Natural Health Remedies

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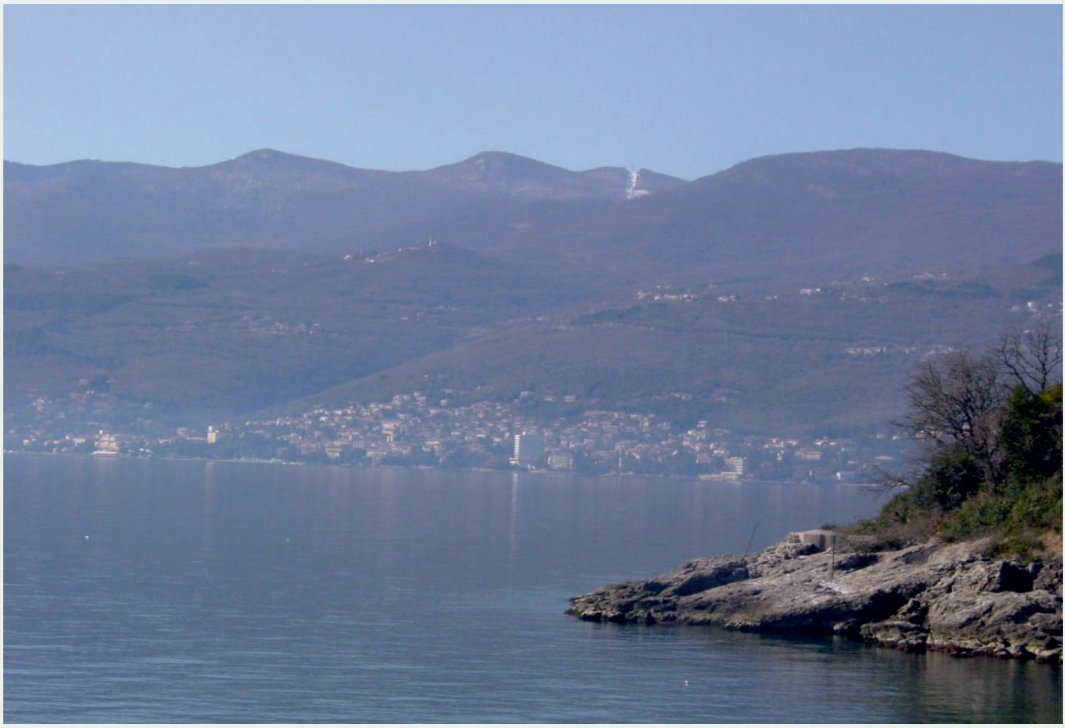

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University of Rijeka textbooks
Manualia Universitatis studiorum Fluminensis

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NATURAL HEALTH REMEDIES

Publisher:
University of Rijeka

Editors:
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Matea Butković

Graphic design and press:
Tiskara i grafika Viškovo d.o.o.

Cover photography:

ISBN 978-953-8447-02-0
(Faculty of Health Studies Rijeka)

ISBN 978-953-8341-32-8
(Faculty of Medicine Rijeka)

In compliance with the act issued by the Senate of the University of Rijeka
(Class: 602-03/23-03/12, Register number: 2170-137-03-23-3, on 25th July 2023).
This book is published as a part of the University of Rijeka edition.

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FOREWORD

Natural health remedies are parts of nature that have a beneficial effect on a healthy and diseased human body. Croatia is relatively rich in sites and/or places of their application in health resort and medical tourism, as well as elsewhere.

The book "Natural Health remedies" is the first of its kind in the Croatian language, but also a rare example in international medical literature. It was written for higher education needs, but it will also serve as a professional resource for anyone else interested in this field.

We thank the reviewers whose comments have improved the final version of this manuscript.

In Rijeka, 2023

Authors

1. INTRODUCTION

Medicine, as a scientific field, is divided into basic medical sciences, clinical medical sciences, and public health, which includes the branch of health ecology. According to the generally accepted definition, health ecology is a branch of public health that deals with those aspects of human health and disease that are caused directly or indirectly by biological, chemical, physical, or psychosocial environmental factors. In Croatia, public health is based on the principles established by Andrija Štampar, as well as additional changes and improvements made during the accession to the European Union.

Today's environmental quality studies point to significant global pollution of water, soil, and food worldwide due to contamination caused by undesirable products of modern technology such as heavy metals (mercury, lead, cadmium), organic chemical compounds (polychlorinated biphenyls and dioxins), and radioactive waste. Mercury pollution has several causes, the main of which is the presence of mercury in the emission of gases and ash after burning coal in thermal power plants. Subsequently, mercury settles in precipitation and enters other systems, such as the marine system, leading to its high levels in the food chain. Mercury thus ends up in higher organisms such as fish, birds, and, eventually, humans. A simple comparative analysis of museum bird feathers reveals that the saturation of the environment with toxic organic mercury compounds has doubled since the beginning of the industrial revolution. Scientists recommend that women eat fish-based meals not more than once to twice a week because mercury crosses the placental barrier and may cause serious damage to the fetus in the early stages of development precisely because of the known toxic cumulative effect.

Lead pollution occurs in many industrial areas around the world due to its discharges into the environment from smelteries and during the combustion of lead-enriched petrol. Chronic low-concentration lead poisoning causes milder forms of intellectual difficulties in children. In some urban industrial areas, increased levels of lead in the dentin of deciduous teeth show a statistically significant correlation with the IQ of school-age children. Many organic compounds such as polychlorinated biphenyls and dioxins are widespread in the environment due to their non- or poor biodegradability. In addition, they are easily transmitted through various food chains precisely because of their fat-soluble properties.

Global environmental problems such as the well-known greenhouse effect, ozone holes, global warming, and global and regional climate change are associated with planet overcrowding and the human need to consume vast amounts of energy and substances, and, consequently, the production of large amounts of waste. We can reduce waste management to reduction and prevention, reuse, and recycling. It is also vital to apply the "polluter pays" principle.

The population of people is growing exponentially on planet Earth, which can be imagined as a spacecraft limited in space and available resources. The world's population exceeded 7 billion in 2011. The first billion was reached around 1800, the second followed only 130 years (1930), the third after 30 years (1959), the fourth after 15 years (1974), the fifth after 13 years (1987), and the sixth after 12 year (1999) later. For the last three billion new residents, the time required to reach a billion was around 11 to 13 years. All this leads to the fact that man literally takes away many natural habitats of other living beings, which leads to the extinction of plant and animal species.

All human activities are also accompanied by an exponential increase in consumption and the irreversible destruction of fossil fuel stocks such as coal, oil, and gas. The problems are even more dire because of the general public's assumption about the limitlessness of resources as well as the possibilities of accepting and disposing of waste. In some parts of planet Earth, natural resources have been fully depleted, and people who used to live in these areas have been forced to abandon them; the same holds true for wildlife. For example, in the past, Egypt was much greener than it is today. In the future, sea levels, rivers, and lakes could rise and become a new reason for large-scale migration as a result of global warming and the consequent melting of polar ice. The number of ecological refugees is continuously increasing in many developing countries, especially in slums around large cities in South America and parts of Africa and Europe. Ecological refugees are already beginning to change the socio-demographic composition of developed countries in Western Europe and North America. Mass migrations are becoming a public health problem because people carry with them and transmit many diseases. Diseases that may not have been present in certain areas begin to appear and the local population has not developed resistance to them yet. Because the cultural, linguistic, and ethnic background of newcomers differs from that of the host country, there are often a number of obstacles to providing much-needed health care. Sometimes immigrants become population groups that have very little contact with the health service. This can favor the onset and development of diseases. A new infectious disease with a high contagiousness index could

spread across the planet in a very short period of time, precisely because of the extreme mobility of passengers today, primarily by air transport.

Increased air pollution by dust particles and numerous atmospheric allergens will further increase the incidence and prevalence of acute and chronic respiratory diseases. An increasing number of employees in closed offices and business premises will cause the frequent occurrence of the "sick building syndrome."

Vector-borne diseases are likely to spread to temperate climates where they do not dominate at this point. These diseases include malaria, arboviruses (an acronym that refers to viruses transmitted by arthropod vectors) such as viral hemorrhagic fever, dengue fever, viral encephalitis, typhoid, and Lyme borreliosis. The fact is that we have effective vaccines, and we know other preventive and curative health measures against some but, unfortunately, not all of these diseases. Drinking water and some fiber-rich foods are very susceptible to contamination by toxic compounds especially after environmental disasters. Chemical pollution of underground streams, rivers, and lakes occurs in many environments, which attracts people's attention and causes outrage. However, scientifically proving direct adverse health effects is not always simple.

A chemical waste dump in Niagara Falls, New York became notorious in the 1970s when people living near the former Love Canal landfill began falling ill. The landfill was active until 1953, when it was closed. The chemicals were disposed of at a depth of 6 to 7 meters, and after the cessation of waste disposal, the canal itself was covered with soil and soon the vegetation began to flourish over the landfill. The land was sold, and, in the late 1950s, the first school was built, as well as the first hundred houses. The residents were initially unaware that they were living above more than 21,000 tons of chemical waste. Following the occurrence of epilepsy, asthma, birth defects, frequent abortions, urinary tract infections, and similar diseases, as well as the growing interest of the public and local population, the truth about the former landfill was revealed. In 1978, Love Canal became a national media event with published news about the "public health time bomb." In 1979, the Environmental Protection Agency published the results of blood tests, which showed elevated levels of white blood cells (leukocytes), precursors of leukemia, as well as chromosome damage in the inhabitants of Love Canal. Thirty-three percent of the participants had chromosome damage, while in the normal population it amounts to about 1%. Other studies failed to detect harmfulness. Concerns about exposure were more related to groundwater flows than drinking water. Underground currents penetrated basements and led to exposure in air and soil. Eventually, the U.S. government relocated almost all residents and reimbursed them for the value

of their homes. However, fewer than 90 of the 900 families originally settled decided to stay.

Furthermore, one textbook example of environmental pollution is the bizarre poisoning of livestock and humans after the contamination of animal feed with biphenyls in Michigan, United States, in 1973. PBBs (polychlorinated biphenyls) were widely used as flame retardants in the 1970s. Several tons of such flame retardants were mixed with animal feed and distributed to farms in Michigan. A study comprising 4,545 participants was carried out to determine the effect of polychlorinated biphenyls on humans. The participants were divided into groups depending on the degree of exposure. Blood and serum PBB levels were analyzed, T and B lymphocytes were quantified as well as *in vitro* tests. The results showed that there was no statistically significant difference that could be related to polychlorinated biphenyls.

One of the aspects of health ecology that is insufficiently considered are the physical environmental factors. By that we are referring to the influence of noise and vibration, electromagnetic radiation, light pollution, and heat. According to some estimates in Europe, 40% of the population is exposed to road traffic noise intensity above 55dB during the day, and as much as 20% to noise levels exceeding 65dB. These noise levels are considered unacceptable for long-term exposure of the population. Robert Heinrich Herman Koch, who is considered the founder of modern bacteriology, said that the day would come when noise would become one of man's greatest enemies and he would have to fight it like he once fought plague and cholera. That is our reality today. Recently, increasing attention has been paid to lower-intensity noise that does not damage hearing, but can, in fact, cause other health disorders. One of the most recent studies shows that a mere reduction of 7dB reduces the overall percentage of people who experience negative psychoacoustic effects by as much as 300%. Worldwide, 275 million people have severe hearing impairments, with as many as three-quarters of deaf and hard of hearing people living in middle- and low-income countries.

Major accidents at nuclear power plants (Chernobyl and Fukushima) have unequivocally confirmed the negative effects of radiation on people in the affected areas. One of the future potential environmental problems is the safe disposal of radioactive waste, either from nuclear power plants or unused nuclear weapons. Nuclear waste with an extremely long half-life is disposed of by burying it in concrete shells and/or abandoned mines. Such partial and very short-term solutions do not consider the key fact that nuclear waste remains radioactive in units of measurement that are more appropriate to geology than human biology. Also, such partial solutions do not solve the problem, but only

postpone it, which directly conflicts with the generally accepted definition of sustainable development. Sustainable development is the kind of development that meets the needs of present generations without compromising future generations' ability to meet theirs.

Furthermore, ozone depletion leads to an increase in ultraviolet radiation, which, in turn, will lead to an increase in the number of melanoma and non-melanoma malignancies, as well as cases of the clouding of the eye lens. It has been established with certainty that there is a trend of a marked increase in these diseases. A weakened defense response is a further consequence of ultraviolet radiation, which further reduces the body's resistance to infections and increases susceptibility to malignant diseases.

It is necessary to mention the negative effects of heat on humans. Unfavorable thermal conditions of the working environment reduce the feeling of thermal sensation, affect the ability to work and safety, lead to injuries at work, and can directly endanger the life and health of exposed workers. We also expect a further increase in the prevalence of some diseases and an increase in premature death rates, which we associate, for example, with heat stress. Very young people, the elderly, and people with chronic respiratory and cardiovascular diseases will be particularly exposed. Long periods of extreme warm weather also increase the propensity for violent and antisocial behavior, resulting in numerous episodes of violence, riots, or other forms of civil unrest. Due to the concept of occurrence, these disorders will become a future distinct public health problem.

Certain public health measures will need to vastly gain in significance and importance in the future. These are, for example, measures of more detailed ecological control of various environmental media (air, water, food, sea, soil), public health programs of quality nutrition determined by the national food policy, and programs of immunization, and professional reception and treatment of migrants. Finally, family planning programs must be highlighted, as the environmental problems of humanity have largely arisen as a result of overpopulation. The world essentially needs several generations of one-child families. If this were achieved, ecological and demographic catastrophe would be avoided, and a balance of biological resources and stabilization of a severely disrupted global environmental situation could be expected. If an appropriate step is to be taken in this direction, a decisive effort and the unity of all humanity is needed. Too much is being invested in curative health measures (which are often only palliative) but insufficiently in prevention and health preservation. However, it is known that the preventive part of health care is a mirror of the universal culture of a nation.

