International Journal of Advance Research in Science and Engineering
Vol. No.9, Issue No. 12, December 2020
www.ijarse.com
IJARSE
ISSN 2319 - 8354

PHYSICAL CONCEPTS AND PHENOMENA IN THE CONTEXT OF THE KYRGYZ EPOS "MANAS"

Koldoshev M.K.

Osh State University, docent,
Cand. of Sciences (Pedagogy),
City of Osh, Kyrgyz Republic

Abstract

In the proposed research article, some physical concepts and phenomena that are reflected in the content of the Kyrgyz epos "Manas" are described and considered. As it turns out from the episodes of the epic "Manas" the soldiers always used such weapons as binoculars, cannons, rifles, bows and arrows. Hence, it can be assumed that the Kyrgyz possessed knowledge relevant to the science of physics, and thus skillfully used some form of weapons. Therefore, the content of certain lines of the epic is based on physical concepts and phenomena in terms of optics, amount of motion, force momentum, dynamics laws, physical static, electromagnetic phenomena, heat conduction and other. The content analysis of certain episodes and lines of the epic shows that the Kyrgyz people had the knowledge in measuring the weight, the severity of objects. Consequently, the Kyrgyz had a relationship to trade from the earliest times and were doing deals.

Keywords: Binoculars, Gun, Weight, Mass, Time, Boiling, Evaporation.

Kyrgyz people lived in harmony with nature. They observed different phenomena of nature, got to know nature deeply (to treat nature with great care). In addition, it's a fact that the Kyrgyz used their experiences, empirical knowledge appropriately while acquiring objects, weapons, equipment in life.

Subsequently, in the era of Manas people not only used but also knew techniques of using (in physical science) weapons in an excellent way. The following cites from Manas could be a good illustration of the fact mentioned:

He set up the spy-glass to watch,

It is covered in leather,

In a case with a screw cap,

With a ruby inserted at the end of the pipe.

To stretch it, it is twisted six times,

Its glass, so as not to get dusty,

Wrapped in white kadek[1] cloth,

And it is intended for a long journey.

Sixty craftsmen, forty jewelers,

Implanted its glass in.

Its handle is made of steel,

The cover [pipe] resembles a body amulet[2]. [1, p. 1681]

Beyond, it is mentioned that Manas' binocular was the best and it was taken from the Urum country (Arabs called Byzantine as "Urum" or "Rom", later it belonged to Asia Minor).

As is known a binocular is an optical instrument that helps to look through to see things far away more clearly.

She had the power to bring what is far away,

The skins of this incomparable telescope

Without removing from the neck,

From the bosom [pipe] pulled out,

Your Alma brought it to my eyes. [11: p. 505]

The following description of cannon is another proof of weapon use:

Strong roar of the cannon
Was heard on three days' way away.
The citizens of Dukan town,
Suddenly were out of breath from fear [1, p. 261]

Here, a very huge weapon "cannon" is described. In our opinion, the Kyrgyz people gave the name "Urkorboo" to the cannon as "Urkor" is the Pleiades (constellation) [9, p. 824]. Therefore, we can say that in ancient era people used highly developed military weapons. Thus, people didn't know what impulse was, they did not know the "conservation and conversion of energy", but they knew

[1] a Chinese cloth
[2] An amulet is usually an oblong or square leather pouch, into which paper with texts from the holy books is sewn. It is worn as a talisman against damage, evil eye and disease [8, p. 735].

how to use those weapons. They understood certain mechanisms and already use them.

Our ancestors realized about physical properties of light, the reflection of light from the lens, the phenomenon of refraction of light. They also supposed focusing a light beam in a binocular optical system and mechanical properties, lens system of binoculars and their effective use. They felt the importance of a screw thread that we can find out from lines of "Manas" epic.

