

## **The effect of compound exercises within the phosphagen system on some bio-kinetic abilities of football players under 17 years old**

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**Abstract:** The purpose of this paper is to preparing the players and subjecting them to perform complex exercises within the phosphagenic system because of its importance in raising some of the bio-kinetic capabilities represented by (explosive ability, flexibility, agility) by improving their ability to perform well and continuing that without decreasing the player's ability to continue playing during the match. As for the research problem, by following the researcher's youth league in Wasit governorate and some training units, he noticed their lack of many bio-kinetic abilities, especially in explosive ability, flexibility and agility, and these capabilities lead to weak players' ability to perform strong and fast continuous throughout the match, and the researcher explains the weakness of the players' bio-kinetic capabilities to The vocabulary of the training units does not include exercises of an explosive nature, as well as flexibility and agility. The aim of the research is to prepare complex exercises within the phosphagenic system in developing some of the bio-kinetic capabilities of young football players. In addition to identifying the effect of compound exercises within the phosphagenic system in developing some of the bio-kinetic abilities of young football players. The research assumed that there were statistically significant differences between the experimental and control groups in some bio-kinetic abilities and in favor of the experimental group. In addition, there were statistically significant differences between the pre, post-tests of the experimental, and control groups in some bio-kinetic abilities and in favor of the post-test. As for the research sample, it was also chosen in a deliberate way, and they are the players of Al-Nahrain and Al-Sharqiya Club, the youth category, due to the availability of the research requirements in them, and the number of the research sample was (32) players. Goalkeepers and some players from each club were excluded, bringing the final number to (20) players. The research sample was divided into two experimental groups, represented by the youth of the martyrs, and the control group represented by the youth of the Eastern Province, and each group included (10) players. The pre tests were conducted on the two research groups, after which the compound exercises were applied within (24) training units, and after the completion of the training units, the post-tests were conducted and the test data were collected using Excel and processed statistically with the Spss statistical bag. After the presentation and discussion of the results, the researcher reached the most important conclusions, namely the compound exercises within the phosphagenic system contributed to the development of the bio-kinetic capabilities represented by (explosive ability, flexibility and agility) in the experimental research group. In addition to the superiority of the experimental group over the control group in the post-tests due to the complex exercises within the phosphagenic system and the nature of their application, using the training tools represented by the Swiss ball and rubber ropes.

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### **Introduction:**

The coaches and workers in the field of football tended to develop the game, as this depends on the players' physical, skill and scheming level. The science of sports training has been relied upon in preparing the training curricula and bringing the players' level to a level comparable to the competitors' players by preparing them to perform and repeat muscle contractions. In a strong and fast anaerobic manner and continue to do so in order to resolve the situations that players are exposed to during the match as well as to determine the performance of football skills.

And performing exercises in a fast and strong manner will contribute to the development of physical abilities as well as planning, as the performance of complex exercises with time within the anaerobic system works to achieve high rates of agility, flexibility and strength that players must enjoy in order to increase their ability to do football skills in the opposite direction, As well as friction with the opponent and trying to overcome it through the body's ability to flexibility and agility during the transition from defense to attack and vice versa, and the continuation of kinetic work in proportion to the time required for this and the many repetitions during the match. Also, these (compound) exercises help in the explosive power, agility and flexibility of the player, and its reflection on the performance of attacks and the return to defense at full speed without affecting the performance of the skills of the game and its performance to the fullest.

Hence the importance of the study in preparing the players and subjecting them to perform complex exercises within the phosphagenic system because of its importance in raising some of the bio-kinetic capabilities represented by (explosive ability, agility, flexibility).

**Research problem:**

The research problem emerged through the researcher’s follow-up to the junior league in Wasit Governorate and some training units. I noticed their lack of many bio-kinetic capabilities, especially in explosive ability, flexibility, agility and evasiveness. Weakness of the players' bio-kinetic abilities to not include the vocabulary of the training units for explosive exercises as well as flexibility and agility.

**Research objective:**

- Preparing compound exercises within the phosphagenic system in some of the bio-kinetic abilities of young football players.
- Identifying the effect of compound exercises within the phosphagenic system in developing some of the bio-kinetic abilities of young football players.

