

ANCIENT USES OF GEOTHERMAL ENERGY IN THE PRECARPATHIAN AREA AND IN THE PANNONIAN BASIN

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ABSTRACT

The early beginnings of the utilisation by mankind of geothermal waters in the Precarpathian area and in the Pannonian Basin are lost in the darkness of prehistory. Many Neolithic elements attest an intense and continuous human activity in the vicinity of the thermal springs. Heat of the natural manifestations was the first therapeutical relieve for the early inhabitants of the region in question, who, during their evolution, came to consider the thermal waters as a gift from the gods. In historical times, the use of these waters and the associated thermomineral muds became progressively more frequent and systematic, so that many thermal localities acquired a significant importance as recreational and curing stations. The Great Conquerors (the Romans in the first two/three centuries of the Christian Era, and the Turks in the late Middle Ages), in fact, gave bright and fame to numerous thermal localities, like: *Aquae Pannonicae* (Baden Wien), *Aquincum* (Budapest), Hévíz Spa, *Germisara* (Geoagiu Spa), *Ad Mediam* (Herculane Spa), Felix Spa, etc. Even in the period of the Lower Middle Ages these natural sanatoria were attended, mostly by local people, for the treatment of wounds and illnesses by the use of the thermomineral waters and muds. Afterwards, in the Late Renaissance, these thermal localities were "rediscovered" and flourished again both as curing and recreational stations, especially in the second part of the last century.

Key words: Geothermal water, Precarpathian area, ancient uses, historical development.

INTRODUCTION

In the area of the large Inter-Carpathian and Pannonian basins the warm springs constituted the only form of manifestation of geothermal energy.

The archaeological finds dating from the Neolithic discovered at the site and in the surroundings of geothermal manifestations indicate that man was attracted to settle in this friendly areas. In fact, the human community has continued to live and develop from prehistoric times to nowadays, as the archaeological settlements from Oradea-Salca, Felix Spa, Budapest, Hévíz, Baden and Herculane Spa prove it.

For the prehistoric man and in the antiquity the hot springs were thought to be founts of life and health; they were therefore considered a divine gift and thus sacred.

Before the Roman conquest the practice of balneotherapy had been an indigenous custom of the life of the Celtic and Dacian peoples who already had an autonomous and developed civilisation, and who therefore possessed their own tradition of thermal bathing. Unfortunately, these people have left no written traces; their main occupation was agriculture, hunting and sheep breeding; their principal building material was wood that did not resist more than

2000 years of extremely agitated history

In the popular tradition, which is orally transmitted through many generations, among the legends and the myths of the south western part of Romania is one legend about Iovan Iorgovan who is a local Hercules that kills the dragon with the seven heads from a cave, near the present Herculane spa, with smelly (H_2S rich) hot water. This legend is comparable to other legends formed in the antiquity in the Mediterranean area as, for instance, the Winning fight of Hercules with the giants *Laestrygonians* at the Santa Cesarea spa (Southern Apulia, Italy) and the victory of Zeus over *Typhoeus* at the Phlegrean Fields (Campania, Italy).

UTILISATION OF THE THERMAL SPRINGS DURING THE ROMAN PERIOD

The real brilliance of the localities with thermal springs in the Precarpathian area and in the Pannonian Basin is given by the fact that they were all included in the network of watering places of the Roman Empire during the conquest and romanisation of the provinces in Pannonia -1st century B.C.- and of Dacia -the beginning of the 2nd century AD.

Romans' behaviour towards thermal bathing had been significantly influenced by the "contacts" that this people had with several peoples (Etruscans, Greeks, etc.) in the Mediterranean area from the 5th through the 1st century B.C. (Cataldi and Chiellini, 1995; this volume).

In the first century B.C. the Roman Republic and (after the year 29 B.C.) the Empire was consolidated, the conquered territories were increasingly vast and the commercial dealings and exchanges became increasingly intense. All these facts, together with the benefits deriving from knowledge of the life styles and technologies of other peoples, as well as the readily available funds from the state, left the Romans time to systematically dedicate to the care of their bodies and therefore also to the balneotherapy (Cataldi, 1993).

For the region under review the northern limit of the Roman Empire was -for more than three centuries- the Danube: the Middle Danube (for *Pannonia Superior*, *Pannonia Inferior* and *Moesia Superior* provinces) and the Lower Danube (for *Moesia Inferior*) up to *Pontus Euxinus* (Black Sea). (Fig. 1)

The Roman emperor Traian, conquered the rich and powerful Dacia only at the beginning of the 2nd century AD.; afterwards the Romans ruled over Dacia for almost two centuries. During this period, spa complexes were constructed in all localities with thermal manifestations in order to utilise both natural hot and therapeutic properties of their salts and muds; moreover, some of these localities became commercially and strategically important (Cataldi, 1993).