In conclusion, we believe that we should strive to cancel out the negative effects of the environment on people and strive to maintain or improve human health through natural health remedies.

2. CLASSIFICATION OF NATURAL HEALTH REMEDIES

The concepts of a health place and a health-tourist place have been systematically neglected for decades. Yet, in the last twenty years, the concepts health place and health-tourist place are being increasingly discussed in professional and scientific circles as a consequence of today's trend of returning to nature and the original environment.

While man once had to think about how he would survive, now there is concern for personal health, its improvement, as well as increasing the quality of life. In the last few years, terms such as health medicinal tourism, health tourism, and medical tourism have not been fully clarified, neither legally nor professionally. Different authors have provided different definitions, whether from an economic, health, or interdisciplinary point of view.

Health tourism can be defined as a special form of tourism, which takes care of the health of healthy tourists. It uses natural health remedies, as well as methods and procedures of physical and rehabilitation medicine to preserve and improve one's health and the quality of life. In health tourism, stays are realized in places and areas where there are natural health remedies, as well as conditions and activities for the recovery and maintenance of human mental and physical abilities.

Medical tourism is a form of medical activity, which provides tourists with various forms of medical services in a tourist place. In this case, a tourist visit and experience are motivated solely by medical reasons.

Medicinal tourism in health resorts provides sick tourists with various health and medical services in institutions of different types, primarily health institutions. In health resort tourism, various procedures and methods of applying natural health remedies, physical and rehabilitation, as well as other procedures that are used to preserve and improve health. It also includes undergoing prevention measures, treatment, extended treatment, recovery and rehabilitation following various diseases in natural health resorts. The very concept of health resort tourism is associated with natural health resorts and the profession of doctors.

It is also worth noting the dangers to which tourists' and travelers' health is exposed. This refers to the spread of infectious diseases, possible various injuries, but also the consequences caused by the use of alcohol, drugs, and the like, which is addressed by tourism (travel) medicine.

One of the tourist motivators in health and health resort tourism, and to some extent medical tourism, is the presence of mental, physical, or psychophysical pain. Pain is a complex subjective experience, difficult to define, explain, or measure. It has different meanings to different people, but also for the same people at different times and under different circumstances. Sometimes pain occurs due to symptomatic diseases such as the sick building syndrome, migraine, and other diseases to which modern medicine and pharmaceuticals have not yet given the right answer, precisely because of the multicausal and complex nature of such diseases. Tourists' stay in health-tourist places may be the right answer in such cases.

Natural health remedies are parts of nature, its inherent component, which have a beneficial effect on preserving and improving health, improving the quality of life and prevention, treatment, extended treatment, recovery, and rehabilitation of various diseases. They are divided into climatic, marine, and thermal (balneological) medicinal health remedies, which can be seen in the table below (Table 1).

In the international professional literature, there is a tendency to combine marine and thermal health remedies into medical hydrology, which is further divided into groups, while climatology remains a separate entity. Currently, the world's most relevant international organization dealing with natural healing agents is the International Society of Medical Hydrology and Climatology (ISMH), which was founded in 1921. The current president of ISMH (2012) is Prof. Zeki Karagülle, who is also the Head of the Department of Medical Ecology and Hydroclimatology in Istanbul. This testifies to the interconnectedness between health ecology, on the one hand, and hydrology and climatology, on the other.

Table 1. Natural health remedies

Climatic	**Marine**	**Thermal (balneological)**
change of climatic region	climate	mineral and thermal waters
climatic elements and factors	air purity	peloid

climatic procedures	sea water	naphtalan
air purity	algae	climate
solar radiation	plants	air purity
marine health remedies	walking trails	plants
karstic caves	solar radiation	walking trails
salt mines	sand	solar radiation
	salt peloid	
	sea peloid (liman)	

Three special sciences emerge from this: *balneology* (Latin balneum = bath, Greek λόγος = science), *thalasology* (Greek θάλαττα = sea, Greek λόγος = science), and *climatology* (Greek κλίμα = slope, λόγος = science), which study the natural health remedies of land, sea, and atmosphere and the ways and results of their application to healthy and diseased human bodies.

For the purpose of an efficient and effective application of natural health remedies, it is necessary to satisfy the so-called health resort conditions for the application of natural health remedies (Table 2), which include the daily schedule of meals, treatment, rest, and free time.

It is recommended to have breakfast between 8 and 9 a.m., lunch between 1 and 2 p.m., and dinner between 6 and 7 p.m. Treatment is carried out in the morning and/or afternoon, and day rest after lunch and night from 9 p.m. to 7 a.m. Various recreational, social, civic, and spiritual activities are carried out during the free time. A healthy diet presupposes a healthy way of preparing and consuming food. Essentially, all meals should have certain caloric energy values; they must include a balanced ratio and composition of proteins, carbohydrates, and fats as well as vitamins and minerals, while the diet must be personally tailored to the individual. A prerequisite for the beneficial effects of natural health remedies is the exclusion of smoking, alcohol, drugs, and harmful habits (poor sitting posture, skipping meals, bad rest schedule, etc.). Morning exercise, especially outside in the fresh air, has a very beneficial effect on the locomotor system, cardiovascular and respiratory systems, and mental health. Staying in the fresh air all day has a very positive effect on the overall physical and mental health.

Social, cultural, sports, and spiritual programs that include various facilities are also essential as well as the exclusion of noise and air, sea, or soil pollution.

Table 2. Health resort conditions for the application of natural health remedies

Health resort conditions
daily schedule
healthy and/or dietary nutrition
exclusion of smoking, alcohol, drugs, and harmful habits
morning exercise in the fresh air
spending time in the fresh air
social programs
cultural programs
recreational and sports programs
spiritual programs
exclusion of air pollution caused by noise, light, and particles

The term *health resort medicine* is found in the Anglosaxon (English) literature. However, it is important to note that there are very large differences in the understanding and application of health resort medicine in Europe.

It is safe to say that, from the very beginning, man as a species has been associated with natural health remedies: climate, solar radiation, sea, mineral and thermal waters, healing mud, and other health remedies, and this has manifested itself over the centuries precisely by the use of natural health remedies in the treatment, rehabilitation, and prevention of disease and in improving the quality of life. From the very beginnings of the human race, human dwellings have been built on the seashore or near freshwater springs. Ancient Rome was famous for its baths, which are still preserved today. It should be mentioned that, during the Roman Empire, at the time of its greatest prosperity, Rome had 13 aqueducts, 1,352 public fountains, 11 imperial baths as well as 962 public baths.

In the Middle Ages, the use of natural healing agents was not considered, which lasted until the middle of the 18th century, when they began to be reconsidered, including their use in balneotherapy, climatotherapy, and thalassotherapy.

Here, the notion of health ecology needs to be mentioned. If we know that man has long noticed the connection between health remedies and the environment, it should be said that throughout human history, the prevailing environmental health remedies that endangered human health have changed

and thus changed the profession that deals with the prevention and control of disease. Health ecology (environmental health) is a branch of public health that deals with all public aspects of human health and disease. Medicine itself, in general, can be divided into three parts. These are the basic medical sciences, clinical medicine, and public health.

Today's health ecology system is based on Andrija Štampar's principles of public health as well as additional changes and improvements that have been made and are still being made as a result of Croatia's accession to the European Union, which began in 2001 and occurred on July 1, 2013. Today's county Institutes of Public Health are located organizationally in the Croatian Institute of Public Health, at Rockefellerova ulica 7 in Zagreb.

Andrija Štampar (1888-1958) was a well-known and recognized public health worker, a world-renowned physician, who chaired the First World Health Assembly in 1948, which gave rise to the World Health Organization (WHO). Štampar played a significant role in drafting the WHO constitution and later chaired the sessions of the World Health Organization on several occasions. He was the rector of the University of Zagreb and the dean of the Faculty of Medicine in Zagreb. He also participated in the founding of the Faculty of Medicine in Rijeka. He was also the president of the then Yugoslav Academy of Arts and Sciences (YAAS), to which he was elected four times in total. Simply put, Andrija Štampar was a world-renowned public health worker. The School of Public Health in Zagreb is called Andrija Štampar. It is essentially a special institution of the Faculty of Medicine in Zagreb, which unites several of its departments: the Department of Social Medicine and Health Care Organization, the Department of Medical Statistics, Epidemiology, and Medical Informatics, the Department of Family Medicine, the Department of Medical Sociology and Health Economics, and the Department of Health Ecology and Occupational Medicine. It is located at Rockefellerova 4 in Zagreb (ref 9). The World Health Organization (WHO) was founded on April 7, 1948, as a United Nations agency that succeeded the Health Organization under the auspices of the League of Nations, which they had previously dissolved. That is why World Health Day is celebrated on that date.

Indications and contraindications

We can compile indications and contraindications both for the use of all three individual groups of natural health remedies – climatic, marine, and thermal (balneological), and natural health remedies in general.

Table 3. Indications and contraindications for the use of natural health remedies

Indications	Contraindications
Increased resistance and general condition of the organism	Acute diseases
Prophylaxis of diseases, especially those associated with cooling	Acute stage of chronic diseases
Recovery after long-term illness and surgery	Second and third-degree cardiopulmonary and cardiovascular insufficiency
Accelerated recovery	
Tuberculosis and nonspecific lung diseases	
Cardiovascular diseases with mild circulatory failure	
Endocrine diseases and metabolic disorders	
Chronic nephritis and nephrosis with sufficiently maintained renal function	
Nervous and mental diseases	
Diseases of the locomotor system	

2.1. Climatic health remedies

Climate (from the ancient Greek word κλιμα meaning slope) is defined as a set of meteorological health remedies and phenomena that over a period of time make up the average state of the atmosphere over some part of the Earth's surface. Climatotherapy (Greek κλίμα = slope, θεραπεία = treatment) applies climatic principles (elements) and health remedies (modifiers) characteristic of an area that have a favorable physicochemical, biological, and psychological impact on the human body. Dosed climatic stimuli cause a reaction in the body whereby a healing effect is achieved.

The very application of climatic health remedies has led to the development of a range of special forms of treatment, depending on the applied natural health remedy. We can list a number of such forms of treatment. Climatotherapy

primarily uses climatic natural health remedies and procedures, from which the following forms of treatment have developed:

- aerotherapy,
- heliotherapy,
- speleotherapy.

In the case of climatic health remedies inherent to the sea and the seacoast, it is usual that there is a certain intertwining with thalassotherapeutic health remedies. It should be mentioned that there are indications as well as contraindications for the use of natural health remedies in treatment, which can are presented in Table 4. This means that some diseases and conditions will react positively to the application of climatic health remedies, while other diseases and conditions will react negatively to their application, i.e., the rules of the profession prohibit all forms of their application.

The Greek physician Hippocrates of Kos (460-380 BC) was the most famous ancient Greek physician and is considered the father of medicine. He noticed the influence of food, occupation, and especially climate in the development of disease. One of his books, *De aerem aquis et locis* (*On Airs, Waters, and Places*), can be considered the earliest work of health ecology. In this work, Hippocrates recommends that local climatic health remedies, water, and food quality and the characteristics of individual seasons be taken into account in the treatment of patients; the influence of winds is also discussed. This is essentially the first known description, at least to date, of the importance of local climatic health remedies, i.e., air, water, and the environment on human health. Hippocrates is better known for his work *Corpus Hippocraticum*, a collection of about 70 different medical works from ancient Greece that is strongly associated with Hippocrates and his teachings. These works differ in content, age, and style and are largely of unknown authorship. None of the volumes in the Corpus have been proven to have originated from Hippocrates himself, although some sources claim otherwise. The most famous work of Hippocrates' Corpus is the Hippocratic Oath, a declaration of medical ethics.

Contraindications for the use of climatic health remedies in treatments include acute diseases, acute stage of chronic diseases, and second and third-degree cardiopulmonary and cardiovascular insufficiency.

Monitoring and reporting on the state of health and disease in Croatia began some 250 years ago, i.e., from the mid-18th century. Such a health report, which doctors and physicists were obliged to write, also contained a description of climatic parameters and temperature, along with a description of the disease, often according to monthly characteristics. Health reports of the last 25 years

of the 19th century, as well as later in the 20th century, no longer contained descriptions of climatic parameters.

Table 4. Indications for the use of climatic health remedies

Climate type	Indications
Coastal climate without major daily and annual fluctuations in meteorological principles, with an abundance of solar radiation and swimming in the sea	Tuberculosis and non-specific lung diseases
	Class I heart failure
	Cardiovascular disease with mild symptoms
	Functional diseases of the nervous system
	Metabolic disorders
Humid subtropical climate with balneotherapy	Cardiovascular diseases
	Diseases of the locomotor system
	Endocrine diseases
	Diseases of the nervous system
Humid climate with high temperatures	Lung diseases
Coastal climate with strong winds and rapid temperature changes	Compensated vascular disease
	Functions of the nervous system
	Mild endocrine disorders
Altitude climate (altitudes above 800 m above sea level)	Tuberculosis and nonspecific lung diseases without cardiovascular insufficiency
Desert climate	Chronic nephritis and nephrosis with sufficiently maintained renal function

2.2. Water-based health remedies (balneotherapy and thalassotherapy)

Water is a chemical compound of two hydrogen atoms and one oxygen atom with the chemical formula H_2O. Pure water is odorless and tasteless. Water is essential and necessary for life as we know it. Water is densest at 4 °C, which is called water anomaly. World Water Day is celebrated on March 22 every year. Earth is also called the Blue planet because, looking from space, it appears blue due to the reflection from the ocean.

The human fetus swims in water; man consists of more than 50% water, 60% in adult males and 55% in adult females. People have long inhabited places where they found water for themselves and their livestock during migrations in the very beginnings of the human race. The first great civilizations (Egypt, Mesopotamia, India) developed right along the rivers with large amounts of water that allowed greater numbers of people to inhabit the area.