**Research hypotheses:**

- There are statistically significant differences between the experimental and control groups in some bio-kinetic abilities and in favor of the experimental group.
- There are statistically significant differences between the pre, post-tests of the experimental, and control groups in some bio-kinetic abilities in favor of the post-test.

**Research fields:**

- Human field: Al-Shuhada Club junior football players for the 2021-2022 season.
- Time field: (2/2/2022) to (1/8/2022)
- Spatial field: Al-Shuhada Football Club Stadium.

**Research methodology and field procedures:**

**Research Methodology:**

The researcher followed the experimental method as it fits with the nature of the research problem, and chose to design the method of the two equal groups (experimental and control) with pre and post-tests.

**Community and sample research:**

The research community was determined by the players of Al-Kut district football clubs for the youth category (Kut, Al-Jihad, Al-Azzah, Al-Shuhada, Al-Sharqiya, Al-Nahrain and Wasit) for the sports season 2021-2022, numbering (126) players. The research requirements were in them, and the number of the research sample was (32) players, and the goalkeepers and some players were excluded from each club, so that the final number was (20) players. Thus, the research sample constituted (15.9%) of the research community. Table (1) shows the population and sample of the research

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No.	Research community	No. of players	sample Research	
			Experimental group (Al-Shuhada)	Control group (Al-Sharqiya)
1	Kut	18	10 players	players 10
2	Al-Jihad	18		
3	Al-Azzah	18		
4	Al-Shuhada	18		
5	Al-Sharqiya	18		
6	Al-Nahrain	18		
7	Wasit	18		

**Homogeneity of the research sample:**

The researcher performed homogeneity for the sample members in terms of (length, mass, age, training age) as shown in Table (2).

Table (2) shows the homogeneity of the research sample with the torsion coefficient of the variables (length, mass, age, training age)

Variables	Measuring unit	Mean	Std. Deviations	Median	Skewness
Length	Cm	171	5.902	170	0.599
Mass	Kg	63.40	5.977	61	0.137
Age	Year	15.72	0.79	15.95	0.492-
training age	Months	29.5	4.859	26	0.381

#### **Equivalence of the two search groups:**

The equivalence is performed on the two research groups by conducting tests for the research variables, as in Table (3).

Table (3) shows the equivalence of the two research groups in some bio-kinetic abilities

Variables	Measuring unit	Experimental		Control		T value	Level Sig	Type Sig
		Mean	Standard deviation	Mean	Standard deviation			
Explosive ability	cm	37.600	2.503	36.800	1.813	0.818	0.424	Non sig
agility	second	7.500	0.971	7.550	0.724	0.130	0.898	Non sig
kinetic flexibility	Repetition	19.500	1.581	19.300	1.636	0.278	0.784	Non sig

#### **Data collection methods:**

They are all devices, tools and means that help the researcher collect information and solve the problem to be studied. The following devices have been used:

#### **Equipment used:**

- Electronic stopwatch, two (2) type (Casio).
- A two (2) video camera for the purpose of documentation.

#### **Tools used:**

- Tape measure.
- Footballs (12).
- whistle number (2)
- Adhesive tape.
- Miscellaneous office tools.
- Barriers (20) of different heights.
- Number of (40) pillars of different heights.

#### **Means of collecting information:**

- Arab and foreign sources.
- International Information Network (Internet).
- Questionnaire form.
- Tests and measurements.
- Personal interviews (experts and specialists)

#### **Field Research Procedures:**

##### **Determining the search variables:**

The search variables were defined as follows:

Bio-kinetic capabilities (explosive ability, agility, flexibility).

