
HISTORY AND DESCRIPTION OF HÉVÍZ SPA WITH SPECIAL EMPHASIS ON WEIGHT-BATH

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Lake Hévíz

Lake of Hévíz is one of the largest natural and also biologically active thermal lake of the World. The physiotherapy applied here is based on the medical water. The name of the lake means hot water and it can be found in the west part of Transdanubia, near to the western end of Lake Balaton. It is situated in a valley between two hill-ranges of North-South direction and the actual water level is 109.39 metres. Hévíz spa is built on the eastern slopes of a hill on the west side of the lake.

The history of the lake goes back to the beginnings of the geological Middle Ages. Hévíz is the very last spring on the South-West of the karst waters stretching along the dolomites and karsts of the upper triassis of the Transdanubian mountains. We have several evidences to prove that the thermal water didn't spring on the recent water level but much higher than that. It started about 20-22 thousand years ago at the same place as it is today probably at the same time as lake Balaton was forming. The rising water first was flowing into lake Balaton. As an effect of climate changing the water level of Balaton was lowering. In the former basin of the lake peat was created from the plants living there before. As a result of this procedure the bottom of the lake, as well as the swamp around it consists of thick peat.

The spring of the lake with its 45 000 m²'s water surface, rich in minerals, is at the bottom of the vertical sand wall, 38.5 metres deep. The width of the spring-cave of the lake in Hévíz is 2-3 ms, its height is 60-80 cms. This narrow hole is actually the gate of the 14-17 metres wide hole, the so-called Amphora room. The room is divided by a mud layer. Two springs come up from here. A karst water spring of 26.3°C on the east side and a hot water thermal spring of 41°C on the west side. The waters flowing into the crater consists of approx. 10 % of cold and 90 % of hot springs.

The spring, which is continuously feeding the lake, keeps it moving all the time, and the water coming up from the depths is moving towards the shores with slow, circular movements. As a result of the difference of the temperature of the waters and the air, the water cools down on the surface a little bit and it flows downwards due to its higher density. Meanwhile the whole mass of waters moving slowly to the right with a tubular movement. The water of the lake is lead to river Zala by two canals and from there to lake Balaton.

The water flow of the lake is 410 l/ sec and the water is changed in every 2-3 days. In summer its temperature reaches 37-38°C and in winter it is not lower than 22-23°C either.

As an effect of its rich geohistorical past and geological qualities, the spring-lake is in such an organic water-geological unity with the surrounding swamps and moor world that it owns a very specific, very unique flora and fauna. The biological experiments showed that Hévíz has its own flora and fauna, typical for the hot spring and among them some interesting species can exclusively be found here inside Hungary or even Europe [1]. Some characteristic microorganisations such as seaweeds, algs (especially blue algs) sulphur bacteria, micromonosporos and *Streptomyces* species. The microorganism of the water and the mud and its terminal products of its circulation contribute to the great medical effect of the lake to a large extent. The fauna is varied, from small monoplasm to vertebrates you can find various species in the lake. The most spectacular species of flora are the water-lilies having been settled here in 1898 by Sándor Lovassy. The natural forest groups around the lake were significantly changed by artificial forest planting which started at the beginning of the 20th century. You can find numerous moor cypresses around the lake.

The heat of the water and its medical effect is protected by a 50 ha large wood from the harmful effects of the outer environment and civilisation. Resulting from its situation and its relief conditions the number of wind-free days is very high. Due to the protecting woods, the wind protection of the lake is even higher. The highest rainwater level is measured here in the area which is 679 mms per year. The temperature is balanced, too thanks to the continuous heat radiation and the evaporation of the lake, so summers are not too hot and winters are mild. The climate all around lake Balaton is similar to the Mediterranean climate and inside this the climate of spa Hévíz is submediterranean.

Due to the heat radiation of the large water surface and the evaporation of the thick flora there is often fog here. That is a speciality of the microclimate here. On a less windy day this steam covers the lake and its surroundings, in the form of a hemisphere making it possible to bath outside in winter time as well.