We are led to think that several Celtic and Dacian centres (*Vindobona*, *Cornutum*, *Brigetio*, *Aquincum*, *Apulum*, *Dierna*, *Ad Mediam*) were subsequently chosen by the Romans for their military encampments precisely -because of their vicinity to the hot springs.

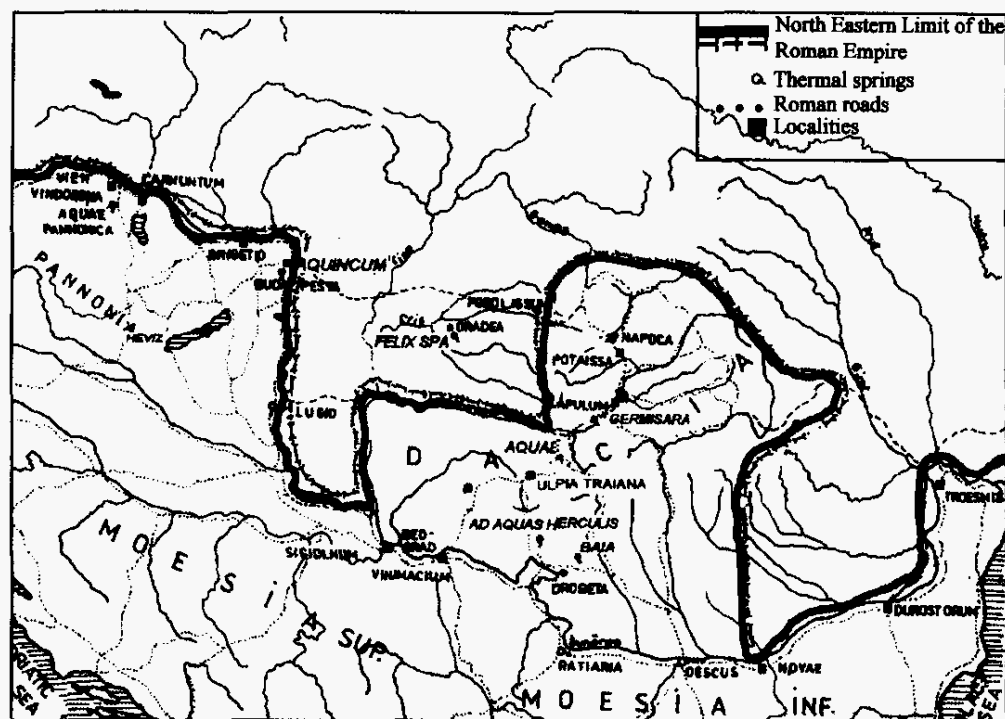


Figure 1 Map Showing the location of Thermal Stations in the Precarpathian area and in the Pannonian Basin in the third century A.D.

The importance that thermal bathing had in Central Europe during the Imperial Period can further be deduced from the famous cartographic document *Tabula Peutingeriana* (the official map of the Empire in the fourth century A.D.). This atlas shows in the fifth of eight segments the principal thermal spas existing in Pannonia and Dacia and indicates that these had achieved a great degree of importance both for balneological and military purposes. The Romans built and fortified *Vindobona* (present day Vienna) near *Baden* (Austria), the capital of *Pannonia Superior* and centre of Legion, and *Aquincum* (Budapest) the capital of *Pannonia Inferior*. The latter had a thermal complex in close proximity on the left bank of the Danube. Dacia, with its capital *Ulpia Traiana Sarmizegetusa*, had on its territory the thermal springs of *Aque* (Călan, Hunedoara) and near *Apulum* (today Alba Iulia) - the centre of the thirteenth legion *Gemina* - was the thermal complex of *Germisara* (Băile Geoaagiu). The most important watering place in this part of the Empire, *Aque Herculi*, had in close proximity the fortress of *Drobeta*. Moreover, *Derna*, on the left bank of the Danube, *Ad Mediam* and *Tibisium* were located along the imperial route to the central sector of Dacia. This means that the layout of the main routes was purportedly established so as to connect, as much as possible, the different thermal localities with each other, and evidences their importance.

During the second and third centuries A.D. the territory under Roman rule or the region in question (Pannonia and Dacia) thermal bathing became such a diffused practice and a way of life so rooted at all levels of society, as to make of each spa not only a station of cure (*sanatorium*, or also *valetudinarium*), but also a meeting place for the people, and therefore a reference point for every aspect of civic life (Cataldi, 1993).