**Determining the tests used in the research:**

**Tests of bio-kinetic aptitudes:**

- First: Test name: Vertical jump test from stability: (Latif and Kateh. 2021)
- Objective of the test: To measure the explosive force of the muscles of the lower extremities.
- Test tools:
  - A blackboard, made of wood, 1.5 meters long and half a meter wide, on which white lines are drawn, and the distance between each line is 2 cm.
  - A smooth wall whose height is not less than 3.5 cm from the ground.
  - Chalk pieces or lime powder, a piece of cloth to wipe the marks of lime after reading each attempt made by the player.
- **Procedures:**
  - The board or piece of wood is fixed on the wall with a distance of not less than 15 cm so that the player does not make contact with the wall while jumping up.
  - It must be taken into account that the bottom edge of the board is at a height from the ground for the shortest player to take the test from the vertical jump allowed up.
  - Draw a line on the floor perpendicular to the wall with a length of 30 cm.
- **Test description:**
  - The player grabs a piece of chalk not less than 3 cm, then stands facing the board (the blackboard) and raises the arms as high as possible and makes a mark with chalk on the board, noting that the two heels are attached to the ground.
  - The player then stands facing the board at the side, so that the feet are on the 30 cm line.
  - The player swings the arms down and back with the torso bent forward and down and the knees bent to a right angle position only.
  - The player extends the knees and pushes the feet together to jump up while swinging the arms strongly forward and upward to reach them to the maximum possible height, where he puts a mark with chalk on the board, wall or blackboard at the highest point he reaches.
  - The player swings the proximal arm forward and down when landing.
- **Test instructions:**
  - The feet should be pushed together from the jumping position.
  - It is necessary for the player to swing the arms forward and down to adjust the timing of the movement before performing the jump up process in order to reach the maximum possible height.
  - The tested player is given 3-5 consecutive attempts, and the result of the best attempt is calculated.
  - Measurements are taken to the nearest 1 cm.
  - Jump up with feet together from a stationary position.
  - Do not stick a piece of chalk outside the fingers of the hand so as not to affect the results.
  - It is preferable for the arbitrator to stand on a ladder or a table near the board or the blackboard so that he can clearly read the results of the different attempts.
- **Test management:**
  - An observer who calculates the score and notes the performance.
  - Recorder: Calls the players and records the results
- Score Calculation: The number of centimeters between the line he reaches from a standing position and the mark reached by the player as a result of the jump is recorded to the nearest 1 cm.

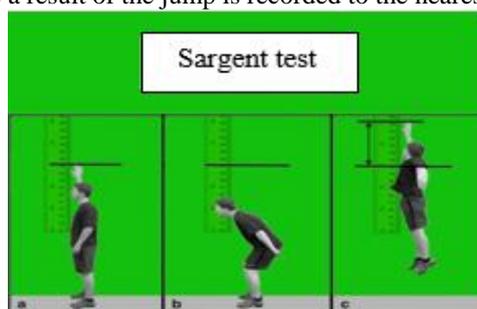


Figure (1)

Shows the performance of the vertical jump test of stability

### **Second, the agility test**

- Test name: zigzag ran the Barrow method (Al-Hakim. 2004).
- The purpose of the test: To measure agility.
- Tools: a rectangular running field built on solid ground, its length (4.75) and its width (3 m), a stopwatch, five posts (with a standing height of not less than (30 cm)), and the distance between the starting line and the first post is (75 cm).
- Performance description: The tester takes the standby position from the high start behind the starting line and when given the signal at the start, he sprints between the five legs and back to the start.
- Calculation of the score: The time taken by the laboratory to travel the distance from the beginning to the end is recorded, and each player is given two attempts and calculating the best one.

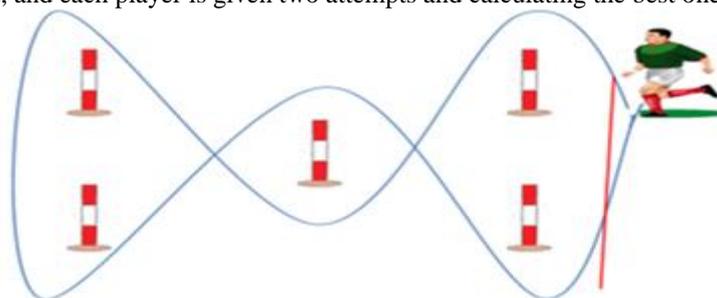


Figure (2)  
Shows the agility test

### **Third, the kinetic flexibility test**

- Test name: Touching the floor and wall, right and left, consecutively (20 seconds) (Saadallah. 2002).
- The objective of the test: To measure kinetic flexibility.
- Tools used: stopwatch, wall, draw an (X) on two points:
  - On the floor between the feet of the laboratory.
  - On the wall behind the back of the lab (center).

The height of the mark on the wall depends on the height of the player, as well as the distance between the wall and the mark on the ground.