This valley with its comparatively dust free air full of steam contributes to the medical effect.

The history of the lake

The first archeological evidence is from 7500 years ago. After the Celtic rule of the region, the Romans came and the recent area of Transdanubia was taken and controlled by the Roman Empire. Hévíz is rich in Roman memories, such as an altar stone, sacred to Jupiter, explored Roman villas and cemeteries, that also prove this fact. The Romans used the lake for industrial purposes, too to manufacture leather. Later the Huns and then German tribes and Avars lived here. The first written memory after the Hungarian Conquest is a document from 1259, which mentions Alsópáhok, a neighbouring settlement of Hévíz and the name of this village refers to the profession of those who were

dealing with leather. The name “Hévíz” first appears in a document in 1328 “polas sar Hwzyusaar nominata” (which means a swamp called mud, large mud) and you can also read about “memora ad usum piscatonis” (places capable for fishing) and the “locus vulgariter Hewyz” (meaning a place simply called Hévíz).

From 1566 the Turkish Empire occupied the areas of south of lake Balaton, so near the fortresses there were battles taking place all the time and the people who had been living here were looking for shelter in the swamps and woods. The water level of lake Balaton was raising in the XVI-XVIIth century and it enlarged the mass of the water of Hévíz valley, thus creating a large swamping procedure and this swanpland made it difficult to approach the lake.

Before the regulation the water of Hévíz was flowing into lake Balaton. In the area between Hévíz and Small Balaton the springwater of Hévíz was flowing all over free. The shape of the lake was longer at that time than it is today according to a map from 1769. In the XVIIIth century they started to regulate the flowing area by building mills there. In 1731 Mátyás Bél, the polyhistor of the era, was the first to mention the medical effect of the lake. Queen Mary Theresa ordered a research to be done in order to enumerate the natural treasures of the country, among them the mineral and thermal springs, too. This task was done by Ferenc Szláby, a graduated doctor and physician of county Zala, who was to make a scientific description of the composition of the lake according to the ideas of the age in 1769. The people living in the region had already known about the medical effect of the lake but its fame is due to Earl György Festetics. During his work the regulation of the waters of the swamps started to take place and he had organised works in the surroundings of the lake such as the bathing house, which was standing on a raft, was built and finished according to his orders [2]. The barber-surgeons of the lake treating people in the bath, had to register all the patients in diaries and cooperated with the hospital and the pharmacy, operating at Keszthely. In 1868 Earl György Festetics (II) started to have the buildings built which were already capable to accomodate patients here. By the spring of 1868, the construction of the so called Mirror bath, standing on oak wood columns was at the beginning phase of its construction, providing separate parts for women and men. Between 1885 and 1905, there were several people who rented the place but finally it was Vencel Reischl in 1905, a beer-brewery owner from Keszthely, who entered a contract to rent it for 35 years. The agreement ordered the rental to invest money in innovations and reconstruction works. Hévíz bath was really constructed after 1905 and it got its nationwide fame, Reischl had the out-of-date old, buildings in poor condition demolished and also entered a contract with Vilmos Schulhof MD, who had been the chief physician of Lukács bath in Budapest. They created a consulting room in the House N. VI. (today building D), where he worked from 1st May to 30th September every year. Vilmos Schulhof created the Zander Institution in Hévíz in 1911 to satisfy the needs of the era in motion-therapy, with gymnastics and electrotherapical equipment [3]. He analysed his experiments in scientific publications in Hungary and abroad. He was the member of the International Peloid Committee. He invited his younger brother, Ödön Schulhof MD from Budapest to work

with him, as an X-ray expert and physiotherapeutic doctor in Zander and was the leader of the laboratory and diagnostical examinations. From 1923 he was working in Hévíz every summer, too, providing the X-ray and laboratory diagnostics, operating here. The third significant personality in balneology was Károly Moll MD, who had already been working here in the summer seasons since 1920, and from 1932 he became an official bath-doctor of Hévíz [4]. His name is associated with the invention of the weight-bath therapy.

