

# THE HISTORY OF GEOTHERMAL RESOURCES USE IN RUSSIA AND THE FORMER USSR.

Valentina Svalova

Institute of Environmental Geoscience, Russian Academy of Sciences, Geothermal Council of Russia, Moscow, Russia

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## ABSTRACT.

Usage of geothermal energy in Russia and the former USSR goes back to deep antiquity. And always the reality was in neighbourhood with legends.

History of hot and mineral springs is traced from Crimean antique towns through Kiev Russia, Moscow State and Russian Empire to our days.

Wave of ancient civilization arised in Mediterranean near volcanoes and hot springs, rolled through all territory of Russia and reached Kamchatka where met another culture and magic land of geysers and volcanoes.

Another wave of civilization from ancient Greece rolled through Western Europe, crossed Atlantic Ocean with the first American settlers and met American Indians' culture.

Finally two waves of civilization reached Pacific Ocean from different sides at the regions of high thermal activity and met each other in Bering strait. As Christopher Columb discovered America from Eastern coast as Vitus Bering reached America from western coast.

Peoples of fairy land Kamchatka have as fantastic legends as American Indians and ancient Greeks.

## INTRODUCTION.

The history of the thermal and mineral water investigations is connected very close with practical use of the Earth's deep heat and goes back to far antiquity.

At least in near 355 year B.C. the Greek philosopher Platon writing about legendary Atlantida mentioned that the hot springs gushed out in the centre of the atlants' main town. Hence the manifestations of the Earth's heat were known to people more than 3,5 thousand years.

First of all the geothermal waters attracted the people's attention in volcanic regions. Visible displays of deep heat activity inspired the writers and poets. For instance the greate Italian poet Dante Alighieri (1265-1321) used the data about hot springs of Italy when writing the "Hell" - first part of the "Divine Comedy". Soffioni of Tuscany with steam temperature near 450 oC at the day surface maybe gave him reason to call Tuscany the town of fire ("Hell", Song 10). The lake of hot mineral water Buliname situated in Italy not far from town Viterbo and famouse by its curative properties from Roman Empire time also is mentioned in his immortal creation. Dante wrote that the sinners drained the hot steam to their dwellings.

Earth fire power manifestations - volcanoes, geysers, earthquakes - always excited people's feeling of beauty and fear. Interest to the Earth's geothermal energy arised very long ago. For ages people began to use natural resources. It is difficult to answer when, where and which people first discovered the medicinal properties of hydrotherms, as it is impossible to ascertain who invented the plough and wheel for the first time. Evidently this discovery came to people by

natural way. Very likely that wild animals led ancient people to hot springs. For a long time the warriors treated their wounds in mineral geothermes.

## 1. A BRIDGE FROM THE ANCIENT GREECE TO ANTIQUAE TOWNS OF CRIMEA.

It is considered that curative properties of underground springs were known to people of the Stone Age. The mineral springs of Epidaurus in the Ancient Greece could be considered as the most ancient known spa (6 century B.C.) in the world. Even now it is possible to see there the plates with diagnosis and descriptions of the illness treatment courses. Famouse sanctuary of God-Healer Asklepius is placed in 9 km from port Epidaurus.

It is impossible now to elucidate a question of Asklepius transformation from the Hero at the beginning of 5 century B.C. to the God at the end of the same century. The Greeks honoured him as creator of medicine. Gomer glorified him as wonderful physician. Asklepius not only treated sick people but also resurrected the deads. According to legend Asklepius had his healing ability due to Apollon, centaur Hyron and Aphyna. The Goddess presented him an ampule with medusa Gorgona's blood taken from the left side of her body. This blood had power to raise from the deads. Aphyna kept another ampule with medusa's blood taken from the right side of the body that gave her power to destroy life and begin the wars. The influence of this legend is traced to Russian falk tales about dead water.

The significance of the God Asklepius and his sanctuary had been increasing. The pilgrims arriving at Epidaurus had to clear themselves by water from sacred spring and then to make a sacrifice. Later they spent a night not far from sanctuary where the God healed them during sleeping. Sometimes they got momentary and miraculous curing.

In the beginning of 4 century B.C. the theatre was built on the slope of rock near sanctuary. Solemn celebrations devoted to Asklepius had been held there every 4 years.

Historians suppose that the founder of medical science Hyppokrat (460-370 years B.C.) lived and worked at the same place.