Water covers about 71% of the Earth's surface, of which 97% is salt water (oceans) and 3% fresh water. Fresh water comprises 68.7% of polar caps and glaciers, 30.1% of groundwater, 0.3% of surface water, and 0.9% of other waters. In terms of surface water, 87% includes lakes, 11% wetlands, and only 2% rivers.

Hydrology is the science of the distribution, movement, and quality of water on Earth, while hydrography studies the distribution of water. Medical hydrology studies the use of water for medical and healing purposes. The use of water for healing is probably as old as humanity itself. One of the reasons for the reduced use of medical hydrology in treatment is the development of effective analgesics (painkillers). True, it should be emphasized that no analgesic is capable of relieving pain, regardless of its potency, and that reports of adverse analgesic reactions that have endangered patients' lives have led to renewed interest in medical hydrology.

While in the Croatian professional literature medical hydrology is divided into thalassotherapy and balneotherapy, in the world professional literature, medical hydrology is used as a single term.

2.2.1. Balneotherapy

Balneotherapy (Latin balneum = bath, Greek θεραπεία = treatment) is the medical application of thermal (balneological) health remedies: mineral waters, peloids, and naphtalan for healing purposes. The very purpose of balneotherapy is the prevention, treatment, recovery, and rehabilitation of certain types of

diseases and conditions and the improvement of health, on the one hand, and the quality of life, on the other. In the table below, we can observe a further classification of thermal (balneological) health remedies by procedures.

Table 5. Classification of thermal health remedies by procedures

Mineral and thermal waters	**Peloids**	**Naphtalan**
Bath	Bath	Bath
Compress		Coating
Bandage	Bandage	Cream
Drink	Drink	Mastic coating
Shower	Spraying	Local occlusion
Hydromassage	Microclyster	Vaginal tampon
Hydrogymnastics	Vaginal tampon	Sollux
Microclyster	Hypodermic injection	Iontophoresis
Vaginal spraying	Intramuscular injection	Ultrasonophoresis
Hypodermic injection	Ophthalmic preparation	
Intramuscular injection	Galvanization	
Galvanization	Electrophoresis	
Iontophoresis	Diathermy	
Ultrasound	Galvanic diathermy	
	Shortwave diathermy	
	Ultrasound	

Balneotherapy primarily uses mineral and thermal waters, peloids, and naphtalan through their various procedures, from which the following forms of treatment have developed:

- hydrotherapy,
- peloidotherapy,
- naphtalan therapy.

These health remedies are used in different ways, the most common of which are:

- bath
- coating,

- bandage,
- shower
- hydromassage
- hydrogymnastics,
- inhalation,
- drinking
- microclysters,
- vaginal spraying,
- subcutaneous injection,
- intramuscular injection,
- iontophoresis,
- ultrasound.

Topical healing agents are applied directly or through a fabric to the whole body or individual parts of the body. Topical healing agents can be used in pharmaceutical, cosmetic, and other similar preparations. There are certain indications as well as contraindications when applying thermal (balneological) health remedies, as shown in Table 6.

Table 6. Indications and contraindications for the use of thermal (balneological) health remedies

Indications	**Contraindications**
Cardiovascular diseases	All diseases in the acute stage
Endocrine and metabolic diseases	Heart aneurysm
Diseases of the locomotor system	Cardiovascular diseases with second- and third-degree blood flow impairment
Urinary tract diseases	Malignant neoplasms
Diseases of the central and peripheral nervous system	Advanced atherosclerosis
Skin diseases	Bleeding
Chronic occupational heavy metal poisoning	Thrombosis and embolism in the acute stage
Chronic inflammatory gynecological diseases	Pulmonary tuberculosis in the acute stage
	Angina pectoris with frequent recurrences

	Infectious diseases Stage II and III hypertension with impaired cerebral blood flow Glaucoma in exacerbation Heart attack and stroke within 3-6 months Some skin diseases (exudative eczema, pemphigus) Hypotonia with severe cerebral crises The second half of pregnancy

Table 7 lists all currently known sites and/or places for the application of thermal agents. Regardless of whether there is a site, it is questionable whether there is organized use in the form of a special hospital or health resort. There are no sites (or places of application) of thermal health remedies in the Primorje-Gorski Kotar County.

Table 7. Sites and/or places of application of thermal health remedies

Number	**Site or application place**	**Purpose and type of health remedy***
1	APATOVAC	nmwic
	Apatovačka kiselica see APATOVAC	
2	BABINA GREDA	ntmw
3	BELEČKA SELNICA	ndw
4	BIZOVAC	Btmwfe
	Bizovačke toplice see BIZOVAC	
5	BLIZANAC (Kruševo near Obrovac)	nmw
6	BOK (near Sisak)	ntmw
7	BOKŠIĆ (near Našica)	ntmw
8	BRUBNO	nmw
9	BUČIĆKA SLATINA	nmwa
10	BUJAVICA	ntmwi
11	CAPRAG	ntmwi
	Cučerje see ZAGREB	

12	DARUVAR	Btw
	Anina kupelj	
	Antunovo vrelo i kupelj	
	Ivanovo vrelo i kupelj	
	Marijina kupelj	
	Siegenthalovo vrelo i kupelj	
13	DRAVKA (near Đurdevac)	ntmw
14	DRENOVEC (near Ludbreg)	na
	Dubrava (near Dubrovnika) see KUKURIJEK	
	Dubrava – Markuševec see ZAGREB	
15	DUDAROVE KUPKE (near Županja)	nmw
16	ĐAKOVAČKA BREZNICA	Btmws
17	ERNESTINOVO	ntmw
18	FUŽINE***	Cnmwfc
19	GLAVICE (near Sinj)	nmw
20	GLAVNICA DONJA	nwas
21	GLOGOVNIČKE TOPLICE (near Križevci)	nhw
22	GORNJA BISTRA (near Zagreb)	nmws
23	GOTAVOLEC	ntw
	Handžova see RADOBOJ	
24	HARINA ZLAKA	ntwr
25	ILIDZE (near Velike, Požega)	ntw
26	ISTARSKE TOPLICE	Btmwsrp
	Hladno vrelo	nmwr
	Toplo vrelo	ntmwr
27	IVANIĆ GRAD	btmwn
28	JAGUNIĆEVE TOPLICE (near Tuheljske Toplice)	ntw
29	JAMNICA	nmwfc
	Ivino vrelo	
	Janino vrelo	nmwfc
	Jamnička kiselica see JAMNICA	
30	JEZERČICA (near Stubice)	ntw
	Kalnička kiselica vidi APATOVAC	
31	KAMENA GORICA (near Mađarevo)	ntw
32	KAMENSKO	nmwc
	Kamenska kiselica see KAMENSKO	

33	KAPELA (near Bjelovara)	ndw
34	KARLOVAC-1	ntmw
35	KARLOVAC-2	ntmw
36	KATALENA (Ludbreg)	ntmw
37	KLASNIĆ (near Glina)	nmw
38	KLOKUN	nmw
39	KOŠČEVEC (near Varaždinske Toplice)	np
40	KRAPINSKE TOPLICE	Btw
	Jakovova kupelj	
41	KREČA VES	ntw
42	KRIŽEVČANKA-1	ntmw
	Kruševo (near Obrovac) see BLIZANAC	
43	KUKUNJEVAC (near Obrovac)	nw
44	KUKURIJEK (Dubrava near Dubrovnik)	nmw
45	KUMROVEC	ntw
46	KUTNJAK (near Koprivnice)	ntmw
47	LASINJA	nmwfc
	Lasinjska kiselica see LASINJA	
48	LEŠĆANKSA (near Duga Resa)	ntmw
49	LEŠCE (near Generalski stol)	ntwr
50	LIPIK	Btmwfic
51	LUNJKOVEC (near Ludbreg)	ntm
52	MADARINCI	ntmw
	Markovići (near Moravče) see GLAVNICA DONJA	
53	MIGALOVCI	ntmw
54	MOKOŠICA	nmwsr
	Naphtalan see IVANIĆ GRAD	
55	NAŠICE	np
56	OBRADOVCI	ntmw
57	OMBLA DUBROVAČKA	nws
58	ORAHOVICA	nwfc
59	OROSAVLJE	nhw
60	PAKLENICA	ntmwi
61	PETRINJA	ntmw
62	POSUSED (near Podsused)	ntmw
	Podsusedske Toplice see SUTINSKO	

63	POPOVIĆ BRDO	nmwc
64	PREČEC	ntmwi
65	RADOBOJ, HANDŽOVA (near Sveti Križ)	nws
66	RATARNICA	ntmw
67	ROGOZNICA	nmwp
68	SAMOBOR-1 (near SAMOBOR)	ntw
69	SAMOBOR S-2 (near SAMOBORA)	ntw
70	SISAČKO JODNO LJEČILIŠTE	ntmwi
71	SLANI POTOK (near STUBICE)	nmw
72	SLANJE (near VARAŽDINSKE TOPLICE)	nhw
73	SLAVETIĆ	nhws
	Slavonsko more see BIZOVAČKE TOPLICE	
	Smrdeće Toplice see TUHELJSKE TOPLICE	
74	SPLITSKE TOPLICE	TBtmws
	Cattanovo vrelo (Spring Cattani)	ntmws
	Franjevačko vrelo (Spring Sveti Frane)	nmws
	Kupališno vrelo	
75	STREKOVAČKO VRELO	nmw
76	STRUGAČA (near Sutinske Toplice)	nhw
77	STUBIČKE TOPLICE	Btwr
	Glavno vrelo	
	Maksimilijaneum	
78	STUPNIK	ntmw
79	SUTINSKE TOPLICE	ntwp
80	SUTINSKO (near Podsused, Zagreb)	ntw
81	SVETA JELENA (near Samobor)	ntw
82	SVETA NEDELJA	ntw
83	SVETA VODA (near Virovitica)	nhw
84	SVETI IVAN ZELINA	ntwr
	Sveti Martin na Muri see VUČKOVEČKE TOPLICE	
	Sveti Stjepan see ISTARSKE TOPLICE	
85	SVETOJANSKE TOPLICE (near Jastrebarsko)	ntw
86	ŠEMNICA (near Sveti Križ Začretje)	ntwr
	Šemničke Toplice see ŠEMNICA	
87	ŠIMUNOVEC (see Stubičke Toplice)	ntmw
	Šmidhenove Toplice see SVETA JELENA	

	Štrigova see VUČKOVEČKE TOPLICE	
88	ŠUMEĆANI	nmw
89	TABORŠTINA	nhw
90	TISKOVAC	nmw
	Toplica see TOPUSKO	
91	TOPLOČICA (near Gornji Stenjevac)	ndws
	TOPLOČICA (near Gotalovac) see GOTALOVEC	
92	TOPLIČICA (near Mađarevo, Kamena Gorica)	ntw
93	TOPLIČICA (near Medvednica)	ntw
	TOPLIČICA (near Orosavlje) see OROSAVLJE	
	TOPLIČICA (near Sveta Jana) see SLAVETIĆ	
94	TOPLIČICA (near Zajezda)	ntw
	TOPLIČICA (near Sveti Ivan Zelina) see SVETI IVAN ZELINA	
95	TOPUSKO	Btwrp
	Vrelo Topličica	ntw
96	TUHELJSKE TOPLICE	Btwsp
	Dadino vrelo	ntw
	Vrelo u bari	ntw
	Valpovačke Toplice see BIZOVAČKE TOPLICE	
97	VARAŽDINSKE TOPLICE	Btmwsp
	Izvor u perivoju	
	Josipova kupelj	
	Konstantinova kupelj	
	Pučka kupelj	
	Velika (near Požega) see ILIDŽE	
98	VELIKA CIGLENA (near Bjelovar)	ntmw
	Južno vrelo	ntw
99	VIDNJEVIĆ (near Gvozd)	np
100	VINKOVCI (train station)	ntmw
101	VRATNO (near Križevci)	ntw
102	VRBNIVA POD VELJUNOM (Kordun)	nmw
103	VRLIKA	nmw
104	VUČKOVE TOPLICE	ntmw
105	VUKOVAR	nmwi
106	ZAGREB	

	Blato	ntm
	Čučerje	ntw
	Dubrava	ntmw
	Mladost	
	Šalata	ntmw
107	ZAKUČAC (near Omiš)	nmw
108	ŽIROVAC (near Topusko)	nmw

* C - climatotherapy, T - thalassotherapy, B - balneotherapy, tw - thermal water, tmw - mineral and thermal water, p - peloid, l - liman, s - sand, n - naphtalan, dw - deep water, hw - healing water, mw - mineral water, a - arsenic water, f - fluorine water, i - iodine, c - carbonated water, s - sulfur, fe - ferrous, r - radioactive

*** Listed, no site

Balneological (balneochemical) analysis is a chemical-physical analysis of water and peloids presented and adapted to balneological needs, which includes the most important chemical and physical properties that characterize water and peloids and can be effective for the human body. Chemical analysis is the foundation of any balneological analysis, which is why the name balneochemical analysis is used. Balneological analysis can be obtained from the chemical analysis of water by recalculation. Sometimes, since the chemical analysis was performed by a laboratory for some other purpose, certain important parameters are omitted.

Balneological analysis must also contain basic but necessary data such as the area and name of the source (health place), name of the individual springs (well, borehole), date and time of collection and place from which the sample was taken, the name of the institution (laboratory), the name of the analyst (one or more), and the analytical number of the protocol (book, record book) under which the analysis is conducted. The sampling date is also the valid date of the analysis regardless of when the analysis was completed.