The thermal balneology, however, had already established itself as a local tradition before the arrival of Romans, and this practice had resulted in the formation of numerous cults of protective divinities of the thermal waters. It was from the Dacians (the religion of which was monotheism) that the Romans adopted the cult of their local divinity. In honour of the hot springs (*Fontes calidae*) and of the place (*Genus Loci*) as well as in honour of the divinity of the water (*Numines*

aquarum or of *Nimphae Saluiferae*), numerous votive offerings were dedicated. But the most numerous statues, inscribed pillars, altars and temples were dedicated in honour of the health giving divinities: *Heracles*, *Aesculapius* and *Hygeia* (Macrea, 1969).

Another proof of the symbiosis of the Roman and the Dacic cultures is the adjoining of the Roman divinity *Dis Pater* (the underground god *Pluto*) with the Dacic divinity *Terra Mater* (adjoining found on a bronze plate at *Ad Mediam*, altar table at *Germisara*, etc.)

HERCULANE SPA

After the conquest of Dacia (106 A.D.), in the narrow valley of Cerna, sheltered by abrupt mountains, the Romans discovered the curative thermal springs which they named *Ad aquas Herculi sacras Ad Mediam*. It is however certain that these geothermal manifestations had been used by the Dacians long before the Romans arrival. Archaeological settlement in *Outlaws Cave* (inside the spa area) certifies a permanent settlement throughout the Neolithic. In the area of these baths, Roman wins (denars) from about 93-92 B.C. have been discovered, proving the existence of an active population, dealing in handicraft and trade, carrying out exchanges of goods with the South-Danubian (*Moesia*) under Roman occupation (Macrea, 1969). The vicinity of the Roman road coming from the Danube, as well as the mild climate, the fresh air and the picturesque natural surroundings determined the new masters to develop the thermal springs, setting up buildings for the cure, pools, aqueducts. The *Hercules thermae* got an impetuous and acquired fame for a long period of time. After Aurelianus had left Dacia (273 A.D.) under the pressure of the "barbarian peoples", the complex fell into decay however, the thermal springs nearby continued to be used by the local population and occasionally also by travellers crossing the region. In the year 535 A.D., the Emperor Justinianus of Constantinople set up here the bishopric *Ad Aquas of Dacia Ripensis* (Gogăltan, 1980).

As a result of many stormy invasions by a number of peoples, the spa in question remained active in the long period between the 6th and 15th centuries; afterwards, its balneological frequenting was deeply



Figure 2 The statue of Hercules located at Herculané spa
Bronze WW. made in 1852 of a marble statue dating from the
third century A.D.

affected by the passage of many war fronts, especially those related to the bloody conflict between the Ottoman and Austrian Empires in the period of 16th and 17th centuries. The driving away of the Turks from this region (after more than two centuries of occupation, when they rebuilt partly the old Roman thermal spas), by the armies under command of prince Eugene of Savoy, also brought about the "rediscovery" of the Herculané spa. Many Roman archaeological vestiges have been discovered here during the modernisation of the baths: statues, sarcophagi, altars and votive *tabulae*. The most frequently represented among the votive offerings is Hercules *salutiferous* (the healer); there also occur votive artefacts dedicated to *Hygeia* and *Aesculapius*. Unfortunately, most of the statues and other invaluable objects have been lost (a ship carrying such archaeological vestiges wrecked in 1755 in front of the city Pest), or were sent to the Court of Vienna to decorate the interior of the imperial library (Cristescu, 1978).

The further development of the Herculané spa after the modernisation undertaken by the Austrians gave them a certain international fame in the 18th and 19th centuries A.D.

GERMISARA SPA (Geoagiu spa, Alba County)

The spa has remained almost permanently active for more than twenty centuries, enjoying a great fame and growth in the second and third centuries AD. The ruins of this spa, which date back to the Roman period and are to be found in the area of the last century watering place, include remnants of imposing stone and brick buildings, water tanks and pools dug in massive rock, and a complex of network of pipelines for both thermal and cold water. They evidence that an intensive balneological activity was developed in the antiquity in this establishment.

In addition to the previous ones, remnants of numerous monuments, statues, bas-reliefs, sanctuaries, inscribed pillars, etc., are to be found in this place, with dedications to gods, demigods and *nimphae*, such as *Sulis Minerva*, *Diana Augusta*, *Fortuna*, *Hercules invictus*, *Aesculapius*, *Hygeia* and *Nimphae sanctissimae et salutiferae*. These

dedications are "signed" by persons of the ruling class, wealthy people, veterans of the Roman army and modest people, which attest that balneology was largely practised, at that time, by people of any social classes. Moreover, findings have been discovered of oracular altars and craters.