For ages the nautical ways linked Mediterranean with Black Sea coast. In 6-5 centuries B.C. the Greeks founded towns Kerkinida, Chersonese, Feodosiya and Panticapaeum at the place of present Yevpatoriya, Sevastopol, Feodosiya and Kerch.

Crimean south coast is famous by its spas and health resorts with mineral springs and medical muds.

Chersonese was founded in 421 year B.C. Archaeological excavations began there in 1827 year discovered thermae, theatre ruins, mint. In opinion of some investigators the founders of this town-state were representatives of democratic party forced to leave their native town Pont Gerakleya by conquering oligarchy party. A famous Chersonesean oath tells about patriotism of citizens. The text of the oath was cut on

the marble plate in 3 century B.C. found during town excavations.

The town had good lay-out. The streets crossed at right angles. There were beautiful temples at the squares. Stone gutters were laid along the streets. Public buildings and the houses of rich people were decorated by columns and mosaic floors. Such an outstanding piece of Chersonesean art and skill was mosaic floor from the bath room of rich citizen. In the center of composition there are two women. There is a washing cup between bathers. Two birds are represented in mosaic picture.

Near town walls the region of handicraftsmen was situated. Archaeologists found there the remains of ceramic production. Different handicrafts prospered in Chersonese: metal-working skill, jeweller's art, weaving. Metal medical instruments found during excavations tell about medicine development in the town. Also we know about physicians there from inscriptions on the stones. All antique world was full of such inscriptions which are the unique reliable way of information. During 150 years of excavations there were found more than 500 Greek and Latin inscriptions on the stones. Stone archives as if sound-track the most interesting pages of history. Here is the epitaph on the stele of 4-3 century B.C. found in Chersonese:

Father, physician Evkles from Tenedos,  
Set up this tomb to his son Leschanorid.

Since 1 century A.D. Crimea was under influence of powerful Roman Empire. The Romans moving to different directions and conquering new lands had been building everywhere fortresses, harbours and roads. Such fortress and road were built in Kharaks near present famous health resort Miskhor. As everywhere the Romans built there thermae, the remains of which were found by archaeologists. Also they set up sanctuary and laid ceramic water tubes. The thermae were for Romans the public places. They came there to rest, relax, talk about life and even read.

Later fortress Kharaks was destroyed. But in 1912 year famous "Swallow's nest" which became the symbol of Crimean south coast was built by architect A.V. Shervud at that place.

In written documents of ancient Greek and Roman scientists the earliest data about natural and water peculiarities of Black Sea region could be found. So ancient Greek historian Herodotus (490-480 - near 425 years B.C.) who gave the first systematic description of Scythian mode of life pointed out the existence of salt spring on the left side of Ipanid (South Bug). Later ancient Greek philosopher and scientist Aristotle (384-322 years B.C.) wrote about apparently the same spring. And more later Mark Vitruvius, the Roman architect and engineer of the 1st century B.C., mentioned it. Ancient Roman scientist Plinius Maior (23 or 24 - 79 years A.D.) indicated on existing project of Black and Caspian seas linking and mentioned Crimean springs in his book "Natural history". Historical documents show that ancient Russia was acquainted with ancient Greek culture property and scientific heritage of Aristotle.

## 2. LEGENDS AND REALITY.

At the territory of the former USSR in Georgia, Armenia, in the region of Caucasian mineral springs the remains of ancient bathes were found which date from the Bronze Age (the end of 4 - the beginning of the 1st Millennium B.C.).

In Armenia in the mountains of Agmagan range the stone symbolic dragons (vishaps) remained near underground

springs from 2nd Millennium B.C. to our time. These dragons were set up there as deities-guards of underground water.

According to legend Georgian duke Vakhtang Gorgasali (4 century A.D.) hunted in the forests of Kura river valley and wounded partridge. When he founded it the partridge lay already boiled in hot water. Later the thermae were built near hot springs and their fame spread very far from Georgia. And then duke Gorgasali founded town Tbilisi there. "Tbili" means warm in Georgian. So far the ancient water catching galleries are remained in the region of hot springs in Old Tbilisi. And now it is possible to visit the baths with hot spring water (Fig.1).

Almost all hot springs are surrounded by legends and traditions. So according to Turkmen legend herdsman Archman was turned out of his aul as bearer of all illnesses and ailments. Looking for shelter the herdsman found a warm spring. He drank water and bathed. And he went out from spring water absolutely healthy. Since that time the glory of Archman spring medicinal properties had been overgrowing by new legends, real facts and events. Now the spa is built near Archman's hot spring in 130 km from Ashkhabad.