Balneological analysis of mineral and thermal waters is multifaceted because it provides insight into the chemical composition and physical properties and allows the balneological classification of mineral and thermal water due to the special way of presenting the mineral composition and physical properties. In this case, the balneological analysis includes:

1) organoleptic properties: odor, taste, color, and transparency when taking samples, including when the sample entered the laboratory,

2) physicochemical properties: water temperature, pH value at sampling (electrochemical), electrical conductivity in μS cm^{-1} (at sampling or as early

as possible), redox potential (at sampling) according to the calomer electrode in mV, density and specific gravity, freezing point depression, boiling point elevation, surface tension, etc., radioactivity radon (α rays),

3) chemical analysis: evaporating residue at 105 °C and 180 °C, cations: Li^{+}, Na^{+}, K^{+}, NH_4^{+}, Mg^{++}, Fe^{++}, and Al^{++}, microelements or trace elements: Zn^{++}, Cu^{++}, Hg^{++}, Pb^{++}, Cd^{++}, Ce^{++}, Cr^{++}, Se^{++}, Co^{++}, Ni^{++}, Mo^{++}, V^{++}, Ag^{++}, Hg^{++}, As^{+++}, U^{+++}, and others, anions: F^{-}, Cl^{-}, Br^{-}, J^{-}, NO_2^{-}, NO_3^{-}, HCO_3^{-}, SO_4^{-}, HPO_4^{-}, undissociated substances: H_2SiO_3, H_2TiO_3, HBO_2, organic substances: consumption of $KMnO_4$, organic substances (TOC), phenols, polyclinics,

4) gases: CO_2 carbon dioxide (free and dissolved), N_2 nitrogen, O_2 oxygen, H_2S hydrogen sulfide, NH_4 and its homologues,

5) presentation of performed tests: mineralization (sum of solids) expressed in mg/kg or mg/L, molar concentration expressed in mmol/kg or mol/L, millival concentration (milliequivalent concentration) in mval/k or mal/L, millival % cation and millival % anion, carbonate and sulphate control analysis, through analysis and calculation.

Determining all of the above is a very demanding and expensive undertaking. Such analyses are called detailed analyses and they are rarely performed. In practice, large-scale analyses are more often performed that meet the basic conditions for the preparation of a balneological opinion. Also, in practice, analyses are made that contain an even smaller choice of measurements, such as the basic balneological analysis and orientation analysis. The basic analysis contains the most basic cations and anions and the most basic physical measurements, while the orientation analysis contains the anionic composition in addition to the basic physical measurements, and both serve as control balneological analyses for various purposes, including monitoring research.

Balneological analysis of peloids is also based on physical and chemical analyses and measurements. The presentation of a peloid analysis is more complex in comparison to the water analysis, which is relatively simpler, due to its composition, type, and origin. The fact that the origin of peloids (genesis) is quite different is proved by the different composition, structure, and physical properties of peloids. In addition to the balneological analysis of peloids, the data valid for water analysis must be indicated, such as the name of the institution (laboratory), the date of sampling, air temperature, humidity in relative percentages, and other relevant data on peloid sites. The content of the parameters of balneological analysis in this case includes:

1) organoleptic examination and granulometric analysis of peloids: color, odor, consistency, homogeneity, larger components, and granulometric analysis;

2) physicochemical properties of peloids: density of naturally moist, density of normal consistency and for coating, pH value of a naturally moist peloid, normal consistency and for coating, water capacity or moisture capacity, sedimentation volume, swelling rate, water capacity, determination of normal consistency, specific wet/dry heat, wet/dry heat capacity, thermal conductivity (heat retention);

3) chemical analysis – composition of a natural peloid in % of dry matter: moisture (105 °C), volatile matter (organic matter), ash (acid soluble), sand (acid insoluble), SiO_2, residue, water soluble matter – content of organic substances (quantitative processing of inorganic substances only in the presence of more than 1 g), content of inorganic substances: Cl^-, HCO_3^-, SO_4^-, H_2S and sulfide sulfur content, J content (iodide);

3a) in the case of peat: bitumen (greases, waxes, resins, etc.), soluble carbohydrates, pectins and the like, cellulose and hemicellulose, alkali-soluble humic acids, lignin and humins;

3b) in the case of bituminous peloids: bitumen (greases, waxes, resins, etc.), paints and other alcohol-soluble components, hemicellulose and cellulose, nitrogen content (total);

4) microbiological finding (hygienic analysis): number of colonies, E. coli coliform bacteria, pathogenic fungi.

Experts from the former Institute of Physical Medicine and Rehabilitation (formerly the Balneological-Climatological Institute) and today the Department of Balneoclimatology, the Department of Environmental and Occupational Health of the "Andrija Štampar" School of Public Health at the Faculty of Medicine in Zagreb recommend that the rules of balneological analysis of mineral and thermal waters be followed at the beginning of exploitation, during research (opening a new catchment of a spring or well), after each hydraulic intervention (cleaning or recatchment of a spring), possible earthquakes, major construction projects, and in case of suspicion of a significant change in the composition due to pollution and the like. In addition to the abovementioned, they recommend periodic analysis after a certain period of time, but without an accurate time indication. Regarding balneological analyses of peloids, the same applies, i.e., repeating the analysis after serious interventions in the immediate vicinity of the site or after major floods, negligent wastewater supply, water disposal, or other impurities in the area, construction of larger facilities in the immediate vicinity (on factory grounds and the like, and the construction of ports, marinas, shipyards and the like at sea). One of the negative examples that illustrates the importance of this approach is the location Poljud near Split in the Kaštela Bay had a very high quality peloid, which is unusable due to the previously mentioned harmful effects. The analysis of peloids must be repeated after regeneration, which is a minimum of 10 years.

2.2.1.1. Mineral and thermal waters

Mineral and thermal waters are formed by geological processes in the hinterland. A more detailed classification of mineral and thermal waters can be seen in the following table.

Table 8. Classification of mineral and thermal waters

Biologically active substances	**Dominant ionic composition**	
> from 10mg Fe/L iron	> from 20 mval% Na sodium	
> from 0.7 mg As/L arsenic	> from 20 mval% K potassium	
> from 2 F mg/L fluorine	> from 20 mval% Mg magnesium	
> from 1 J mg/L iodine	> from 20 mval% Ca calcium	
> from 5 Br mg/L bromine	> from 20 mval% HCO_3 hydrogen carbonate	
	> from 20 mval% Cl chloride	
	> from 20 mval% SO_4 sulfate	
Gases	Amount of solutes (mineralization)	
> 1 mg/L S^{--} (H2S) sulfur	<of 1000 mg/L non-mineral	
> 1000 mg/L CO_2 carbon dioxide	> of 1000 mg/L mineral	
Radioactivity	**Temperature**	
> from 80 Bq/L Rn radon	<20 °C cold water	cold water
> from 3.7 Bq/L Ra radium	20 - 34 °C hypothermic water	thermal water
	34 - 38 °C isothermic water	thermal water
	> 38 °C hyperthermic water	thermal water

Source: Čepelak R. Balneološka (balneokemijska) analiza termomineralnih voda i peloida. In: Ivanišević G, ed. *Topličkі ljekoviti činitelji u Hrvatskoj*. Zagreb: Akademija medicinskih znanosti Hrvatske. 2001:28.

There are special indications for the use of mineral and thermal waters for healing purposes, such as the diseases of the musculoskeletal system (inflammatory rheumatic diseases, degenerative diseases of the joints and spine, extraarticular rheumatism), post-traumatic and postoperative rehabilitation of the locomotor system (contractures, muscular atrophy) central and peripheral nervous system (hemiparesis after CVI, peripheral nerve damage), vascular disease, and skin disease. It is also worth mentioning the contraindications,

which include certain diseases in their acute stage, cardiovascular diseases with second- and third-degree impaired blood flow, stage II and III hypertension, hypotension with severe cerebral crises, malignant diseases, and certain infectious diseases.

It should be said that the thermal effects of mineral and thermal water are as follows: analgesia, muscle relaxation, anti-inflammatory effect, increased connective tissue extensibility, stimulating phagocytosis and diffusion, reducing synovial fluid viscosity, while the effects of salt water include changes in skin osmotic behavior, stimulating microcirculation, inhibiting epidermal mitosis, sensitivity to ultraviolet rays, impact on skin metabolism and thermoregulation, muscle relaxation, and modulation of inflammation. The mineral and thermal water itself is suitable for use in the form of baths in bathtubs and pools, as well as for hydromassage and kinesiotherapy.

2.2.1.2. Peloids

Peloid is essentially mud (clay) used for medical purposes. The distribution of peloids in Croatia at the Balneological-Climatological Institute was initiated by Dr. Leo Trauner and later continued by Renata Novak. It should be noted that the classification of peloids is quite difficult because their origin is very different and, therefore, the physicochemical properties of peloids as well. The classification of peloids is shown in Table 9.

Table 9. Classification of peloids

GENETIC CLASSIFICATION		ORIGIN	CHEMICAL COMPOSITION		
			HUMIDITY		DRY COMPONENT
			%	Inorganic %	Organic + evaporable %
soil loose sediments	SOILS	Aerobical break-down in alkaline medium	< 10-20	92->99	< 1-8
	PELOIDS				
underwater loose sediments	spring	Saprofication in alkaline medium	10-50	96->99	<1-4
	marine		40-70	82-98	2-18
	liman		30-75	67-98	2-33
	bitumen		70-90	54-88	12-46
	PEATS	Humification in acidic medium			
	peat soils		70-77	52-67	33-48
	peat		67-92	1-25	75-99

Source: Čepelak R. Balneološka (balneokemijska) analiza termomineralnih voda i peloida. In: Ivanišević G, ed. *Topličkі ljekoviti činitelji u Hrvatskoj*. Zagreb: Akademija medicinskih znanosti Hrvatske. 2001:33.

Until 50 years ago, peloids were applied directly to the body, also as a mud bath, while today they are used exclusively as peloid wraps at a temperature between 40 °C and 50 °C. Indications for the use of peloids are degenerative diseases of the joints and spine, inflammatory diseases of the joints and spine in remission, chronic gynecological diseases, and post-traumatic conditions in the chronic phase.

2.2.1.3. Naphtalan

Naphtalan is a natural petroleum-crude oil, dark brown in color, and with a characteristic odor. It is currently being used in only two places in the world. The first place is a city called Naftalan in Azerbaijan, a country in the South Caucasus with access to the Caspian Sea and the second place is Ivanić Grad, where the Special Hospital for Medical Rehabilitation Naftalan is located. The origin of the name naphtalan is related to the Greek word “naphtha” (“νάφθα”),

which means pertaining to oil, and the Azerbaijani suffix "-alan," which is of the verb "to take" so that the meaning would literally translate as "oil buyer."

Ivanić Grad is located 27 km away from Zagreb, the Croatian capital, on the gentle slopes of the mountain range Moslavačka gora. Nature wanted this city to become known for its extremely rare and powerful natural health remedies. This site marks the second locality of naphtalan, a specific type of healing oil, in the world and the only one in Europe. This is without a doubt a real rarity and something that too few people in Croatia are familiar with. Although the knowledge about the origin of the Pannonian Sea and its disappearance 10,000 years ago has almost disappeared, the discovery of the healing naphtalan in Ivanić Grad is connected with the former existence of the Pannonian Sea.

Naphtalan has been known as a natural health remedy since ancient times because the known past of naphtalan use dates back 600-700 years. Healing rites from terrible diseases were performed at the source of naphtalan. Towards the end of the 19th century, engineer Jaeger from Germany leased the entire naphtalan source in Azerbaijan and, in 1895, organized the first treatment in bathtubs. He even transported naphtalan to Germany, where he began making naphtalan ointments and other preparations. At that time, naphtalan began to enter many pharmacopoeias under different names: *naphthalanum, naphthalanum liquidum*, and the like.

A naphtalan deposit was found in Ivanić Grad in the 1970s. Additional seven years passed in an intensive chemical, biological, and clinical study of the naphtalan site to finally determine that the naphtalan from Ivanić Grad has the same properties as the, until then, unique naphtalan from Azerbaijan. It was also determined that naphtalan from Ivanić Grad has no toxic or carcinogenic effects. After many years of efforts, the Naftalan Health Resort in Ivanić Grad was finally opened in 1989.

Apart from the mechanical and thermal effect, naphtalan also has a pronounced bioactive effect, which is attributed to polycyclic naphthenic hydrocarbons, the most important of which are steranes. Naphtalan has the following effects:

1) anti-inflammatory properties because the active substances of naphtalan pass through the skin; compounds similar to the mediators of the suprarenal gland are formed, which then stimulate its function and impact the synthesis of corticosteroids;

2) desensitizing and antihistamine action as evidenced by various antigen tests;

3) vasodilatory properties attributed to nitric compounds and cyclopentane acids. Collaterals are formed in the skin, subcutaneous tissue, and deeper tissues, blood vessels dilate, and trophic processes are restored, skin trophic and turgor are improved. The vasodilatory effect is also manifested in the rapid flushing of swellings and the resorption of inflammatory infiltrates;

4) effect on protein metabolism in such a way that protein metabolism is optimized, the amount of high molecular weight polypeptides is reduced, and the amount of micromolecular polypeptides is increased;

5) effect on electrolyte metabolism so that electrolytes are normalized, and conduction and ability to activate skeletal muscles are improved;

6) hypocoagulant and antiplatelet effect because the use of naphthalanotherapy prolongs the period of blood clotting and reduces platelet aggregation;

7) effect on the central nervous system by stimulating the parasympathetic nerve and inhibiting the sympathetic nervous system, and it has a sedative effect;

8) local effect because it has a local emollient, reducing agent, and antipruritic effect;

9) effect of naphtalan *in vitro* on keratinocyte proliferation and differentiation.

Regarding the method of application of naphtalan, the Naftalan Special Hospital in Ivanić Grad uses a refined distillate of naphtalan free of resins, tars, and other undesirable substances and with an increased concentration of medicinal ingredients. We need to distinguish between the general and local application of naphtalan.