At the time of Abu Nasr[3],
Purchased by order,
Glazed in a reddish tint.
To stretch it, it is twisted six times,
It was lengthened by as much as one and a half kez[4] [1, p. 1289]

We are talking about powerful binoculars, which took six months' way, as close as six days' distance. [1, p. 926]

(A one-day trip is a distance of about 30-35 kilometres traveled by a person on foot; or, according to the forecast of the scholar Baiysh Arapov - 50-60 km. - ahorseback).

Brave Almanbet[5] used the binocular to see things far away. And these binoculars were designed by skilled masters. Fine, magnificent weapons were admired by jewelers and were made perfectly. They are described like this:

E.g. White weights were installed for protecting from dust.

The Kyrgyz used such kinds of measures of capacity, weight as *pood* (16,38 kg), *batman* (6-12 poods = 98,28 kg - 195,56 kg), *cheksa*, *chaksa* (5-6 kg), *jyng* (560 grams), *myskal* (4,30 gram or 100 grains of barley), *ser/zer* (0,10 gram), *cheirek* (¼ part of one thing, measure of weight (4-6 kg), *kadak* (409,5 gram), *dirham* (3-3,5 gr of silver coins), *arpa* (0,05 gram), *paisa*, *baisa* (25,6 gram), *nimshek* (approximately 12 kg), *chaka/chelek* (10-12 kg), *kap* (9-10 poods), *toktu kap* (3 poods), *koi kap* (6 poods), *torpok kap* (7 poods), *tai kap* (9-10 poods), *ash kashyk* (tablespoon), *chai-kashyk* - a teaspoon, *chomuch* - a ladle, etc.(certain changes have been made in the author's text) [5, p. 32].

[3] Abu Nasr may refer to Abu Nasr Al-Farabi, Islamic philosopher, known in the West as Alpharabius; c. 872 – between 14 December, 950 and 12 January, 951.
[4] kez - (iran. *gas* - length equal to 87 centimetres
[5] One of the main characters of the epic Manas, the closest associate of Manas.

- *elbow* - a distance from a middle finger to the elbow.

Elbow is a measure of distance. It is 0, 5 metres. According to M. I. Gramm, elbow is approximately 45 cm. But in K. K. Yudakhin's dictionary, it is 50 cm.

- *palm* is also a measure of distance - 4 fingers straightened together = 74, 48 millimetres, or 7,4 cm.
- *thumb* is 18, 71 millimetres, or 1, 9 cm [4, p. 59].

When the Kyrgyz people measured they didn't say a *thumb*, but *eli* as the length of one finger.

If you enter any pharmacy in Europe, you can see a measure of distance like *gran*. Its weight is the weight of 1 grain, which is planted. Usually, it is barley grain.

In addition, the word *gran* in Latin *granum* means a *very tiny*. In English *gran* means *grain*, in German - *grano* [4, p. 25].

In Europe *gran* - *barley grain* - had been used in pharmacy for hundred years. The Kyrgyz people used *myskal* for measuring weight. This measure was similar to *gran*; *myskal* = 4, 30 gr or 100 grains of barley; *dirham* = 3 - 3, 5 gr of silver coins [5, p. 32].

According to M. I. Gramm's investigation, Muslims measure with *gran*. If we say that *barley grain* is *gran*, thus, 1 *dirham* is 48, 225 gran (3, 09 gr), and 1 *myskal* is 68, 888 gran (4, 41 gr).

Due to the Shariah $^{1}/_{7}$ fraction - *myskal* is 4, 464 gr. Scholars came to this final conclusion. [4, p. 144].

In the 20th century, the International Organization for Standardization adopted (in 31 documents) usual gran (not jewelry as 64, 798911 milligram. In this case, 1 gram = 15, 62 gran [4, p. 25], 1 gran = 0, 06402 gr).

According to the Shariah in Central Asian countries $^{10}/_{7}$ fraction still remains important, and it is an interesting fact that in Bukhara, 3, 36 gr of *dirham* (*myskal* is 4, 8 gr), in Khorezm - *dirham* is 3, 185 gr, Khorezm *myskal* is 4, 55 gr). Samarkand's *myskal* is 4, 46 gr [4, p. 145].