Here is the other legend. The 15th century. Cruel Turkish ruler Uzun-pasha had power in Akkerman (Belgorod-Dnestrovsky now). And he put the beauty Ukrainian Paraskoveya into damp dungeon. Once when Uzun-pasha wanted to come into dungeon the doors opened, the shackles fell down and the girl ran to Dneestr liman. But janizaries overtook her. And when they took up their curved yataghans above her head the miracle happened. Suddenly girl began to rise and disappeared in air. Janizaries turned into stones. And the crystal-clear water spring tore away from the earth in place where her footprints were... The centuries passed but the spring lives.

For ages people of different countries and nationalities gave the names of hot springs to the places and villages. These names reflected thermal and mineral water usage through history. So for example the name of famous spa Khodga-Obi-Garm means Holy hot water in Tajik. Yangan tau means Hot Mountain in translation from Bashkir. The spa name Kuldur-Hot came from misrepresented Tungus word Khul-Dgi-Uri. And Psekups means Hot Spring in Kabardian. There are many similar examples in France, Germany and other countries.

It is possible that exactly medicinal properties of hot mineral waters were reflected in old Russian folk tales, which told about dead and alive water. These tales show people's dream about magic water healing wounds and reviving the deceased.

Here is how Russian folk tale "Ivan-Tsarevich and Grey Wolf" tells about it:

"...Ivan-Tsarevich lies dead and already ravens fly above him. Suddenly Grey Wolf ran, caught raven with his nestling and said: "Fly, raven, for alive and dead water. If you bring it I'll set free your nestling." Nothing to do. Raven flew. He flew long or fast, but brought alive and dead water. Grey Wolf sprinkled Ivan-Tsarevich's wounds by dead water and they healed. Wolf sprinkled him by alive water and Ivan-Tsarevich came to life..." Visiting Tretyakov Gallery in Moscow it is possible to see a picture of famous Russian painter Victor Vasnetsov (1848-1926) "Ivan-Tsarevich and Grey Wolf".

Great Russian poet Alexander Pushkin (1799-1837) used folk legends about alive and dead water in his famous poem "Ruslan and Lyudmila". There Ruslan was killed and then came to life due to dead and alive water. Famous Russian

composer Mikhail Glinka (1804-1857) composed opera "Ruslan and Lyudmila" in 1842.

Stories about alive and dead water could be found not only in Russian fairy-tales but also in American Indians' legends, in epos of India, in popular tales of different people. For ages many people believed to existence of such water. Spanish conquistadors even organized expedition to islands placed at the boundary of Caribbean Sea and Atlantic Ocean after hearing from Indian tribes about alive water springs there. Sure their travel was not successful but useful as they discovered and mapped some islands of Antiles.

The dreams about magic water could be traced from many Russian folk tales. So Ivan-fool turns into Ivan-Tsarevich after bathing in magic boiling water in the poem-tale "Konyok-Gorbunok" written by Russian writer Petr Ershov (1815-1869) on the base of popular tales. Everybody who visited Tretyakov Gallery remembers famous picture of Victor Vasnetsov "Alyonushka" illustrating folk tale "Sister Alyonushka and brother Ivanushka" where Ivanushka turned into kid after drinking water from magic well.

Reality and invention are mixed in famous legend about Bakhchisarai fountain.

Powerful Tatar dynasty of Gyreys ruled in Crimea in 1427-1783 years A.D. There is a grave-mausoleum of beautiful Georgian wife of khan Kerim-Gyrey in Bakhchisarai. And there is a famous "Fountain of tears" devoted to her by khan constructed as marble cups in which spring water incessantly flows from marble wall.

But local people tell that she was not Georgian but Polish wife Maria from Pototsky family.

A.S. Pushkin wrote famous poem "Bakhchisarai fountain" in

1824. Famous soviet composer Boris Asafiev (1884-1949) created ballet with the same name in 1934. Great Russian painter Karl Brullov (1799-1852) painted a picture "Bakhchisarai fountain" in

1849. There is a basin and fountain of spring water in the picture.

According to Pushkin's version of the legend khan Gyrey had a favourite wife Zarema in his harem where were many wives. Once a new young wife Maria appeared there. She was very sad but so beautiful that khan forget about Zarema. One night Maria died. And Zarema was killed by eunuchs-guards at the same night. Nobody knows all secrets of harem. But from that time khan Gyrey leaved his harem and tried to forget those events participating in cruel wars. After returning from the war he set up "Fountain of tears".