- Performance method: Upon hearing the start signal, the tester bends the torso forward downward to touch the ground with the tips of the fingers at the (X) mark between the feet, then extends the torso high while turning to the left to touch the (X) mark behind the back with the tips of the fingers, then rotates the torso and bends it down to touch the (X) mark between the feet a second time, then extends the torso while turning to the right to touch the (X) mark behind the back, and so on, taking into account not to move the feet during the performance.
- Recording: The player records the number of rounds he completed during (20 seconds). The right and left round is considered one attempt.
- Number of Attempts: Only one attempt.

### **Exploratory experience:**

The researcher conducted a reconnaissance experiment over a period of two days with the assistant work team. It was conducted on Wednesday and Thursday (9-10/2/2022). It was conducted on (4) players from outside the research sample.

### **Pre-tests:**

The pre- tests of the research sample were conducted on Saturday, 12/2/2022 at four o'clock in the afternoon, and accompanied by the auxiliary work team at the Al-Shuhada football stadium, tests were conducted for explosive ability, kinetic flexibility and agility.

### **Exercises used**

These complex exercises were applied to the experimental group prepared by the researcher at Al-Shuhada Football Stadium during (24) training units in (8) weeks, at the rate of (3) training units per week on days (Sunday, Tuesday, Thursday) in each week. It started on Sunday (20/2/2022) until Thursday (14/5/2022). The appropriate intensity was taken into account, which is appropriate to the age group and the training stage of the player, and those exercises were prepared with a time that falls under (30 seconds) and the appropriate intensity was taken into account in each exercise in proportion to the players' abilities, and the intensity was

codified according to the level of the players using the maximum possible Its performance in one exercise, and the nature of these exercises was characterized as being complex (physical - skill) and the principle of gradation was taken into account during training, starting from intensity (80%), up to intensity (100%) in a high-intensity interval training method, and repetitive training method, and the exercises were applied during The period of specific preparation and load formation (1:2), as well as the intensity of the exercises, was extracted from the best time to perform each exercise.

**Post-tests:**

After the exercises are completed during the application of the experiment, the post-tests of the research sample will be conducted on Sunday, 17/5/2022, and accompanied by the auxiliary work team at the Al-Shuhada Football Stadium, as it included bio-kinetic tests according to the conditions of the pre- tests.

**Statistical methods:** The search data was processed through the Statistical Package for the Social Sciences (SPSS).

**Results and discussion:**

**Presentation and discussion of the results of the tests for the bio-kinetic abilities of the control and experimental groups for the results of the two tests, the pre and post-tests:**

**Presentation of the results of the pre and post-tests in the bio-kinetic abilities of the control group**

Table (4) shows the means, standard deviations, mean difference, standard deviation, calculated (T) value and the result of differences for the results of the pre and post-tests in the bio-kinetic abilities of the control group.

Variables	Measuring unit	Pre-test		Post-test		arithmetic mean of difference	standard deviation of differences	T value calculated	Level Sig	Type Sig
		Mean	Standard deviation	Mean	Standard deviation					
Explosive ability	cm	36.800	1.813	39.400	1.505	2.600	0.791	3.284	0.009	sig
agility	second	7.550	0.724	7.300	0.888	-0.250	0.271	0.921	0.381	Non sig
kinetic flexibility	Repetition	19.300	1.636	20.400	1.264	1.100	0.640	1.718	0.120	Non sig

- At a significance level of  $\leq 0.05$  and with a degree of freedom (9)

**Presentation of the results of the pre and post-tests in the bio-kinetic abilities of the experimental group**

Table (5) shows the arithmetic means, standard deviations, arithmetic mean difference, standard deviation, calculated (T) value and the result of differences for the results of the pre and post-tests in the bio-kinetic abilities of the experimental group

Variables	Measuring unit	Pre-test		Post-test		arithmetic mean of difference	standard deviation of differences	T value calculated	Level Sig	Type Sig
		Mean	Standard deviation	Mean	Standard deviation					
Explosive ability	cm	37.600	2.503	40.100	2.558	2.500	0.960	2.591	0.021	sig
agility	second	7.500	0.971	6.400	0.459	-1.100	1.074	3.236	0.010	sig
kinetic flexibility	Repetition	19.500	1.581	22.100	1.911	2.600	0.819	3.170	0.011	sig