In general application, the following is used:

1) naphtalan baths in bathtubs applied once a day, so that the patient is immersed up to the shoulder in an oily medium at a temperature of 34-38 °C for 10-14 minutes,

2) coating the whole body with naphtalan is applied in patients in whom naphtalan baths in the bathtub cannot be used due to impaired mobility, as well as due to contraindications for the application of the aforementioned naphtalan bath procedure. In this case, the patient coated with naphtalan is illuminated with a Solux lamp for 15-20 minutes.

In local application, the following is used:

1) partial coating with naphtalan;

2) iontophoresis with naphtalan; here, naphtalan is introduced into the desired area via galvanic current from the cathode;

3) naphtalan sonophoresis; naphtalan is applied as a contact medium between the ultrasound head and the area of the body to which the ultrasound is applied. The application of sonophoresis to the small hand and feet joints feet is performed in a naphtalan bath in which an ultrasonic head is immersed;

4) mastic therapy; the mastic itself is essentially a solid preparation containing 30% naphtalan, paraffin, wax, and camphor in proportions. It is applied in the form of compresses or by immersing parts of the body (hands) in a dissolved medium, and exercises are performed with progressive resistance. With this thermotherapeutic procedure, strong hyperemia, a highly prolonged thermal effect, and a pronounced consensual reaction are achieved. It is important to mention that it has been observed that patients feel a pleasant warmth when applying compresses, less hot than when applying paraffin of the same temperature, which then essentially allows the use of higher mastic temperatures for therapeutic purposes.

At the Naftalan Special Hospital, naphtalan therapy is administered for three weeks. It is also important to mention that the best results are achieved if the procedure is repeated for three years, the first time after 6 to 8 months, the second time after 8 to 10 months and the third time after 12 months. Indications and contraindications are listed in Table 10.

Table 10. Indications and contraindications for naphtalan therapy

Indications	**Contraindications**
Diseases of the musculoskeletal system: - inflammatory rheumatic diseases: rheumatoid arthritis, psoriatic arthritis, ankylosing spondylitis - degenerative diseases of the joints and spine - extraarticular rheumatism Skin diseases: - neurodermatitis, psoriasis, contact dermatitis, scleroderma Post-traumatic and postoperative rehabilitation of the locomotor system: - contractures, burns, frostbite	All diseases in the acute stage Stage II and III hypertension Cardiovascular diseases with second- and third-degree blood flow impairment Severe liver and kidney damage Severe lung disease Malignant diseases

Blood vessel diseases Diseases of the central and peripheral nervous system: - spastic hemiparesis, peripheral nerve damage, neuropathy	

2.2.2. Thalassotherapy

Thalassotherapy (Greek θάλαττα = sea, Greek θεραπεία = treatment) is also called marinotherapy or seawater treatment. Thalassotherapy is the medical application of natural health remedies inherent in the sea and the coast for healing purposes and is part of a comprehensive medical therapy. We all know that the sea is the source of life, and that the sea consists mostly of salt water, and man himself consists of more than 55% water.

Organized by the International Thalassotherapy Association (Fr. *Association internationale de Thalassotherapie*), several international thalassotherapy congresses have been held. The Association itself was founded in France, in 1913.

Table 11. International thalassotherapy congresses

Year	**Place and country**
1914	Cannes (France)
1920	Monaco (Monaco)
1923	Venice (Italy)
1925	Arcachon (France)
1928	Bucharest (Romania)
1931	Berck (France)
1935	San Sebastian (Portugal)
1938	Montpellier – Palavas (France)
1954	Opatija (former Yugoslavia)
1957	Cannes (France)
1960	Estoril – Lisbon (Portugal)
1963	Venice – Lido (Italy)

1966	Westerland – Sylt (Federal Republic of Germany, i.e., West Germany before the unification, author note)
1969	Eforie Nord – Mangalia (Romania)
1972	Dinard – Saint Malo – Granville (France)
1975	Opatija – Poreč (former Yugoslavia)
1979	Varna – Droujba – Golden Sands (Bulgaria)
1981	Las plamas de Gran Canaria (Spain)
1985	Rostockl – Warnemunde (German Democratic Republic, i.e., East Germany before the unification, author note)
1991	Borkum (Germany, post-unification)

The application of natural health remedies has led to the development of different forms of treatment, depending on the applied natural health remedy. Thalassotherapy (marinotherapy) primarily uses natural marine health remedies and procedures, from which the following forms of treatment have developed:

- aerotherapy,
- hydrotherapy,
- algotherapy,
- aromatherapy,
- kinesitherapy,
- heliotherapy,
- psychotherapy,
- peloidotherapy,
- limanotherapy.

In thalassotherapy health remedies, it is common to find some intertwining with climatic natural health remedies. In essence, each type of therapy and treatment has its own indications (reasons) for its professional and medical application. However, there are contraindications for the use of natural health remedies that essentially prevent their use so as not to cause more harm than good. We know that all health professionals should act according to the Latin proverb "Primum non nocere," meaning "first, do no harm." The source of that Latin proverb is unknown. Some of the indications and contraindications for the use of thalassotherapy are listed in the following table.

Table 12. Indications and contraindications for the use of marine health remedies

Indications	Contraindications
Children's diseases	Acute febrile diseases
Nervous system diseases	Acute inflammation of the skin and soft tissues
Diseases of the locomotor system	Skin insensitivity (anesthesia) to heat
Rheumatic diseases	Acute stage of rheumatic diseases
Cardiovascular diseases	Malignant diseases and precancerous lesions
Respiratory diseases	Propensity to bleed
Endocrine and metabolic diseases	Tuberculosis
Diseases of the digestive system	Occlusive arterial disease
Blood diseases	Severe anemia
Kidney and urinary tract diseases	Severe heart disease with decompensation
Skin diseases	Urinary tract infections
Gynecological diseases	Chronic inflammation of the kidneys
Diseases of the ear, nose, and throat	Chronic diseases in a state of aggravation
Eye diseases	Poor general condition
Surgical diseases	AIDS

2.2.3. Balneoreaction (climatoreaction, thalassoreaction, natural healing reaction)

Balneoreaction (climatoreaction, thalassoreaction, natural healing reaction) is the occurrence of various general and local symptoms, such as fatigue, depression, insomnia, loss of appetite, indigestion, runny nose, fever, rash, pain in diseased and/or damaged parts of the body after three to 12 days of applying natural health remedies. These symptoms disappear spontaneously after a few days and do not need to be treated. Balneoreaction (climatoreaction, thalassoreaction, natural healing reaction) is an indicator of the body's reactivity to the application of natural health remedies, as well as a sign of the potency of these health remedies, which is taken into account when dosing them.

2.3. Biogeographical foundation (flora and fauna)

In deciduous forests there are ash, oak, chestnut, linden, hornbeam, maple, birch trees, etc. The shrubs represented in such forests include hazel and hawthorn, and others. In mixed forests, in the lower mountains, along with beech, there are some species of coniferous trees such as spruce and fir. Coniferous forests are found in the higher mountains, whose trees may lose some water. Animals residing here include birds, deer, wolf, squirrel, rabbit, and others, some of which are protected. Holm oak forests, mixed holm oak and Aleppo pine forests, and pure Aleppo pine forests grow in the coastal belt and on the islands. At heights above 350 meters above sea level on the islands and 600 meters along the coast, the Aleppo pine is replaced by the Dalmatian black pine. In the sub-Mediterranean area, the holm oak is replaced by the downy oak, which forms mixed communities with white and black hornbeam. Oak forests have been destroyed by uncontrolled felling, browsing, and fires, so today they are mostly maquis, garrigue, and shrubbery.

The plant kingdom in Croatia consists of 4,500 plant species and subspecies, and almost 50% of them are found in the range of forest forms of vegetation, i.e., forests and maquis, as well as shrubs and garrigues. Out of the total number of forest species, 269 are autochthonous, which makes Croatia one of the richest countries in Europe in terms of tree species. With regards to the type of vegetation, Croatia is divided into two basic horizontal vegetation zones, so we have the Mediterranean region and the Euro-Siberian-North American forest region. The Mediterranean region consists of the stenomediterranean vegetation zone characterized by the Aleppo pine and holm oak evergreen vegetation zone, the eumediterranean holm oak evergreen vegetation zone with myrtle, then the sub-Mediterranean vegetation zone of thermophilic deciduous forests such as mixed downy oak and Oriental hornbeam. The forest is home to many animals, and the more diverse the fauna, the greater the value of the forest.

Due to its great biodiversity and temperate climate, Croatia is potentially an ideal area for treatment and recovery from various diseases.

2.4. Additional elements

There are a number of additional elements that need special emphasis. Below are some important additional elements on which medicinal tourism is based.

2.4.1. Aromatherapy with Mediterranean plants

Aromatherapy uses essential oils in the prevention and preservation of health, care, preservation of psychophysical balance, mitigation of stress, and improvement of the quality of life. The beginnings of aromatherapy can be found in the oldest civilizations. In Egypt, priests used the properties of certain essential oils in embalming. In ancient Greece and ancient Rome, essential oils were often used in baths and for massage, in rituals and ceremonies. With various ups and downs, the use of essential oils lasted until the 19th century when it was suppressed. However, in the 20th century, the use of essential oil was revived. The term aromatherapy was first used in a French book published in 1937, *Aromatherapie: Les Huiles Essentielles, Hormones Végétales* by the chemist Rene-Maurice Gattefosse.

According to their chemical composition, essential oils have very complex structures, which contain more than 500 different compounds. According to the chemical composition, the components of essential oils can be divided into carbohydrates, alcohols, ketones, phenols, esters, ethers, acids, and lactones. As for the healing effect itself, the antifungal and antibacterial effect of essential oils should be mentioned. Direct methods of application are massage, baths, compresses, and inhalations, while indirect methods include the use of aroma lamps, hand sprays, and rinsing of the oral cavity and pharynx. When applying essential oils by massage, essential oils are applied diluted to the skin because they are previously mixed with base oils (almond oil, sesame oil, wheat germ oil, calendula oil).

There is very little verified scientific information on aromatherapy nowadays. Aromatherapy is based on a holistic approach to an individual (sick or healthy person), which means that when being applied to a person, various aspects are taken into account that affect the health and quality of life such as emotions, stress, spiritual aspect, life attitudes, and the like.

In many countries, the work of occupational therapists is regulated in accordance with legal and professional guidelines. If something similar were applied in Croatia, it would encourage the development of medicinal oil cultivation and thus gain an additional dimension in health and health resort tourism.

In Croatia, the profession of aromatherapist has only recently been established, which is entered into the workbook; this means that there is still a lot of work to be done. There are several related similar occupations besides the primary name aromatherapist; there is also aromamasseur/masseuse, aromatherapist specialist, phyto-aromatherapist, and family aromatherapist. There are several courses such as aroma energy therapy, aromatherapy, body detoxification, natural aroma cosmetics, raindrop, phyto-aromatherapy school, and courses in natural cosmetics. These occupations and courses are conducted by the following institutions: AromaVita – School of Aromatherapy (Zagreb), The Public University of Rijeka (Rijeka), Adrianus School (Zagreb), Essentia Vitae (Zagreb), Profokus School (Zagreb), Aroma Academy (Zagreb), and Cedrus Center (Zagreb).

The oldest institution is AromaVita – School of Aromatherapy (Zagreb), which offers training for two professions: aromatherapist and specialist aromatherapist. A specialist aromatherapist undergoes a training program that builds on the basic aromatherapist program. The aromatherapist program is implemented through regular (6 months) and correspondence consultative classes (12 months). The student is trained to apply 40 types of essential oils and 20 types of vegetable oils through massages, baths, inhalations, compresses, and the production of various aromatic-cosmetic preparations and fragrances. The courses cover the following content: anatomy with physiology, applied aromatherapy, holistic aromatherapy, chemistry of essential oils, psychology with communication, aroma cosmetics, aroma-marketing, aromatherapy, and classical massage. After completing the training, the student is trained in the application of essential oils and massage for the purpose of body care, maintaining health, preventing stress, and establishing psychophysical balance. Employment opportunities: own company or craft, beauty salons, fitness centers, wellness and SPA centers, rehabilitation centers, various cosmetic companies, etc. After completing the training for a specialist aromatherapist, each participant has the opportunity for further international training and membership in the International Society for Professional Aromatherapists.

Veli Lošinj and Mali Lošinj, i.e., the Tourist Board of the town of Mali Lošinj, competent for both towns, have taken the greatest steps of all health-tourist places in the use of aromatherapy with Mediterranean plants. It is necessary to mention the fragrant island garden in which visitors can enjoy the fragrances of the island of Lošinj. On 3,500 square meters of space that was leased from the town of Mali Lošinj in 2004, a private investor (Sandra Nikolić) made, according to many, a piece of fragrant paradise on Earth. More than two thousand seedlings, of which seventy indigenous plant species, enhanced by exotic specimens of species that Lošinj sailors have brought to

their native island throughout history, enrich the area with the fragrances of island nature. In addition, there is an autochthonous island house where, in addition to dried herbs and souvenirs, the visitor can also purchase various herbal liqueurs, among which sage and myrtle liqueurs stand out, which were patented by Sandra Nikolić.

The Tourist Board of Mali Lošinj, in cooperation with the Fragrant Island Garden, continues to develop the project "Fragrances and Flavors of Lošinj," which has spread to the entire city, to camps, hotels, travel agencies, restaurants, beauty salons, and other facilities. The fragrant network is spreading in all forms – from flower arrangements, potpourri, liqueurs, juices, cakes, and fragrant decorations to gastronomic offerings in which indigenous island herbs are used in various ways. The connection between smell (aromatherapy) and taste (food) is recognized here, which testifies to a holistic approach. Appropriate herbs are added to each month of the year.