Pushkin devoted wonderful lines to it:

Fountain of love, fountain alive,  
I brought as gift for you two roses.  
I like inceasing murmur yours  
And so poetic tears those.

More than 1,5 centuries alive roses don't wither at fountain. Somebody brings them there every morning.

### 3. SALINE SPRINGS AND SALT BOILING.

Mineral and hot springs were used not only in medical purposes but for salt getting too. The most ancient data about salt extraction date to Gerodot time (5 century B.C.). It was one of Greek's trading products with Scythia. Later salt was boiled from estuary water of Black Sea region and then from saline springs in the North and East of Russia. Salt boiling was known in Novgorod Russia from 11 century

A.D. People of ancient Novgorod had experience in search of fresh and salt water, had acquaintance with concentrations of natural solutions, with salt falling out depending on temperature. Usage of solutions spreaded due to practice of paint preparation for icons and astringents for building materials. The importance of salt water output was reflected in the names of villages and coat of arms of Russian towns.

Since 11-12 centuries the specific technique of drilling by wooden tubes for brines were used in ancient Novgorod. These tubes reached the depth of 170 m. Underground water output and salt boiling were at high technical level in Russia. Interest of the foreigners to this techniqne confirms it. So there is a book in ancient Swedish language: "Some data about Russia, its roads, ways, fortresses with approaches to them, about boundaries, combined by the last Royal Embassy of Tsar court in Moscow and written by Erik Palmquist in 1674 year". In particular the author describes the salt boiling house at Mshaga river not far from town Narva. He shows drawing of it in his book.

### 4. LEGENDS OF URAL.

Underground waters are connected very close with mineral and ore deposits formation. In the middle of 18 century great Russian scientist M.V. Lomonosov elaborated the teaching about natural waters, solutions, water-rock interaction, elements migration, water role in geological processes and ore deposits formation.

Already ancient people knew about metal ore deposits. The marks of precious and non-ferrous metals output and smelting were found in the Caucasus, Transcaucasia, Ural, Cisurals, Kazakhstan, Altai, Siberia, Middle Asia.

They are of different age but the most ancient ones can be traced back to the 3 millenium B.C. In the Ural and Siberia the signnes of prehistoric ore working, known under name "Chud mines", date from the middle of 3 millenium B.C. Their prosperity was in 12 century B.C. and the end was in 5 century A.D.

Ural is very rich of mineral waters, ore deposits and precious stones. The haviest Russian golden nugget "Big triangle" of 36 kg was found in Urals in 1842 year. Ural is the natural geological museum where different rocks and minerals bed not deep and even sometimes at the earth's surface as in Ilmen preserve. More than 250 minerals were found there. Some of them are very rare and found in Ilmen only. The "stone fever" began there in the end of 18 century when Cossack Prutov found first Ilmen blue topaz. Later amazonites were discovered in Ilmen. And always Ural were famous by its malachite.

Huge natural resources of Ural gave rise to a greate number of fairy-tales and legends. Ancient stories of Ural were combined by Russian writer Pavel Bazhov (1879-1950) in his book "Malachite box". This book has 565 pages and includes 43 tales.

According to legends the riches of Urals belong to Mistress of Copper Mountain. She could turn into lizard. She could reward and ruin. She enticed into mountain Danilamaster, who dreamed to make a stone flower, promising him to discover a skill secret. This story was the base for famous ballet of outstanding Russian composer Sergey Prokofiev (1891-1953) "Legend about stone flower".

### 5. FAIRY-LAND KAMCHATKA.

Geothermal waters attract people's attention mostly in volcanic regions, in which there are many hot springs and geysers and water temperature is higher than in platform areas.

Kamchatka is the most "hot" region of Russia. There are 127 volcanoes, 22 acting among them. At Kuril Islands 100 volcanoes are known, 21 acting. First data about Kurils and Kamchatka were given by Siberian Cossack Vladimir Atlasov who fulfilled a match there in 1697-1699 years. The land investigators discovered a fairy-land not similar to anything else. There were hot stones and lakes, boiling geysers and volcanoes.