The Schulhof brothers and Károly Moll together founded the basements of a regular and well-organised improvement which actually lead the medical factors of the springlake into the system and service of Hungarian health care. There is a promenade in Hévíz named after Vilmos Sculhof where the Medicinal Bath Hospital is situated as well. In 1911 the Minister of Interior Affairs gave Hévíz the title of a “Settlement with the characteristics of a spa”. The open air bath was built in 1926 and soon the roofed Bath house was constructed on the lake. At that time the bath could receive 16000 guests per year. In the middle of the 1920s the construction of huge rest-houses started (that of the post, police, army and finance guards) and more and more hotels and restaurants and villas were built. In the last years of World War II, the German, later the Soviet army used the buildings of the hotels as hospitals. Soon in 1947 the lake could welcome its guests again in the spring bathing season. The turnover was almost the same as before in the years of peace. On 1st of January 1952 the Ministry of Health founded the Hévíz State Medicinal Hospital in the buildings of the bathing area with the main purpose to cure clients with locomotor diseases and curing and rehabilitation of twists and fractures, just as harms caused by several professions. This was also the period when pool masters and masseurs could start their training as well. Hévíz bath was also controlled by the hospital. The development of Hévíz bath was more dynamic in 1968 when the covered pool was built as the most modern therapy center of the time, still functioning there. The buildings of the lake were renovated between 1977 and 1985. But 3rd March 1986 they were burnt down. The reconstruction works started in spring 1988 and the bathing wing of the building had been rebuilt formally by September 1989. In the 1980s the water capacity was lowering because of the water lifting procedure of the nearby bauxit mines but as a result of a wide-range social cooperation the mines, endangering the lake, were closed down and since then the water flow of the lake is continuously raising. The reconstruction of the buildings on the lake started again and modernisation is being still realised. The responsibility of the Hévíz Medicinal Bath and the medicinal mud as well as the water is now controlled by Hévíz Medicinal Bath and St. Andrew (Szent András) Rheumatological Hospital Ltd., which nation wide does the treatment of patients, primarily with locomotor and rheumatological diseases and also gives place for experimental and training works in related fields. The institution also pays attention to environment conservational and nature protectional tasks, as well as to the examination of the ecological and hydrogeological conditions of the lake. The Medicinal bath of Hévíz has been put on the waiting list of the Hungarian National Committee of the World Heritage.

The composition of the medicinal water of Hévíz

Hévíz medicinal water is rich in dissolved and gas-like materials, thus uniting the favourable characteristics of the medicinal baths, containing carbon, sulphur, calcium, magnesium, hydrogen-carbonic and slightly radon. The basin of the lake is covered by mud, which belongs to mixed peloids, both containing organic and disorganic materials and the reduced sulphur compounds represent the special values of medical factors.

	Thermal lake		Thermal pool	
Degree of temp.	In winter : 24-26°C In summer : 32-35°C		34-36°C	
	Kation	Anion	Kation	Anion
Ions	K⁺ : 6.8 mg/l	Cl⁻ : 23 mg/l	K⁺ : 6.8 mg/l	Cl⁻ : 23 mg/l
	Na⁺ : 27 mg/l	Br⁻ : 0.11 mg/l	Na⁺ : 27 mg/l	Br⁻ : 0.11 mg/l
	NH₄⁺ : 0.32 mg/l	J⁻ : 0.021 mg/l	NH₄⁺ : 0.34 mg/l	J⁻ : 0.021mg/l
	Ca₂⁺ : 81 mg/l	SO₄⁻ : 64 mg/l	Ca₂⁺ : 81 mg/l	F⁻ : 1.4 mg/l
	Mg₂⁺ : 36 mg/l	HCO₃⁻ : 378mg/l	Mg₂⁺ : 36 mg/l	SO₄⁻ : 64 mg/l
	Fe₂⁺ : 0.04 mg/l	S₂⁻ : 3.2 mg/l	Fe₂⁺ : 0.04 mg/l	HCO₃⁻ : 378 mg/l S₂⁻ : 3.2 mg/l
	Sum :151 mg/l	Sum : 470 mg/l	Sum : 151 mg/l	Sum : 470 mg/l
Others	Mud, Radon, Metaborid acid, Metasilica acid, organic acid, Special ecosystem, CO ₂ , soluble O ₂	Radon, Metaborid acid, Metasilica acid, CO ₂ , Soluble O ₂ , Sum : 754mg/l		