Table 13. Fragrant calendar of the island of Lošinj

Fragrant month	Herbs
January	Lemon, orange, and tangerine
February	Lemon, orange, and tangerine
March	Rosemary, laurel, eucalyptus
April	Asparagus, Lošinj onion, borage
May	Sage, fennel, nettle
June	Weaver's broom, lavender, immortelle, plantago
July	Bougainvillea, mint, maidenstears
August	Oleander, loquat, fig
September	Jujube, grapes, Indian fig, sea fennel
October	Myrtle, strawberry tree, dandelion, pomegranate
November	Olive, wild rose, quince
December	Pine, agave, spruce

Lectures are organized throughout the year to educate guests and citizens. The local population is educated about the use of aromatic herbs in the diet, and tourism professionals in gastronomy. The thematic facilities of the island of Lošinj have been designed in a way to emphasize the brand of the fragrant island, which has existed since 2008.

Table 14. Fragrant facilities on the island of Lošinj

Type of fragrant facility	Name
Hotel	Aurora, Apoksiomen, Televrin, Mare suites, Vila Deis
Autocamp	Baldarin, Bijar, Čikat, Poljana
Travel agency	Adriatrours, Capelli, Lošinjska plovidba, Marina Nerezine, Meditertan, Plama, Terra incognita
Restaurant	Artatore, kamp Čikat, Diana, Eki, Poljana
Taverns	Privlaka, Silvana
Bistro	Sirius
Bar	Bora
Buffet	Porto
Beauty salons	Bella, Katarina

Relations with the fragrant facilities have been contractually defined. The Tourist Board has undertaken to promote each facility in the media through the presentation "Fragrances and Flavors of Lošinj," preparation of joint printed materials – for each topic with a list of all participants, an Internet campaign with selected topics at least three times a year, a coordination of project preparation, and a presentation in promotional materials.

Fragrant hotels must decorate the reception desk and the restaurant with themed flower arrangements, while other spaces can be decorated as desired. Discreet aromatherapy, using scented candles, oils, and the like will refresh the space and create a fragrant ambience in the reception area, bar, and shared restrooms; provide a fragrant welcome to guests so that hotel rooms are appropriately decorated on the theme of fragrance and flavors (arrangements, bouquets, wall paintings, and the like), and a special thematic gastronomic offer should be highlighted in the dining room with emphasis on the name of the project "Fragrances and Flavors of Lošinj." In a hotel that wishes to be a fragrant hotel, flower bouquets should be placed on every. A visit to the "Fragrant Island Garden" should be included as an integral part of the offer of non-board optional facilities that will be offered to all guests as part of the hotel services.

Fragrant hospitality facilities need to highlight the special thematic gastronomic offer in the dining room with the name of the project "Fragrances and Flavors of Lošinj." The gastronomic offer should include at least two to three themed dishes and two to three themed drinks (herbal teas, liqueurs,

homemade biscuits, cakes from indigenous fruits/herbs) for each individual plant species-theme. If this is not possible for a certain theme, then choose another one should be chosen from the annual fragrant calendar and present it.

A fragrant agency must have a fragrant arrangement at the agency's reception in accordance with the promoted current theme, distribute promotional materials and promote (recommend to guests) the partners in the project "Fragrances and Flavors of Lošinj," offer a fragrant gift to guests for each billed invoice (for stays longer than six days), promote and sell the "Fragrant Island Garden" offer (lectures, workshops, visits) and recommend to renters to embrace the project and apply certain segments in their facilities.

Fragrant beauty salons undertake the obligation to have a reception and part of the space arranged in accordance with the promoted theme, to use discrete thematic aromatherapy through scented candles or oils in accordance with the current theme of the project. It should offer its clients a refreshing drink in accordance with the current theme of the project (flavored water or tea), list three to five services that include fragrant components, with at least one service corresponding to the current project theme.

The Croatian coast and islands are part of the Mediterranean area, which in addition to a mild climate is characterized by aromatic plants such as sage, laurel, rosemary, pine, peppermint, and others. All these plants produce essential oils whose aerosol has a particularly positive effect on air quality.

Although the effectiveness of aromatherapy has yet to be proven, essential oils are believed to have therapeutic effects. Croatia should use its geographical and climatic advantages and develop aromatherapy programs. Aromatherapy with Mediterranean plants should be used as an additional element and could be integrated into certain segments of health and health resort tourism throughout the year and not just during the summer months.

2.4.2. Biogeographical ingredients used in the diet

Since each health-tourist place has a characteristic type of food, it is necessary to offer an appropriate domestic type of food inherent to that health-tourist place. The very definition of food is that it is any substance or product processed, partially processed, or unprocessed, and is intended for consumption or can reasonably be expected to be consumed by humans. The term food also includes beverages, chewing gum, and any other substance, including water, that is intentionally incorporated into food during its production, preparation, or processing. The term also includes water that serves the public supply of the population as drinking water, which is used and/or incorporated into food during

its production, preparation, or processing, packaged in the original packaging as table water, sparkling water, and spring water. It is also important to emphasize what the term food does not include, namely, feed, live animals, unless they are prepared for marketing as food, plants before harvest, harvesting, medicines, and medical products defined by special regulations, cosmetics defined by special regulation, tobacco and tobacco products defined by special regulation, narcotics, or psychotropic substances within the meaning of the United Nations Single Convention on Narcotic Drugs, 1961 and the United Nations Convention on Psychotropic Substances, 1971, residues and contaminants.

It is important to mention the concept of the Mediterranean diet, which is considered the healthiest form of diet. The Mediterranean diet is a modern way or recommendation of a diet based on the traditional diet of southern Italy and coastal Greece and Crete, although individuals consider it a lifestyle as well. Although it is called the Mediterranean diet, such a diet is not common for the entire Mediterranean because it is obvious that different countries have different dietary preferences. A recent health study from these parts, i.e., Greece, carried out in 2009, concluded that dominant components such as moderate consumption of ethanol, low consumption of meat and meat products, and high consumption of vegetables, fruits, nuts, olive oil, and legumes serve as a predictor of lower mortality rates. The prospective cohort study involved nearly 24,000 men and women who had not previously been diagnosed with cancer, heart disease, or diabetes and who had a documented health status.

The foundation of the Mediterranean food pyramid consists of foods of plant origin such as vegetables, fruits, cereals, pasta and bread, olive oil, then fish (especially blue), slightly less poultry and eggs, and moderate amounts of red wine (*bevanda*). All these types of foods contain bioactive components that have a proven positive effect on health and especially olive oil, which is one of the most important components of the Mediterranean diet (Figure 1). Due to the foods it includes, the Mediterranean diet is rich in carbohydrates, dietary fiber, and monounsaturated fatty acids, and low in saturated fats. It, therefore, has a beneficial effect on the prevention and treatment of cardiovascular disease, diabetes, obesity, and cancer.

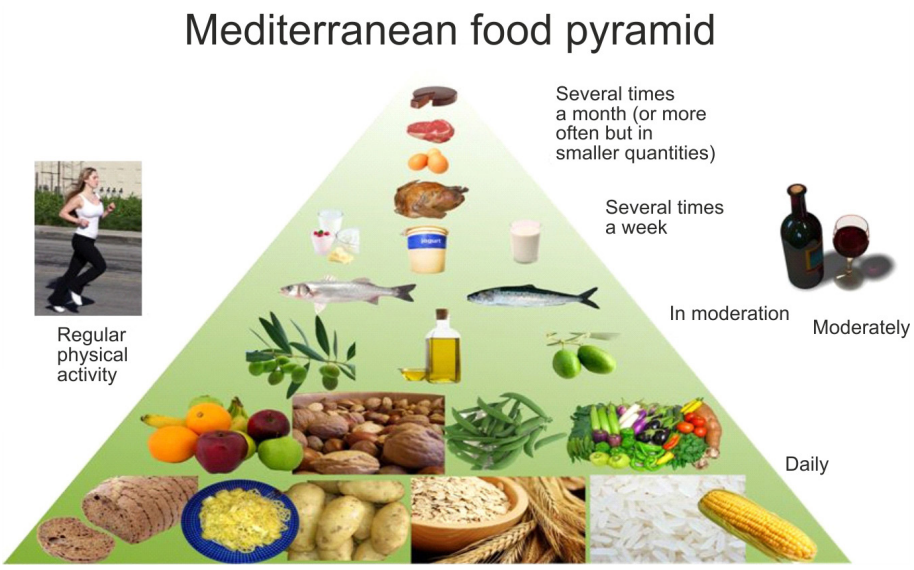

Image 1: Mediterranean food pyramid

Source: Croatian Institute of Public Health, 2010

Diet is one of the health remedies influencing the incidence of cardiovascular disease. Evidence of the importance of nutrition is visible in the differences within Croatia. In areas where the Mediterranean diet predominates, i.e., in the coastal area, there are fewer deaths from cardiovascular disease than in other areas (continental), although the population structure is mostly older. This fact confirms the hypothesis that the Mediterranean diet plays an important role in preventing and/or delaying atherosclerosis. When it comes to cancers typical of developed societies (colon, breast, and prostate cancer), it should be mentioned that these are diet-related cancers. The Mediterranean diet is rich in nutrients that have a protective role, especially olive oil, which stops the promotion of colon cancer, mostly due to the antioxidants and phytosterols it contains. The original Mediterranean diet is rich in fruits and vegetables that contain more fructose (fructose is metabolized more slowly than glucose) and fiber that slows glucose resorption, resulting in maintaining lower blood glucose levels after meals. Because of this, the Mediterranean diet is also suitable as an aid in the treatment of diabetes.

The Mediterranean diet plays a role in the prevention of overweight and obesity. Obesity is a serious disease, and due to its prevalence, it has become a global epidemic. Obesity is caused by the interaction of genetic, metabolic, and external health remedies (mostly physical activity and diet). Prevention of

obesity is of great importance for health, as well as the role of the Mediterranean diet, which, due to its characteristics, can significantly affect the prevention and reduction of obesity. The Mediterranean diet, along with adequate physical activity, contributes to better physical and mental condition, preservation of functional abilities, muscle mass, work of organs and organ systems, and the slowing down of degenerative processes, including cognitive ones, which is extremely important for the elderly population.

People are increasingly reconsidering what and how they eat, and how food can improve their health. That is why tourists are more interested in proper nutrition than ever before. With regards to the Mediterranean diet and health, it is important to mention the meta-analysis from 2008 published in the *British Medical Journal*, one of the most important and prestigious medical and health journals. The meta-analysis included several prospective cohort studies that analyzed the relationship between health, mortality, and the Mediterranean diet. The meta-analysis included 12 studies, in the period from 1996 to 2008, with the studies lasting from 3 to 18 years, and a total of 1,574,299 people were included. It is underscored in the conclusion that the Mediterranean diet is associated with significant improvements in health, such as the reduction in overall mortality by 9%, reduction in mortality from cardiovascular disease by 9%, morbidity and mortality from cancer by 6%, and Parkinson's and Alzheimer's disease by 13%. The results of this meta-analysis as well as other studies are significant in public health because they confirm the positive effect of the Mediterranean diet on the prevention of certain chronic diseases.

It is necessary to mention the individual bioactive components as well as their effects (Table 15).

Table 15. Bioactive components in certain foods of the Mediterranean diet

Food	**Bioactive components**	**Effect**
Olive oil	oleic acid	lowers LDL-cholesterol
Fish	omega 3 fatty acids zinc	reduces the risk of cardiovascular disease and improves mental function and vision function strengthens immunity
Oysters	zinc	strengthens immunity
Garlic	sulfide compounds	lowers LDL-cholesterol, strengthens the immune system

Swiss chard	lutein	preservation of eyesight
Grapes	procyanidins phenolic compounds	antioxidants – can reduce the risk of occurrence of cancer, degenerative and heart diseases
Red wine	flavonoid compounds (resveratrol)	antioxidants - can reduce the risk of occurrence of cancer
Citrus fruit (tangerines, oranges, lemon)	vitamin C carotenoids (lutein, zeaxanthin, cryptoxanthin)	antioxidant - reduces the risk of some cancer sites and cardiovascular disease antioxidants – reduce the risk of cancer, help preserve vision
Fig	magnesium	improves brain, heart, and muscle function
Almond	magnesium calcium	improves brain, heart, and muscle function reduces the risk of osteoporosis
Maraska cherry	anthocyanins and vitamin C	antioxidants – can reduce the risk of occurrence of cancer
Cereals and their processed products	dietary fiber	reduce the risk of cardiovascular disease and colon cancer

Olive oil is one of the main components of the Mediterranean diet, and one recent study in France, involving three cities and nearly 7,000 people, concluded that cognitive deficits in speech and language and visual memory occur much less in those participants who use olive oil moderately and intensively than in those participants who do not use olive oil for cooking and in their diet. From the abovementioned, the effectiveness and positive impact of the Mediterranean diet at senior age is visible not only with regards to cognitive functions, but also lipoprotein levels, mortality from cardiovascular disease, and insulin resistance. Olive oil contains, among other things, active components such as antioxidants, which not only have a positive effect on health but also play an important role in cancer prevention, and some components that lower blood pressure and "bad" (LDL) cholesterol. Also worth mentioning is the antimicrobial activity of certain components that has been proven in intestinal and respiratory diseases. Although most studies and research relate to the consumption of olive oil,

moderate consumption of whole olives can also contribute to a positive health effect. When the Mediterranean diet is mentioned, the "French paradox" inevitably comes to mind, in which a diet rich in saturated animal fats results in surprisingly low morbidity from coronary heart disease. It is believed that the primary cause of this is the high consumption of red wine.

The Mediterranean diet has also been recognized by food companies in Croatia. Company Podravka produces the *Vegeta Mediteran* seasoning containing Mediterranean herbs, which is advertised as "permeated by Mediterranean flavors and aromas, a kind of internal aromatherapy."