Atlasov's Cossacks slept at the hot land, bathed in hot lakes and cooked food in boiling springs, surrounded by glaciers and snows. They lowered meat and vegetables into boiling water in wicker baskets. It was not necessary even to salt food as thermal waters contain the salt enough.

Geographic knowledge in Moscow Russia spreaded together with growth of state and increase of trading. State spreading in 16-17 centuries was mostly due to extremely quick assimilation of new lands from Ural to Pacific Ocean coast.

In 17 century a special geographic expeditions and trips had place to Siberia and Far East. They led to discovery of strait between Asia and Amerika by Russian land investigator Semen Dezhnev in 1648 year called Bering Strait in honour of Vitus Bering expedition 80 years later. And so in one of such trips Atlasov reached Kamchatka.

Some large expeditions were organized due to initiative of Russian Tsar Peter I which mostly were fulfilled after his death. The most important ones were Caspian Sea expedition (1715-1720), Messerschmidt's expedition to Siberia (1719-1727) and Bering's expedition or The First Kamchatka expedition (1725-1730).

Founded in 1725 year Academy of Sciences organized some expeditions from the very beginning of its existence. In scientific reports of these expeditions there were data about temperature measurements in water springs, permafrost zones, caves and mines of Ural, in Siberia, Altai and Volga river region. One of such expeditions was the Second Kamchatka or the First Academic expedition (1733-1743), in which some great scientists took part. As a result of this expedition an outstanding work of S.P. Krasheninnikov "Description of the Land Kamchatka" was published in 1756. There were the first scientific data about rivers, lakes, hot springs, volcanoes and geysers of Kamchatka. The descriptions of natural observations of acting volcanoes and geysers were given and the data of temperature measurements for six groups of hot springs were submitted. Here is Krasheninnikov's description of South Kamchatka region around Paugetka river near Kambal and Koshelev volcanoes:

"Springs gush out in many places as fountains mostly with great noise. Some springs are as lakes in big gaps. Small streams flow from them, combining with each other, divide all this area to small islands and fall into Paudga (Paugetka) river."

In 1739 Krasheninnikov observed volcano Tolbachik eruption.

## 6. S.P. KRASHENINNIKOV AND HIS BOOK "DESCRIPTION OF THE LAND KAMCHATKA."

Science is obliged to Krasheninnikov by the first detailed investigations and reliable descriptions of Kamchatka,

which were staying almost unique source of knowledge about this far part of Russian land during near 100 years.

Being a son of soldier of Peter's I army he had his great successes only due to his own talent and ardour in science.

In 1732 in the age of 21 years he was sent for studying to Academy of Sciences as one of the best students of Slav-Greek-Latin Academy. In August of 1733 he was included among 6 students to Kamchatka expedition under captain-commander Vitus Bering.

He was evaluated very soon by his leaders Gmelin and Miller. They decided to send him to Kamchatka instead themselves as the most talented and capable among students.

Arriving at Kamchatka in October of 1737 year Krasheninnikov immediately began to prepare the first his trip inside the peninsula. During his numerous expeditions he combined collections of rocks and minerals, plants and animals.

The instruction, which defined a field of his investigations, was very wide and included scientific observations and investigations, historic documents and archives researches, description of languages, mode of life, customs and legends of Kamchatka peoples.

Krasheninnikov fulfilled this task perfectly. His book "Description of the Land Kamchatka" is known as one of brilliant work in the world geographic literature. It was translated into English, French, German and Dutch. Unfortunately the book was cut very much in translations.

It was illustrated mostly by engravings of engraver Grimmel made on the base of drawings of painter Berkman who took part in expedition.

The book consists of 4 parts:

- I - Kamchatka and neighbouring countries.
- II - About advantages and disadvantages of Kamchatka.
- III - About peoples of Kamchatka.
- IV - About subjugation of Kamchatka, about riots of different time and treasons, about present state of Russian settlements.

In spite of Miller's remarks about transfer of the Kamchadals' stories to the III ethnographic part of the book, Krasheninnikov did not agree and the legends and tales of ancient peoples of Kamchatka penetrate through all narration.

## 7. LEGENDS AND STORIES OF THE PEOPLES OF KAMCHATKA.

Archaeologic excavations determined that people settled in Kamchatka already 15 thousand years ago.

There were three main nationalities in Kamchatka - the Kamchadals, Kurils and Koryaks.