AQUAE (Călan, Hunedoara County)

Aquae is mentioned in *Ptolemaios' Geographia* (second century B.C.) under its Greek name of *Hydata* (thermal springs) and shown also in the *Tabula Peutingeriana* as *Ad Aquae*. It is placed in the vicinity of the political, administrative and religious metropolis of Dacia named *Colonia Ulpia Traiana Sarmizegetusa*. During the Roman period, this thermal locality was also famous for its travertine quarry.

The ruins of two other Roman *thermae* were discovered in southern Dacia at Săcele (remnants of health bathing facilities and a sanctuary dedicated to *Hygeia* and *Aesculapius*) and at Bala de Jos near Drobeta. In these two localities, oak tubes for bathing (called *alvae*) and "offerings" of Roman coins from the 2nd and 3rd centuries AD. were found (Tudor, 1958).

FELIX SPA (near Oradea)

The balneological practice in this spa and in the nearby thermal stream *Pep* (which is fed by vapour under-lake hot springs) is documented only from the 12th century AD., after Transylvania became a province of the Hungarian kingdom. However, some archaeological findings brought to light in the Salca-Oradea area attest that, on the banks of the 12 km-long segment of the *Pepa* stream (from Felix spa to Oradea), human dements started to establish in the lower Neolithic and developed mostly in the Bronze and Iron ages. The Dacic civilisation is proved by numerous archaeological evidence (from the *Hallstadt* and *La Tène* cultures), however traces of the Roman domination are absent, as the Oradea area was outside the Roman Empire limits. In the eleventh century AD. the Bishopric of Oradea was established, which took possession of the hot springs near Felix and founded the Bishop's spa, that operated over nine centuries. In the warm water of the *Pepa* stream two Tertiary living fossils were preserved: the aquatic plant *Nimphae Lotus Thermalis* and the gastropod *Melanopsis Parreisi*, proving the existence of the thermal springs since the end of this Era. The Felix Spa resort started to be known and visited after 1720, however its true development started in 1885, when the first geothermal well in Romania was drilled here (51 m deep, 195 l/s flow, 49°C wellhead temperature).

AQUINCUM (Budapest)

The existence of this Roman spa complex (*Aque Calidae superiores et inferiores*), located on the right bank of the Danube, is attested since the period of domination of the Emperor Claudius (260-268 A.D.). From that period on, the copious thermal springs feeding the establishment in question were intensively used for balneotherapeutic purposes. During the Roman domination the *thermae* at Aquincum (Illyric name which means hot spring with high flowrate) became very famous in this part of the Empire.

After the decay of the Roman Empire this spa lost its international importance. It continued, however, to be attended by the local people until 890 A.D., when Aquincum started to take a new strategic importance and its thermal establishment began to be again internationally known. This happened in particular after the Hungarian leader of that time (Árpád) constructed a fortified encampment near the thermal springs.

In the thirteenth century the legislation of Buda mentioned in a separate paragraph that part of the geothermal water from springs is transported through wood pipes from the banks of the Danube to the Fortress of Buda (Fekete, 1974).

In the following period, during Turkish domination, the thermal station in question was furtherly expanded by the construction of numerous *ilidse* (i.e. Turkish baths) which enabled thousands of people per day to enjoy hygienic and therapeutical treatment. Among the most important *ilidse*, those built by Mustapha Sokoli-Pasha in 1566, and the others built by Veli Bey in the 17th century (Fig. 3) PIC to be mentioned. The importance of the latter *ilidse* is stressed in the work of the Turkish illuminist Evliya Toelebi.

After driving away of the Turks by the Austrians in 1686, the whole thermal complex of Aquincum was modernised and furtherly expanded, so that it acquired in the 18th century international recognition and attendance (Grove, 1977)

Further on, in the 19th century, the need for larger quantities of thermal



Figure 3. Turkish baths at Aquincum (Budapest)

water led to drilling of a couple of wells (in 1867 and 1878, respectively), which enabled supplying many indoor and outdoor thermal pools. Aquincum then became one of the largest therapeutical and recreational centres in Europe.

HÉVIZ SPA (near Lake Balaton)

The copious under-lake springs (36°C), which PIC continuously flowing since the end of the Tertiary age (as evidenced by travertine and mud deposits), generated the biggest geothermal lake from Europe.



Figure 4. Aerial view of the geothermal lake at Héviz

The local people utilised the thermal waters and the sapropelic muds of this area since prehistoric times. The archaeological sites in fact, date back to Bronze age.

After the Roman conquest, a strong balneological centre (*valetudinarium*) was developed at the geothermal lake at Héviz. This is proven by many bas-reliefs and inscribed pillars, with dedications to gods (Zeus, Sulis Minerva) and to *Nimphae salutiferae*.

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