The term Mediterranean diet, which some understand as food restriction, although it would be more accurate to consider it as a way of eating, especially in the Croatian language, because not everyone is on a diet and the English word contains multiple meanings, could be used as part of the promotional slogan of the Croatian Tourist Board "Mediterranean as it once was." If a tourist wants the Mediterranean as it once was, then it should certainly include the way of eating or food from the Mediterranean as it once was. The Mediterranean diet could be used as another additional element in health tourism and medicinal tourism. This certainly applies to all coastal climatic health places, and in mountain climatic and spa health-tourist places, in addition to the appropriate local types of food, guests should also be offered Mediterranean food.

2.4.3. Physiological foundation of forests

The definition of a forest is that it is land overgrown with forest trees in the form of a stand on an area of more than 1,000 m^2. Forests use carbon dioxide to produce the oxygen that man needs for life. Forests along the oceans are the main source of oxygen for our planet. We say that forests are the lungs of the world.

Common forest functions are:
- protection of soil from water and wind erosion,
- balancing water relations in the landscape and preventing torrents and high-water waves,
- purification of water by seepage through forest soil and supply of underground streams and springs with drinking water,
- favorable impact on climate and agricultural activity,
- purification of polluted air,
- impact on the landscape beauty,
- creating favorable conditions for human health,
- provision of space for rest and recreation,

- conditioning the development of ecological, hunting, and rural tourism,
- preservation of the gene pool of forest trees and other types of forest biocenosis,
- conservation of biodiversity of the gene pool, species, ecosystems, and landscapes,
- supporting general and special nature protection (national parks, etc.) of the forested landscape,
- mitigating the greenhouse effect by binding carbon and enriching the environment with oxygen,
- general protection and improvement of the human environment by the existence of forest ecosystems as biological capital of great value.

Forests have the ability to conserve water because, through their roots, trees draw water from the soil and release it into the atmosphere in the form of water vapor. This means that trees essentially attract water into the soil, which is the first step in a very complex water cycle that prevents the soil from becoming a desert. Their role in storing and purifying drinking water is irreplaceable. Trees are of great importance in maintaining constant levels of atmospheric carbon. Trees extract large amounts of carbon dioxide, CO_2 from the atmosphere and store it in soil and water, thus preventing its sudden return to the atmosphere.

Forests in the Republic of Croatia cover 44% of the land area of the state territory. Their main feature is naturalness, which means that they are indigenous and composed of several species of forest trees as well as many different shrub species and rich ground vegetation; they are also known for their biodiversity. It has been known since ancient times that walks through the forest have a beneficial effect on human health. This was especially recognized in coniferous forests and in lung patients. It is believed that essential oils obtained from the needles of coniferous tree species were used for healing in the earliest human history, which is also mentioned in the Indian records of the Vedas in 1,500 BC. Today, it is believed that there are positive proven effects of coniferous forests on the general recovery of patients with chronic lung disease. Of all coniferous tree species, pine has the strongest healing effect. Pine essential oil is almost colorless and has a refreshing scent, obtained by water distillation from fresh, young shoots. Among the most important ingredients are monocyclic monoterpenes such as β-phellandrene and limonene, followed by bicyclic monoterpenes such as α-pinene, carene, and camphor. It should be mentioned that pine needles are rich in vitamin C. The use of pine essential oil is widespread in aromatherapy and it also has an effect as an antirheumatic, while, in inhalation, it reduces the secretion of bronchial glands and has an antiseptic effect.

Of all the health-tourist places, it is necessary to mention Mali Lošinj and Veli Lošinj. The Čikat forest park is located on Mali Lošinj and the Podjavori forest park is on Veli Lošinj. Together, the Čikat and Podjavori forest parks cover an area of 146.67 ha.

With the rise of air pollution due to increasing industrialization in the twentieth century, the importance of forests in mitigating changes in the environment is increasingly recognized. Today, an increasing number of people spend their free time in the woods, whether through walks, mushroom picking, recreational running, cycling, or hiking. The health and public benefit function of forests far exceeds the value of forests as wood stocks.

3. BALNEOLOGICAL-CLIMATOLOGICAL DEPARTMENT (INSTITUTE)

Recently, as a particularly significant event in the field of our balneology, we marked the 60th anniversary of the founding of the Balneological-Climatological Institute and its 60 years of continuous work, regardless of the changes in its name and home institutions in which it was located. The period of 60 years does not represent much in relation to the entire human civilization, but when we observe what the last two or three centuries have meant for the human race, we come to realize that these 60 years of activity are not so negligible.

Due to their specificity, mineral and thermal waters represent the value and wealth of every country in the world, including Croatia. These waters can be used in many ways, and each type of exploitation is a benefit, regardless of whether they are used as a medicine, refreshing drink, or a source of thermal energy; they can also play a strategic role during times of war.

In other words, health care, health tourism, medicinal tourism, economy, and national defense have a common ground in the exploitation of mineral and thermal waters. The use of mineral and thermal waters in our area dates to Illyrian times, and even to the time of the Roman Empire, when some of our spas were highly regulated. In later periods, spas played a significant role in folk medicine because, in hot water, people sought a cure for their problems and diseases, although often such treatment was based more on empirical than scientific basis. At the beginning of the 18th century, the first researchers of water chemistry appeared in Croatia, whose goal was to discover and scientifically confirm the healing effect of mineral and thermal waters. In 1709, when Johan Leopold Payer performed the first qualitative analysis of the waters of Varaždinske Toplice, he began the professional and scientific research of Croatian mineral and thermal waters. Initially, his work in the field of balneology and balneochemical analytics was individual, disorganized, and unsystematic, initially dominated by many prominent foreign and later domestic names. It was realized many years later that, in Croatia, it was necessary to organize a body that would deal with balneology and conduct a balneological service, as some developed European countries have done.

Much time needed to pass, and a lot of effort and work had to be invested and spent for the Balneological-Climatological Institute to be finally founded in

Croatia in 1949 after several attempts following the example of other countries. Its main *task* was to conduct balneological service testing of healing waters, peloids, climate, and other natural health remedies, and providing expert instructions and opinions on all possibilities of using this natural potential. Although the name of the then Balneological-Climatological Institute changed during the period of 60 years, including the management and funding behind it, the tasks and their fulfillment have remained unchanged to this day. Today, the Institute of Physical Medicine and Rehabilitation, as a successor to the Balneological-Climatological Institute, despite 60 years of work and responsible role and significant results achieved, which in every respect justify the existence of such an institution, no longer operates independently. The balneological service is performed in the Department of Balneoclimatology (Damir Andabaka, B.S. Eng) at the Department of Environmental and Occupational Health of the "Andrija Štampar" School of Public Health, Faculty of Medicine, University of Zagreb, Department of Health Ecology and Occupational Medicine.

Regarding the attempt to establish a balneological institute, the following should be mentioned. The first attempt was made by Matija Šporer, when, in 1871, he presented a program of the balneological institute in Rijeka and when, in 1876, he tried to establish a balneological institute in Opatija. The authorities at the time, however, were not interested in it, and his endeavors fell through. Many years later, the greatest advocate for the establishment of such an institute was Prof. Dr. Radoslav Lopašić, who, in 1937 or 1938, founded the Balneological Institute within the Neuropsychiatric Clinic as a result of the great desire that we have one such institute to conduct balneotherapy. Although the Institute never achieved official status, it held courses in physical therapy and balneology for physicians for the purpose of specialization. Furthermore, a series of balneological lectures was launched as the beginning of joint sessions of experts in the field of balneology. At the first lecture, "The importance of balneotherapy in modern medicine," which he held in the Electro-radio section of the Croatian Medical Association, in April 1938, he emphasized, among other things, the need to establish a balneotherapy service. The term is mentioned here for the first time, which was later gradually transformed into the balneological service due to a more appropriate and more comprehensive meaning. So, even then, an initiative was launched (at least only on paper) for the establishment or existence of such a service, as it had already existed in the then developed European countries, especially Germany.

That same year, somewhat later, in a response to an inquiry from the Ministry of Social Policy of Public Health, no. 24885 of 26 August 1938, signed by Prof. Dr. R. Lopašić, Dr. I. Botteri, and Dr. I. Ivančević on 25 February 1939, it is stated that the Council of the Faculty of Medicine submitted remarks on

the "Conditions for acquiring the right to a specialization in balneology and climatology." It is further stated that the Chair of Balneology with Climatology was planned at the Faculty of Medicine, as a mandatory course, and physical therapy as a secondary and elective course. This was followed by a list of lectures for specialization in balneology. The same document states that balneology is taught also at the Institute of Pharmacology in the form of lectures and exercises with students and scientific research work in the field of balneology.

Somewhat later, in the newly formed Banovina of Croatia, the Permanent Balneological Council of the Banovina of Croatia was established by the decree of the Ban authorities, the Department of Public Health, no. 59897-X-1940. The Council, which operated within the Ministry of Health, began with actual organized work, but not much time was left for more serious results. The Second World War broke out and the Kingdom of Yugoslavia disintegrated, and the Independent State of Croatia was created in these areas. Within the Ministry of Health, the Department for Baths and Ore Springs was established, which included natural mineral and thermal springs, peloids, and health resorts. From the Institute archives, it is observable that individuals, associations, and institutions contacted the Department of Baths and Ore Springs of the Ministry of Health regarding various issues related to the use of thermal springs. The main expert in this field, Dr. Stanko Miholić, was the Head of the Department of Mining and Metallurgy of the Ministry of Forestry and Mining. Therefore, the Ministry of Health has often addressed the Department of Mining and Metallurgy regarding the resolution of these issues. At the same time, Dr. Jozo Budak led the Ordinariate for Balneoclimatology at the Faculty of Medicine in Zagreb. In the newly formed FPR Yugoslavia, i.e., the People's Republic of Croatia, all private health resorts and baths until then were nationalized. The new position of health resorts and baths automatically removed the need to establish bodies that would have everything under control and manage them according to a single plan. Mineral water springs and all health resorts in the territory of the Republic (Federal State of Croatia in 1945) came under the administration of the Ministry of Public Health, i.e., the Department of Baths and Healing Springs. A few years later, the Ministry of Public Health of the People's Republic of Croatia established the Administration of Baths and Climate Health Resorts, Mineral and Hot Springs of the People's Republic of Croatia with its headquarters in Demetrova 18 (3). From the very beginning, the Administration for Natural Health Resorts, Mineral and Hot Springs has been working on collecting all data on mineral and thermal springs and has performed tasks and duties almost identical to the tasks within the competence of balneological institutions. In this way, the Administration became the embryo

of the future Balneological Institute. At the same time, work was being done on the establishment of the Balneological Institute. The initiator of the idea was Dr. Vladimir Franković with the wholehearted support of the Minister of Public Health, Dr. Aleksandar Koharević. As a first step in this direction, it was expected that Dr. Marko Ciglar, as an expert in this field, would be the Head of the future Balneological Institute. Therefore, the Ministry of Public Health of the People's Republic of Croatia, from the Committee for Public Health of the Government of the Federal People's Republic of Yugoslavia in Belgrade, by letter 9433/1948RA. from 15 September 1948, requested that Dr. Marko Ciglar, who was on duty in Sarajevo, be assigned to serve in the People's Republic of Croatia, i.e., in the Directorate of Natural Health Resorts. The Ministry of Public Health of the People's Republic of Croatia did not provide a response; therefore, another letter was sent, no. 12708/1948 of 30 December 1948, from the Committee for the Protection of Public Health, requesting that Dr. Marko Ciglar be assigned to work in the Ministry of Health of the People's Republic of Croatia for the purpose of running the future Balneological Institute. No information is available whether a response arrived or not. Dr. Ciglar remained in Sarajevo.

3.1. Establishment of the Balneological-Climatological Institute

When it became clear that Dr. Ciglar would not arrive, it was decided to take a different approach. After preparations that lasted more than a year, by a temporary decision of the Ministry of Public Health of the People's Republic of Croatia, no. 1140-Org-1949 of 28 August 1949, the Balneological-Climatological Institute of the Administration of Natural Health Resorts of the Ministry of Public Health of the People's Republic of Croatia was established, with its headquarters in Demetrova 18 (3, 4). In fact, this move skillfully used the already existing part of the Administration of Baths and Climate Health Resorts, from which the Directorate of Natural Health Resorts of the Ministry of Public Health separated. From that date, professional and organized testing of mineral and thermal springs and other natural health remedies in Croatia would be conducted in one place. Dr. Vladimir Franković was appointed as the Interim Director of the Balneological Institute. In order to ensure the professional level of the newly established Institute, an expert Council was formed consisting of Dr. Jozo Budak, Head of Physical Therapy, Dr. Drago Cop, Head of Rheumatology, Dr. Vladimir Franković, Interim Director of the Balneological Institute, Dr. Danijel Lipnjak, Director of the Spa Varaždinske Toplice, and Dr. Josip Šnajder, Director of the Spa Krapinske Toplice.

The newly established Institute was located in the building at Demetrova 18, where it still has its headquarters, then Villa Lakatoš (now Villa Ambasador, an extension of the Hotel Ambasador) in Opatija, which houses the Climate Health Resort with two more plots in Opatija.

The building at Demetrova 18 was registered as the Balneological-Climatological Institute on October 11, 1950, as the governing body of public property. The inventory of the Institute, including laboratory equipment, was collected in part from the Ministry of Public Health, and by donations from several bathing places, primarily spas Daruvarske Toplice and Varaždinske Toplice. The Government of the People's Republic of Croatia enacted the Decree on the Balneological-Climatological Institute of the Ministry of Health of the People's Republic of Croatia, no. 2567 of 3 April 1951, which legitimized the work of this institution, including certain tasks whose basic meaning (except for some items that were valid at the time) are still relevant and fully applicable today. With this Decree, the Balneological Institute was given a much more important role that enables the full implementation of the balneological service.

The Balneological-Climatological Institute had several departments, i.e., units:

- Department of Balneology with a balneological laboratory;
- Center for Thermal and climatic health resorts, in which the commissions operated
- Counseling for bathing treatment and clinic;
- Climatic health resort in Opatija located in Villa Lakatoš, today Villa Ambasador;
- Institute Management with accounting.