People in Khorezm and Khiva used *mann* more. Its weight ranges from 4, 095 kg to 4, 914 kg. Interesting to mention that in *4 mann* remains as *mann* (it is called), but this *mann* equaled to 19-20 kg.

The type of product, its kind and form were known to the sellers. As it is mentioned above, the ancient Kyrgyz used *myskal*, *dirham,* and we can find their equivalents in Europe. They coincide with each other. It shows that the Kyrgyz people not only "wandered on rocks, mountains" (some people imagine them like they are wanderers and think that they are far from selling things), but also showed themselves as good sellers.

Lines below are connected to "fluids, boiling and evaporation" (in Physics).

The water boiled violently
The boiling that continued until "ash byshym",
Made the water completely evaporate,
And there was no even a spoonful of water left [1, p.1654].

Ash byshym is approximately two hours [6, p. 71]. Hence, it takes approximately two hours or less for water boiling and evaporation.

These lines can prove that such component like "air conditioning" was in those eras. If people wanted to ventilate the room, they installed equipment like a fridge (system) and cold air came into the room. Thus, they ventilated the air.

If people wanted to heat the room, they put a heater with spirals, thus they heated the house. So, during the Manas era, electric and magnet phenomena were known to people. They used them in their life as mentioned in below lines:

In the sultry summer heat,
A cool breeze blew. [1, p. 257]
On sultry winter days,
Kept warm like summer days,
And on hot summer days incessantly,
A cool breeze blew.
In the winter days continuously,
A warm breeze blew. [1, p. 257]

The old man got ready to go,
He had a flint with him. [1, p. 281].

These lines confirm that even in antiquity the Kyrgyz and Kalmaks were able to receive fire using an empirically invented device called "flint".

In our traditional horse games *at chabysh - horse riding, er engish - pulling each other off the horse (or knocking out of the saddle), kok boru/ulak tartysh - goat-picking, kyz kuumai - the groom, sitting on a poor horse, catches up with the bride,*

under whom is a good horse, tyiyn engmei - competition in which a rider must grab a coin from the ground, er saiysh - pike riders (sometimes with clubs), etc. inertia phenomenon, Newton's first and second laws - laws of dynamics, are used. Riding a horse flexibly requires mastery. To keep equilibrium was quite necessary in some difficult situations. To increase acceleration, to ride easily on horseback and to know techniques of riding were important too. They used to measure time and distance exactly and tactfully.

Archery (in those army times, certainly, archery was the most important skill) was the game, in which people used rules of elastic force and impulse.

In winter, while working on the snowy pass or in hunting the Kyrgyz people used a supply named *japkak – homemade wood skis* for decreasing pressure. Japkak could cause foot locomotor system pressure reduction. The model of this supply is kept in Bishkek (earlier Frunze), in the State History Museum.

While crossing rivers and lakes, *chanach* (*wineskin*) was filled with straws. This chanach was bound to 2 sides of human body.

Such kind of supply – *sal* (raft) is described in the epos. In those times, conservation of Archimedes was known to people or, i. e. they knew the repulsive force of fluids, techniques of using the repulsive force for objects in water.

The Kyrgyz wore warm clothes in very cold, stormy winter days. In very hot weather they used to wear clothes (they took into account reflection of light). So, they learned the ways of keeping thermal equilibrium in their bodies. *Ak kalpak – white high hat, ak elechek – white turban , ak orgo – white house, ichik - sable fur coat, ton – long soft overcoat, tebetei – men's hat, tulup - postun – sheepskin,* etc. These clothe items, first, meant white, true, honesty, fair, generosity, good will, saint colour. Second, our ancestors had a deep knowledge of absorption and reflection of light phenomena.

Consequently, the Kyrgyz people used the phenomenon of thermal band within their real life. *Kol kurosh – arm-wrestling, arkan tartysh - tug of war, kok boru - goat-picking, kachmai top - running away from the ball, chikildik/chikaldak – a game with sticks, oodarysh - pulling each other off the horse (or knocking out of the saddle)* - these games were appropriate for the application of Newton's 3rd law.