Table 1 : The composition of the medicinal water of Hévíz

The hospital and its curing activities in our days

There are 25 doctors working at the hospital today. It has got 1 rheumatological department, 4 rheumatological rehabilitation departments, where patients coming from all over Hungary are treated. We apply almost the total choice of physiotherapeutic methods in our institution. These are : balneotherapy, medical gymnastics, massage, mud packing, electrotherapy (treatments on small, medium, and high frequency), ultrasound treatment, hydrotherapeutic procedures (underwater stream massage, whirlpool bath, electric bath tub) and weight-bath therapy.

Besides curative possibilities, we supply patients with several diagnostic methods, too : X-ray, ultrasound, laboratory, osteodensitometry. The laboratory helps the background of

the scientific work going on at the hospital [5-10], it is involved in the work of the osteoporosis center and it also does everyday laboratory work as well.

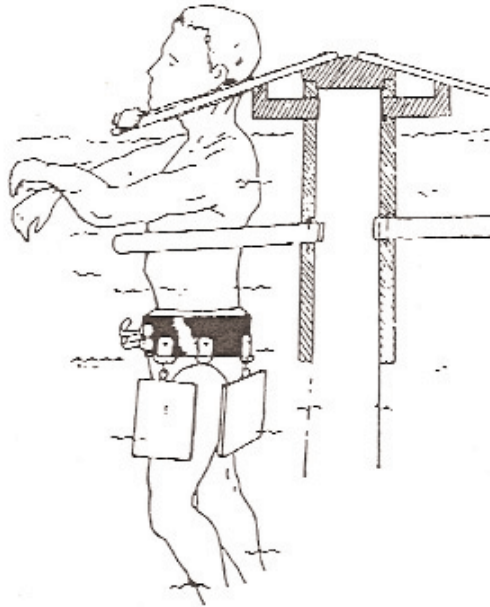
Indications of the cure : rehabilitation of locomotion, especially rheumatological diseases and locomotion operations. The contra-indications of them are the same as those of balneotherapy.

Weight-bath therapy

Definition : It is a hydro- or balneotherapeutic procedure, whose meaning is the vertical hanging of the patient in a water of indifferent temperature in order to stretch some parts of the backbone and the great joints of the lower limbs, with one term : underwater traction.

The representation of traction can be traced back from the Antiquities. The first representation is from the book of Apollonius, the ancient doctor. The “Hippocrates stretching bench”, the so-called “Scammum Hippocrati” was applied very much but sometimes not really for medical purposes, because executors used it, too. Glisson invented the set suitable for traction of the neck in 1650. Mixer and Barr published about discus hernias in 1934. They pointed out the fact that from among the etiological factors of the inflammation of the nerve is the nerve compression, caused by the degenerative changes of the discus is the most significant one. As an effect there was a big change in the traction therapies, the number of different sets for traction was growing [11]. Károly Moll was the first in the world who applied the underwater traction in the form of weight-bath. His first publication on the topic appeared in 1953 [12], which was later followed by some others in Hungarian and in German as well [13-14]. The repositional procedures, applied at discus hernias gave Moll the idea to apply traction on patients while bathing in the lake. At first he hanged weights on strap-belts while the patients were hanging on their armpit on a bar in the water. The so-called bathing raft was an improved variety of this method and besides the armpit supports it contained a holder for the head, too. This way the patient was hanged on three points (two armpits and cervical backbone). By initiating the head-holder the backbone is under a more balanced stretching, on the other hand the patient can bear the traction for a longer time. The weights were made of lead according to Moll and hanged on the belt by mooses which was tied to the hip bone of the patient. In case of hip or knee contracture, the weights were hanged on the ankles. These weights were of 2 or 3 or 5 kgs. Based on his examinations the newly evolved discus hernias were curing faster than the former ones. In hot water the muscles relax and the backbone is stretched and so there is opportunity for the vertebrate disk to regenerate, which is also supported by the hydrostatic pressure on the body. According to his descriptions the time of the weight-bath was 20-60 minutes. In 1963 Károly Moll created the remote controlled weight-bath operated by a machine, where the patient was not loaded with effective weights but with power transmission, but due to the complicated system it could not spread. Another significant innovation in connection with the weight-bath was made by Károly Pap in Debrecen. It is the vibration “lyra” weight-bath. Here the neck stocks were replaced by a Glisson hanger-head harness which is fixed to springs of