- At a significance level of  $\leq 0.05$  and with a degree of freedom (9)

**Discussing the results of the pre and post-tests on the bio-kinetic abilities of the experimental and control groups:**

Through Table (5), it is clear that the experimental group has developed with the studied bio-kinetic capabilities, and this was clearly demonstrated by the significant differences between the results of the pre and post tests, which were in favor of the post tests, because the exercises used contributed to raising the level of the

kinetic abilities of the experimental group, as the exercises prepared from Before the researcher, it was characterized by being physical, skill and physical skill (compound), as it included various exercises such as running with the ball, jumping, rubber ropes, using the agility ladder and Swiss balls to take into account the occurrence of appropriate muscle contractions in the players ... and others, and raising the level of difficulty of performing exercises in a gradual manner, beginning with physical exercises After that, football was included in the physical exercises to be a skillful physical vehicle, and the players trained in it in circumstances close to what happens during the game with an appropriate time and repetition, while giving rest times that fit with work times. "One of the exercises that serve the special preparation are the compound exercises, which are appropriate in their composition to the level of performance of the players that serve two goals at the same time, physically and skillfully, and then gradually become difficult with the passage of time." (Hamada 2002). The exercises used also took into account the researcher, when developing the important bio-kinetic abilities in the game of football, as well as the times of training doses and rest times, which aim to develop the experimental group with the so-called approach used in the research.

The development of exercises and their application according to the correct scientific methods related to bio-kinetic capabilities, which has a significant impact on the development of the level of performance of these skills by choosing training on special exercises commensurate with the nature of the sample. Choosing the appropriate exercises enables the coach to develop physical qualities and at the same time works on the player's mastery of skills (Mukhtar.1995). In addition, the football player cannot master the skills unless he has the necessary bio-kinetic capabilities that allow him to perform perfectly through the interrelation of those skills with each other to apply the tactical duties during the course of the match, and that the exercises used had an effective impact in reaching these The results are clearly defined through the great progress made in the players' bio-kinetic capabilities, as these exercises had a great impact in bringing about a development at the level of functional body systems due to the content of these exercises in the content of their performance on bio-kinetic capabilities such as agility, flexibility and explosive power, especially if the performance is more than the energy system. The user in those abilities. This increases the difficulty of performance to lead to the occurrence of adaptation to those exercises, and its reflection on the bio-kinetic abilities and contribute to their development. This was confirmed by "the training curricula's success is measured by the extent of progress achieved by the player through the skill, physical and functional level, and this depends on the adaptation that the player achieves with the applied training curriculum." (Al-Qat.1999)

**Presentation and discussion of the results of the post-tests of the two research groups (experimental and control) in bio-kinetic abilities:**

**Presentation of the results of the post-tests of the two research groups (experimental and control) in bio-kinetic abilities.**

Table (6) shows the significance of the differences and the value of sig in the post-tests of the two research groups (experimental and control) in the bio-kinetic abilities.

Variables	Experimental		Control		T value	Level Sig	Type Sig
	Mean	Standard deviation	Mean	Standard deviation			
Explosive ability	40.100	2.558	39.400	1.505	0.746	0.465	Non sig
agility	6.400	0.459	7.300	0.888	2.846	0.011	Sig
kinetic flexibility	22.100	1.911	20.400	1.264	2.345	0.031	Sig

- At a significance level of  $\leq 0.05$  and a degree of freedom (18)

**Discussing the results of the post-tests of the two research groups (experimental and control) in bio-kinetic abilities:**

Through Table (6), we showed the significant differences between the experimental and control groups in the variables of agility and flexibility. As for the explosive ability variable, it did not appear significant in the differences in the T-test and the error rate, but in the case of comparing the arithmetic means between the experimental and control groups in the post test, we find that the explosive ability The experimental group has better than the control group and the reason for this is due to the complex exercises prepared by the researcher and which took into account the development of bio-kinetic abilities, because the bio-kinetic abilities are important for the football player, including the research variables of explosive ability, agility and flexibility. The

