general aerobic abilities, a reduction in muscle strength and cases of overtraining.

BP model allows to avoid such conflicting physiological responses and exploits the most appropriate mode of biological adaptation.

How to accomplish these knowledge?


Block
Periodization
Breakthrough in Sport Training
by Vladimir Issurin
URC


Principles and Basics
of Advanced Athletic
Training
by Vladimir Issurin
URC


СПОРТ
без границ
В.Б. Иссурин
Блоковая периодизация
СПОРТИВНОЙ ТРЕНИРОВКИ
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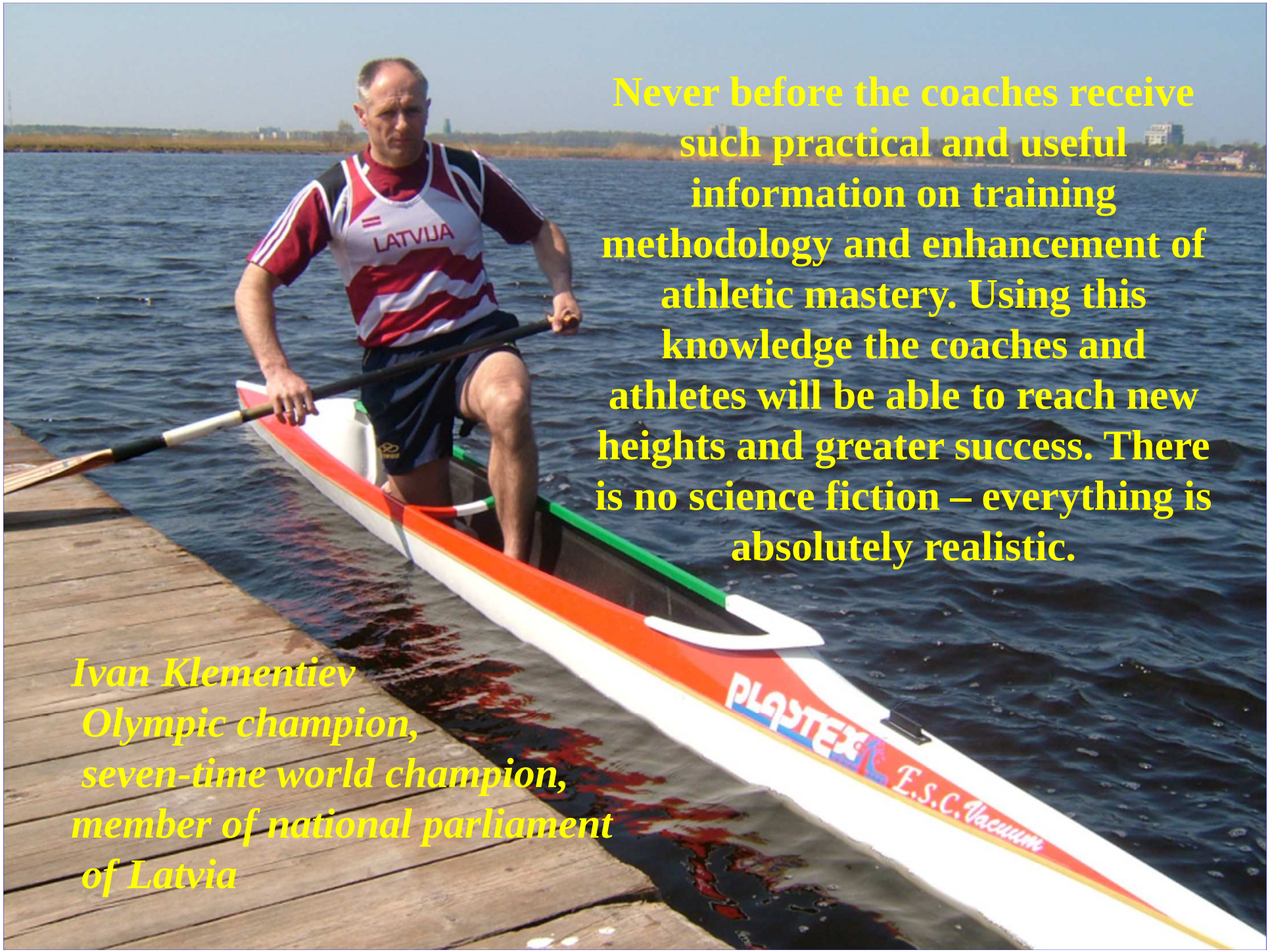
What people are saying ?

I use this opportunity to express my appreciation of methodological recommendations of Prof. Issurin that have assisted me greatly in my work. Prof. Issurin belongs to category of scientists, who know and understand the needs of coaches and his work has expanded our knowledge and enriched our coaching abilities allowing us to strive and reach better results.

Oreste Perri
Two-time world champion, personal coach of a number of Olympic and World champions. Head coach of Italian canoe-kayak national team.



Never before the coaches receive such practical and useful information on training methodology and enhancement of athletic mastery. Using this knowledge the coaches and athletes will be able to reach new heights and greater success. There is no science fiction – everything is absolutely realistic.

Ivan Klementiev
Olympic champion,
seven-time world champion,
member of national parliament
of Latvia

It is quite easy for me to judge the Block Periodization System. Having been coached by Gennady Touretski I have never needed nor used any another system. Therefore, I highly recommend this book to every athlete, who would agree that better understanding can elicit better performance.

Alexander Popov
Five-time Olympic champion, many times world and European champion ,
Russia

Conclusions

1. **Block Periodization as an alternative training approach is worthy for learning and implementation in the preparation of high-performance swimmers**

2. **Basics of Block Periodization are formed by general principles of BP (1), taxonomy of mesocycles-blocks (2), and guidelines for compiling annual cycle (3)**

3. Biological Background of Block Periodization

Periodization is closely connected with two fundamental contributors of human adaptation:

- classic theory of homeostasis, and
- mechanisms of stress adaptation


Thank you
for your
attention

Gennadi Touretski

Personal coach of many-time world and Olympic champions Alexander Popov (RUS) and Michael Klim (AUS)

My familiarity with the study outcomes of Vladimir Issurin cover a long period of cooperation and friendship. I believe the Block Periodization will assist anyone who is searching for new sources of information on how to improve training and obtain higher achievements.