different strength and by means of this it is possible to vibrate the hanging body of the patient. Due to its flexibility the lyra weight-bath is more preferred in case of discus hernia at the neck and at calcification. On the other hand tractions applied at a lumbar area it is better to choose the weight-bath constructed by Moll at Hévíz. In our institution when making a traction by means of the set improved by Strecker-Eggenhoffer, lying in a tub in a horizontal position so that by bending the thighs in front they were curved in kyphosis [15]. The weight-bath was quickly spreading in Hungary as the most effective and most pleasant method of traction and is still applied on a wide range of treatments today. Stretching in warm water is more advantageous than the so-called dry stretching. The pleasant hot water relaxes the reflexively tense muscles and besides this loading is also more comfortable in water because there is no friction under the water, which is inevitable by the dry method. The biomechanics of weight bathing was represented in a publication by Éva Bene MD and Kurutzné Márta Kovács [16-18].



Picture 1 : The original form of the weight-bath in Hévíz

Hévíz mud

The Hungarian Association of Balneology evaluated Hévíz mud in 1907 that it is very close to fango, can even replace it due to its chemical and physical characteristics.

The utilisation of different kinds of peat is wide ranged. The medical section of the International Peat Society, and the Hungarian National Swamp-and Peat Committee,



Picture 2 : Hévíz – Thermal lake

deal with their medical utilisation. During the existence of the Council for Mutual Economic Assistance there was a specific committee examining the utilisation of peat for medical purposes [19]. The bottom of the lake of Hévíz is covered by a natural, mixed type, especially plant originated mud in a 1-7 ms thick layer. There have been done overall examinations in connection with the replacement and protection of the mud [20].

Resulting from the high humid acid content of the mud of Hévíz it is a material of dark grey colour, when fresh, with the smell of sulphur-hydrogen, when dry, with a smell of soil, soft as soil and it is not sticky. Looking at it through a microscope, you can see the remedies of humificated organic materials from plants and sweet water sponge needles as well as snail shells. From among its minerals the most typical is limestone. This humus material has strong colloid characteristics, which has a great significance in forming thermic qualities. The heat-holding capacity of the ready to use mud of Hévíz is 502 sec., its heat leading capacity is 0.0017 calories. The total sulphur content is 0.9 %, in a ready to use condition it is 0.51 %. The sulfats, dissolved in water are transformed into sulphur-hydrogene by sulphur-bacteria. Sulphur-hydrogene owns very good pharmacological effect.

Summary

We have to consider Hévíz lake as a natural medical factor as an ecological unity, whose defining elements are the given hydrophysical, hydrochemical and hydrobiological characteristics further the interaction of the water and the mud bed of the bottom of the lake and the specific microclimate.

The speciality of the treatment in Hévíz is the medicinal bathing outdoors in a natural water, while the relaxed floating and the silent buzzing, the green grass and the colourful

forest, the view of the water lilies has a relaxing, regenerating effect on the whole nervous system.

The efficiency of the bathing cure in Hévíz is not only shown by the decrease of the actual complaints but also serves as prevention in several cases.



Picture 3 : St. Andrew (Szent András) Rheumatological Hospital

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