vehicle performed various side and forward jumping exercises, as well as the use of weights and rubber ropes, which ensured the achievement of muscle contractions for the muscles of the legs, which led to a reduction in the response time of the muscle fibers. The level of the sample and their ages, and this is the Compound factors played a key role in the development of the explosive abilities of the two legs of football players "Because when training strength, it must be taken into account that the exercises are easy, commensurate with the ability of the players, and that they be performed regularly and in the form of groups subject to the capabilities of the player, and to reconcile the effort, repetition and rest periods, as well as the increase in the number of exercises in a gradual manner and according to the time periods" (Amira Hassan Mahmoud and Mahar Hassan Mahmoud.2021) the various jumping exercises play a large and effective role in developing the level of explosive ability of the players, as the various jumping exercises are an appropriate way, but it is the best way to develop the explosive ability of the muscles of the legs, increasing the level of strength of the muscles of the legs leads to improving the explosive ability (Darwish.1998).

As for agility, the compound exercises within the phosphagenic system contained positions that invite players to control the positions of the body, through the use of various and different tools such as ground stairs, which make the frequency of the movement of the two legs fast by reducing the time of friction with the ground and the speed of moving the body in modes, and the control and control of those positions In a smooth and timely manner, as well as the use of exercises that contain changing positions and exchanging movements between their beginnings and ends, and the difference and diversity of exercises for agility and involving under the phosphagenic system, all of this together contributed to reducing the time of motor reaction through the correct compatibility and linkage between the different movements, which Contributed to increasing the players' ability to feel the movement and the compatibility of work between the muscular and nervous systems, Which was confirmed that "the greater the player's ability to sense the movement, the more positive the possibilities of controlling the motor change and the speed of communication and responses that take place between the nervous and muscular systems."( Amira Hassan Mahmoud and Mahar Hassan Mahmoud.2021).The effect of these exercises on the nervous system and the increase in the compatibility between the muscular and nervous systems through the improvements that occur in it in terms of the speed of sending nerve signals through the branched motor units within the muscle fibers, the increase in the speed of these nerve signals makes the players the speed of decision-making in changing the conditions of the body depending on the changing and diverse situations, This is what was stated "One of the factors affecting agility is the efficiency and readiness of the nervous system in terms of receiving sensory signals about the nature of stimuli and sending appropriate nerve signals to them."(Al-Mayahi. 2017)As for the flexibility variable, the researcher used compound exercises that depend by nature on exercises that allow the use of the maximum range of motion allowed by the joints. The explosiveness, which contributed to increasing the muscle's ability to contract and relax, and great flexibility in the speed of return to its initial natural position, as one of the factors that increases flexibility is the degree of compatibility between the main working muscles and their antagonists, meaning that flexibility depends largely between the correct compatibility between these two types of muscles For this reason, the researcher used exercises that allow the use of the widest range of motion according to the times of the phosphagenic system, whether it is through multiple repetitions or the performance time. Here he mentions "The more flexible the tendons and ligaments of the muscles, the wider the range of movement performance, and the muscles that pass or that are adjacent to the joint also have an effect in improving the level of flexibility, in any movement that the individual makes, the contraction of the muscles The main factor is parallel to the relaxation or extension of the work of the antagonist muscles, that is, the easier the work of the antagonist muscles, the less energy is expended to overcome their resistance" (Al-Madamgha. 2017)

### **Conclusions and Recommendations:**

#### **Conclusions:**

- The compound exercises within the phosphagenic system contributed to the development of the bio-kinetic capabilities represented by (explosive ability, flexibility and agility) in the experimental research group.
- The superiority of the experimental group over the control group in the post tests is due to the compound exercises within the phosphagenic system and the nature of their application using the training tools represented by the Swiss ball, rubber ropes, and others.
- The use of physical exercises and skill has a great impact on the development of the bio-kinetic abilities of the experimental group.

**Recommendations:**

- Necessity of employing compound exercises within the phosphagenic system in the training curricula for young players because of their effective contribution to the development of players in terms of bio-kinetic abilities, which in turn will be reflected on the final level of the player positively.
- Young players need to develop their bio-kinetic capabilities, as it is an important pillar for building the player correctly.
- The necessity of using training tools during the application of the compound exercises within the phosphagenic system because it works to make perfect muscle contractions in the players.
- Necessity of using compound exercises within the phosphagenic system to develop other bio-kinetic capabilities such as (transitional speed, kinetic speed, compatibility and strength of all kinds).

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