While using rifles and cannons in the game like *ordo* (*chuko/ashyk - lamb* genicular *bones - Kyrgyz national game*) one's motion transmits into the second motion (motion transmission). It became known; people used conservation of momentum, energy conversion and conservation in their life and on the war fields.

To install *boz ui* (*yurta*), its *tunduk* (*top frame for day time light, zenith skylight*), *kereges* (*sliding walls*), *uuks* (*frame legs*), to tie them together based on equilibrium rules - rules of moments (in Physics). Carrying water with *bakan* (*wooden bow with hooks or notches at the ends for carrying buckets on the shoulder*) also take basis on this rule of moments, i.e. in this case people took into consideration the force of gravity and pressure, thus, load became lighter (when people carried water on their shoulders).

Our ancient ancestors might not know the definition of all physical laws and their mathematical interpretation, but they obviously realized the cause-effect connections of phenomena in Physics and their consequences as well.

Summarizing the above, we can draw the following conclusions:

- the nomadic and semi-nomadic way of life of the Kyrgyz people naturally contributed to arrange their life in accordance with and taking into account the laws of nature;

- physical measures, units and quantities were borrowed from the phenomena and facts of the surrounding nature, and therefore, they were accessible, understandable to every person and convenient to use;

- with the introduction of the international system of quantities, measures and units in physics, the empirical knowledge of our fathers and grandfathers gradually began to be forgotten over time, but despite this, some physical quantities are still used in the everyday life of the Kyrgyz;

- the use of some monetary units of neighboring countries suggests that trade relations and transactions were carried out between these peoples.

References

1. **Manas:** heroic epic of the Kyrgyz people [Text]. / S. Orozbakov's variant. Kyrgyz Republic National Academy of Sciences, Institute of Languages and Literature named after Chyngyz Aitmatov. Compiler: S. Musaev. - Bishkek: Khan-Tengir, 2010. - 1840 p. (In Kyrgyz).
2. **Manas:** heroic epic of the Kyrgyz people: the first part of trilogy [Text] / - Bishkek: "Biyiktik", 2011. - 240 p. (In Kyrgyz).
3. **"Manas"** Encyclopedia. - Bishkek, Kyrgyz Encyclopedia main editorial office, 1995. Vol. 2. - 432 p. (In Kyrgyz).
4. Gramm M. I. Engaging encyclopedia of measures, units and money [Text] / M. I. Gramm // Chelyabinsk, 2000. - 412 p. (In Russian).
5. Kadyrov Ysmaiyl. Dropping tears from Kyrgyz culture [Text] / Ysmaiyl Kadyrov. - Bishkek: "Biyiktik plus", 2014. - 300 p. (In Kyrgyz).
6. Kyrgyz Language Dictionary. Part I. - Bishkek, 2011. - 880 p. (In Kyrgyz).
7. Muratov Abdykerim. National Geographic and Mathematical knowledge in "Manas" epic. / "From Manas to Ch. Aitmatov; problems and viewpoints": international scientific-practical conference materials (Bishkek, January 15, 2016). - Bishkek, 2016. - 388-394 p. (In Kyrgyz).

8. **Manas.** Kyrgyz heroic epic. Book 4. - M.: «Naslediye», 1995. - 768 c. - (The epos of the peoples of Eurasia). (In Russian)
9. Kyrgyz-Russian dictionary [Text] / In two books. Approximately 40 000 words // Compiled by K. K. Yudakhin. - Frunze: Kyrgyz Soviet Encyclopedia, 1985. Book 2. L - Y. - 480 p.
10. Omorov Asykbek. The noblest tradition, history and rituals: (historical-documentary research) [Text] / Asykbek Omorov // Bishkek: "Turar", 2013. - 260 p.+12 p. Illustrated. (In Kyrgyz).
11. **Manas:** The Kyrgyz heroic epos [Text] / M., Main editorial board of oriental literature, Publishing House "Science", 1988. -688 p. (Epos of the peoples of the USSR)