The Kamchadals were as masters of legends and tales as ancient Greeks. They ascribed miracles to all high mountains, volcanoes, hot springs and lakes. They settled hot springs by malicious spirits, volcanoes by souls of deceased. In some legends there are moving mountains that could be the reflection of earthquakes. Here is that they told about volcano Shiveluch.

Story about volcano Shiveluch.

This mountain was situated earlier at the place of Kronotzk lake but it was forced to move to another place as susliks disturbed it very much. And there are two big lakes behind mountain Tiim which were formed by footprints of Shiveluch during moving to new place.

Story about Kronotzk lake.

There are high mountains around Kronotzk lake. Two of them are higher than others. One of them is called Kronotzkaya and another one is anonymous (volcano Krashennikov now). As it is flat from above, the Kamchadals tell that mountain Shiveluch, which was earlier at the place of Kronotzk lake, leaned upon it when got up and broke its top.  
Story about silver fir forest.

River Shemech is remarkable by the next. Firstly there are many hot springs around it. Secondly, there is a silver fir forest at its south bank, that cannot be met anywhere else in Kamchatka. This forest is protected as forbidden by the Kamchadals so that nobody of them dare to fell it and even to touch. According to legend confirmed by many examples everybody who would dare to touch it dies by violent death. They tell also that this forest grew above the Kamchadals' bodies who were in campaign against enemies and starved so much that were forced to eat the bark of trees only and perished of starvation at that place finally.

Story about quarrel of the Kamchadals with sea whales because of knife.

There are three cliffs similar to columns in the sea near falling into of river Unagkig. These cliffs were torn of the coast during earthquake. At the same time the part of the coast together with Kamchadal settlement fell down to the sea. The Kamchadals composed tale that this settlement was destroyed by sea whales for reason of their quarrel with the Kamchadals because of knife which the whales demanded from them.

Story about malicious spirit Unkalyak.

There is a big gorge Unkalyak that means Stone Spirit. The Koryaks tell that malicious spirit Unkalyak lives there. And everybody who passes firstly near this place must sacrifice a stone. In opposite case the spirit sends a misfortune. And as sacrificing people throw stones at the same place there is a big stone heap now.

Story about God Kut and his wife.

The Koryaks consider Kut as the God and the first inhabitant of Kamchatka. The nearest river to his yurta was called Ualkal-vaem, that means river Cheek, as he always put the whale's jaw in front of his dwelling. So now local Koryak inhabitants put a tree in front of their yurtas instead of whale's jaw.

The Koryaks tell the story for confirmation of Kut's being there. Not far from that place there is anonymous lake. In this lake there is an island divided by hollow in two parts. Kut used to combine the birds' eggs at the island. This hollow arised as a result of Kut's fight with his wife because of the eggs. Kut's wife was so lucky that found big birds eggs. On the contrary Kut found small eggs only. He was so upset that considered her happiness as the reason of his failure. He wanted to take away her eggs but she resisted. Fight occurred in which Kut dragged her by hairs wishing to revenge. The result of that fight was the hollow arised in the island.

Story about the Khamsharens.

In front of river Karaga falling into the sea there is Karaginsky island in 40 versts from the coast. The Koryaks live there but the other Koryaks don't consider them as kindred own people and call them the Khamsharens that is born by dog. On their opinion Kut did not create people at the island but the dogs only which regenerated into people later.

Story about stone boats.

In 9 versts from upper reaches of riva Ozernaya (Lake river) there is white rocky mountain which has a form of vertically put boats. Local inhabitants tell that God Kut (or Kutkhu), the creator of Kamchatka, lived in this place and

boated by stone boats in the sea and lake for fishing. Leaving this place he put his stone boats there and for this reason they were surrounded by so great respect that people feared even approach to them.  
Story about spirits Gamuls.

Riva Opala flows from under Opala hill, the highest one close to Penzhinskoye Sea (Shelekov gulf now). It serves as beacon for sailors of both seas although it is in 85 versts from Penzhinskoye Sea. The Kamchadals respect it very much and tell terrible things about it. They fear not only to climb but even to approach to its foot as many spirits Gamuls live there. For this reason a great number of sables and foxes are found there. The Kamchadals tell that there is a large lake on the top and there many whales' bones as Gamuls feed by whales.

Legend about heart of Alaid.

Near south end of Kamchatka there is desert island Alaid consisting of one high mountain with smoke above top. The Kurils living near Kuril lake tell a legend about Alaid.

This mountain as if was placed earlier in the middle of Kuril lake. As because of its height it eclipsed light to other mountains they constantly quarreled with it. Alaid was forced to leave such a restless place and reclude in the sea. But Alaid leaved its heart in the lake in memory of its being there. The stone is situated in the middle of Kuril lake and is called Heart-Stone. Way of Alaid is traced by Lake river (Ozernaya) arising when mountain began to move to the sea. Water from the lake rushed after Alaid and carved a way to the sea.  
Story about Kamchatka volcano (Klyuchevskaya hill now).

The Kamchadals suppose that Kamchatka hill is a dwelling of deceased. It erupts when deceased heat their yurtas. They catch whales in the underground sea and eat them. They use whales' fat for lighting and bones instead of firewood.

Spirits Gamuls also live in this mountain. They boil whales there catching them by night and bringing home 5 or 10 whales opened on every finger. This is confirmed by numerous bones found at all fire-spitting mountains.  
Story about Bilyukay.

Special spirits live in high mountains where snow lies always. And the main among them is Bilyukay. The Kamchadals fear to pass near high mountains and volcanoes. Bilyukay drives by partridges or black foxes. Who saw him would be lucky in hunting and fishing during all his life.

The Kamchadals and Cossacks think that eruptions are the omens of bloodshed. They prove it by many examples. They state that the longer and stronger eruption the bigger bloodshed.

Real story.

The Kamchadals suppose that all hot springs and volcanoes are the dwellings of spirits. So they fear to approach to them and to show to the Russians. Occasionally Stepan Krashennikov had known about hot springs. Inhabitants of Shemyachinsky settlement were forced to explain true reason why they hid that place. Finally they showed hot springs to Krashennikov but did not come up to them. When they saw how the Russians bathed in hot springs, ate boiled meat and drank water the Kamchadals thought that they would perish very soon. After happy returning the Kamchadals told in settlement about audacity of the Russians and were surprised that even spirits could not harm to them.

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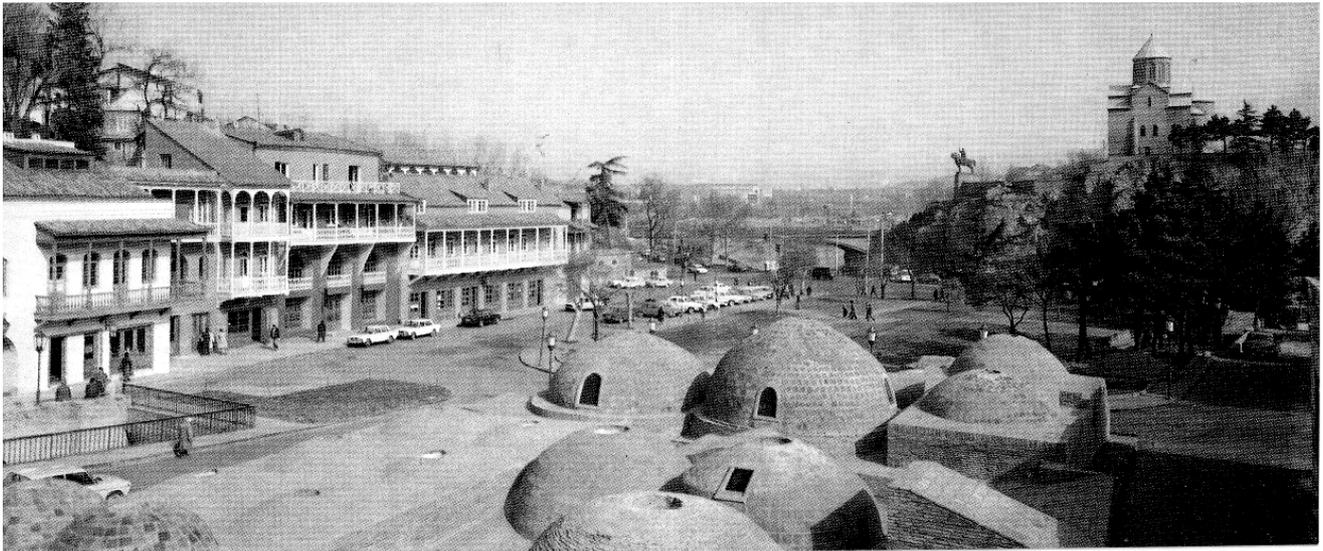


Figure 1. Tbilisi, Georgia. The old city with bathes and monument to Vakhtang Gorgasali.