Although organizationally planned, only the climatology department was missing, as no climatologist could be found. The first years of work of the Balneological-Climatological Institute were very successful. In addition to professional work in the field of balneology, the Balneological-Climatological Institute was the official body of the Ministry of Public Health, through which natural health resorts were supervised, their work coordinated, and patients were referred to bathing and climatic treatment through the Commission and the outpatient clinic. The Balneological Institute also organized various lectures, courses, and seminars in order to raise the level of employee knowledge in health resorts to the highest possible level. Thus, in addition to lectures related to professional development in the field of balneology and physical medicine, diet courses were organized for cooks, courses for bath attendants, and more.

In 1952, the "Yearbook of the Balneological-Climatological Institute" was published. Unfortunately, only that first year. This 162-page book, edited

by Dr. Branko Haramustek, Dr. Stanko Miholić, and Dr. Leo Trauner, is the foundation and starting point for all those who start working in the field of balneology, regardless of the fact that, from then until today, relatively much has been done in the field of balneology.

3.2. Employees of the Balneological-Climatological Institute

The Balneological-Climatological Institute (Image 1) counted 18 employees; a smaller part of whom were employed part-time. Interim director Dr. Vladimir Franković was the head of the Balneological-Climatological Institute until April 1951, after which he was promoted to the director of the Institute. He remained in that position for a short time because he passed away that same year after a serious illness (October 22, 1951). Ružica Richtman, B.S. Eng, was appointed as interim director of the Institute and remained in office until February 12, 1953. The head of the department of Balneology and the research associate of the Institute was Prof. Dr. Stanko Miholić, a great chemist and a notable expert in recent Croatian balneological history. He carried out many balneological analyses of mineral and thermal waters and a small number of analyses of peloids, looking for the causes of their healing effects. He wrote many scientific and professional papers and was the first to determine the age of some eruptive rocks in Croatia, including the wider Balkan region. Dr. Leo Trauner, a specialist in balneology, who studied the biotropic health remedies of natural thermal springs, peloids, climate, and their effects on healthy and diseased organisms, was an external associate and part-time employee of the Institute. He wrote a number of expert articles and discussions on this field and given new interpretations of the balneo-reaction in the effects of mineral and thermal waters on the human body. He reorganized his work in Stubičke Toplice and Topusko and worked in the Center Commission. Assistant Prof. Dr. Ferdo Licul came from the Faculty of Medicine, worked at the Balneological Institute for a short time and was transferred to the Vinogradska Hospital. Dr. Ines Wesley, a part-time doctor, performed tests with mineral waters on laboratory animals. Among the staff with secondary education at the Institute were:

- in the Center for Thermal and Climatic Health Resorts, sector Counseling: nurse Huberta Flerin, medical technician Ana Širec, commercialist Franjo Medvedić, typist Rokica Vujnović, junior statistician Neda Mayer, part-time office clerk Antun Mayer.

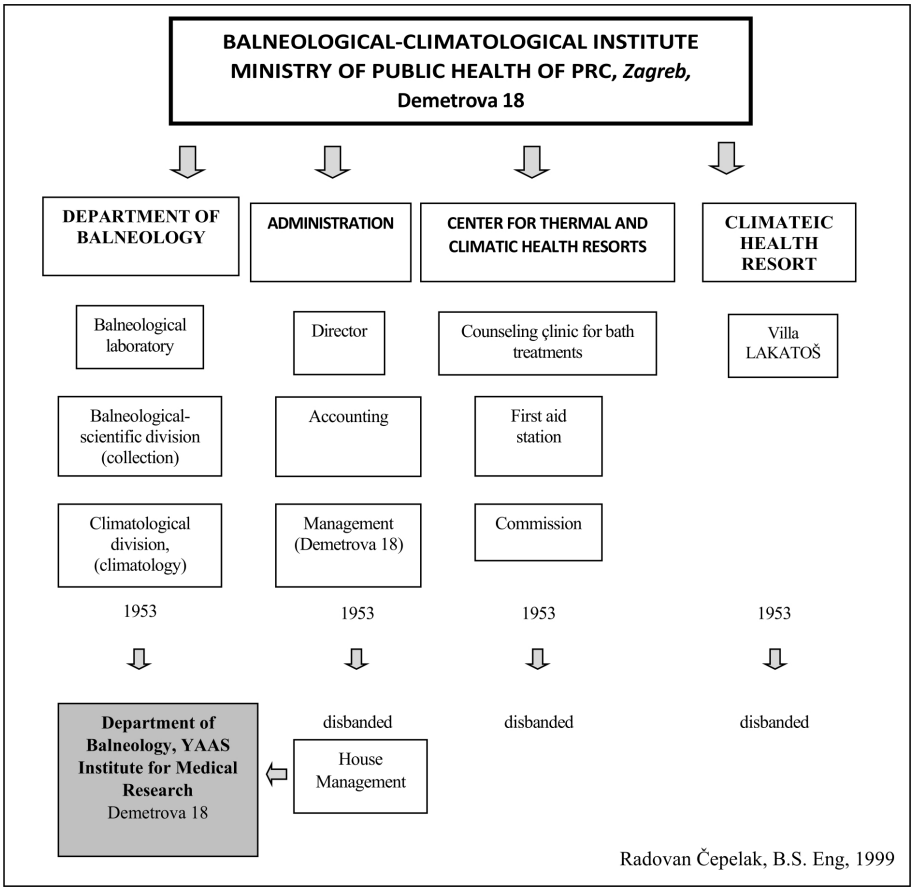

Image 2. Organizational structure of the Balneological-Climatological Institute in the period between 1951 and 1953

The Institute management included: accountant Josip Sabljar in Accounting, junior accountant Đuro Domazet in Accounting and facility manager, office clerk Mira Strohal, assistant office clerk-typist Marija Sutić, and IT expert Petar Jurković in Accounting. In administrative matters: part-time office clerk Pečinko Barica, clerk Vilma Vinković, typist Marija Šutić, and courier Marija Gajski. Balneological laboratory: pharmaceutical assistant Zdravka Roth working on the analysis of mineral and thermal waters and medical technician-trainee Dobrivoj Radunović working in the laboratory for a short time. Support staff: technician and courier Martin Grahovac and cleaners Anka Knežević and Katica Grahovac.

Unfortunately, such a solidly arranged Balneological-Climatological Institute did not last long. It shared the fate of the Ministry of Public Health, which was reformed into the Council for Public Health and Social Policy and significantly reduced in organization. In this way, the Balneological-Climatological Institute also became redundant in an entire array of Ministry remnants. Following previously determined consensual decisions, by the Decision of the Council for Public Health and Social Policy, no. 2615-TV-2-1953 of 15 January 1953, and by the Decision of the Administration of the Yugoslav Academy of Arts and Sciences, no. 371/53 of 22 January 1953, on January 27, 1953, the Balneological-Climatological Institute came under the jurisdiction of the Yugoslav Academy of Arts and Sciences, with all its property, laboratory, business premises, with five systematized employment positions, while remaining the branch of management of the Demetrova 18 building.

The minutes of the takeover were signed by the Balneological-Climatological Institute, interim director Ružica Richtman and Petar Jurković, Institute official, and on behalf of YAAS, by the academician Fran Kogoj, secretary of the Department of Medical Sciences and Dr. Ivan Ilić, secretary of the Management Board of the Academy. Part of the Balneological-Climatological Institute was disbanded. Some parts, such as the Center for Climate and Bath Therapies, together with the archives of the Center, were transferred to the Republic Institute for Social Insurance. The archives related to the work of the health resort, the archives of the former Administration of Baths and Climate Health Resorts, and the archives of the Climate Health Resort in Opatija, were handed over to the Council for Public Health and Social Policy.

The archive related to statistical data was handed over to the Statistical Department of the Council for Public Health and Social Policy of the People's Republic of Croatia. Based on this decision, the inventory of the Counseling Clinic was transferred to the health resorts. In practice, only part of the inventory was returned to the treatment centers at their request. The Balneological Institute was left with a balneological laboratory, a professional library, and a balneological archive, all offices, and management! The Balneological-Climatological Institute became part of the Institute for Medical Research, and according to the Statute of YAAS, it was named the Department of Balneology and Climatology of the YAAS Institute for Medical Research. The headquarters remained in its own building, Demetrova 18 in Zagreb, in the same premises.

Prof. Dr. Stanko Miholić, research associate, was appointed head of the Department. Other experts included: an external associate of the Institute, Prof. Dr. Vale Vouk, a biologist and a renowned expert in the biology of mineral and thermal waters. He worked a lot on the study of the flora of mineral and thermal

springs and, based on that, he developed a special biological classification of mineral and thermal springs. Using the fervor effect, he tried to explain the healing effect of mineral and thermal waters. Dr. Zora Klas, research associate (employed for two years, 1956 and 1957), also worked on the fervor effect, as well as on the interpretation of the phenomenon of slimy water in the saltworks on the island of Pag. Katarina Mirnik, Chem. Eng., expert associate, worked on the analysis of mineral waters and peloids. For a short time, she was the interim head of the Department of Balneoclimatology. The only doctor among them was Dr. Leo Trauner, a specialist in balneology, who continued to work part-time.

Dr. Bogdan Stanišić, Assistant Prof. in Sarajevo, worked at the Balneology Department for three months, in order to improve his analysis. The following staff with secondary education worked at the Institute: pharmaceutical assistant Zdravko Roth on the analysis of mineral and thermal waters. Administrative affairs and management were carried out by the office clerk Đuro Domazet. Support staff: Katica Grahovec, cleaner. It was believed that the Academy, as a polyvalent scientific and educational institution, would have favorable conditions for the further work of balneology and balneological services. However, after a successful start, in which more than 14 professional and scientific papers were published, several balneochemical analyses and expert opinions were made, biological research of some of our mineral and thermal waters and biological research of slimy water in the Pag saltworks was performed, among other activities, its work came to a halt.

The causes of this stalemate most likely lie in personal relations (disagreements) between the head of the Department, Dr. Stanko Miholić, and the YAAS Management Board, i.e., the director of the Institute for Medical Research, Prof. Dr. Branko Kesić. The result was the early retirement (with political undertones) of Dr. Stanko Miholić on July 31, 1957. It went so far that Dr. Miholić was denied access to the premises of the Department of Balneology, including the laboratory. Therefore, for some time, Dr. Miholić performed balneochemical analyses of mineral and thermal waters in the laboratory of the Mineralogical and Petrographic Institute of the Faculty of Science in Demetrova 1.

The Department of Balneology was thus left without an excellent expert in the field of balneology and balneological analytics, which would soon have a negative impact on the professional work of the Department. Katarina Mirnik, Eng., an associate of Prof. Miholić, was appointed as the interim head of the Department of Balneology and Climatology. Dr. Zora Klas, who studied water biology, temporarily relocated abroad. Noticing the great crisis in the further work of the Balneological Institute and the Balneological Service,

a way out of such an unfavorable position was sought. At the beginning of 1957, the Croatian Association of Natural Health Resorts, supported by the Croatian Medical Association, proposed that the Balneological-Climatological Institute be separated from the Yugoslav Academy of Arts and Sciences and become independent. In this regard, the Association sought the opinion of the Executive Council of Parliament of the People's Republic of Croatia on the need for the existence of the Balneological Institute. The Commission of the Council for the Organization of Health Services considered the question of the Balneological-Climatological Institute at its session on 21 May 1957 and adopted the following conclusion to the Council:

1. The Balneological-Climatological Institute shall take over the Association of Natural Health Resorts of Croatia, with the consent of the Council, as an institution with independent funding;
2. An expert commission of the Council shall be appointed, which will professionally and methodologically manage the work of the Institute.

The Academy (YAAS) responded to a request from the Council that it was ready to resign from the Balneological-Climatological Institute. At that time, the Faculty of Medicine in Zagreb was also interested in rescuing the Balneological-Climatological Institute. The Faculty Board was appointed to take over the Balneological-Climatological Institute within its institution. The Board held three sessions, at which all issues related to the organization and manner of work and the role of the Balneological Institute, i.e., the future Institute of Balneology, were discussed in detail.

Representatives of the Public Health Council of the People's Republic of Croatia and the Balneological-Climatological Section of the Medical Association of the People's Republic of Croatia were also invited to one of these sessions. At the final session, on December 9, 1957, the signed Prof. Dr. M. Schwarzwald and Dr. T. Pinter and assistant Dr. V. Mandić, on behalf of the Committee, stated that the establishment of the Department of Balneo-Climatology and Physical Therapy represented a benefit for the Faculty of Medicine, because an Institute envisioned by the Statute was established, which had not existed thus far within the Faculty of Medicine. Among other things, it was envisaged that the Institute has three departments: a) medical, b) chemical-physical, and c) physical therapy.

3.3. Activities of the Balneological-Climatological Institute within the Faculty of Medicine in Zagreb

After mutual decisions between YAAS and the Faculty of Medicine of the University of Zagreb, on March 6, 1958, the Balneological-Climatological Institute was handed over to the Faculty of Medicine as an independent institute, with all its inventory, laboratory equipment, systematized workplaces, and staff. The Handover Record states, among other things: The mentioned building in Demetrova 18 is taken over, yet the governing body remains registered in the land register as at the time when it was taken over by the Yugoslav Academy of Arts and Sciences, i.e., the governing body is the Balneological-Climatological Institute. The Handover Record was signed by: Prof. Dr. Branko Kesić, director of the Institute for Medical Research and Dr. Karlo Schulz, expert associate of the Institute for Medical Research, on behalf of YAAS, and Prof. Dr. Frane Mihaljević, dean of the Faculty, Dr. Remigij Bubanj, director of the Faculty of Medicine, Ivan Kunšt, auditor, and Radoslav Maršalek, Eng., clerk, on behalf of the Faculty of Medicine. According to the agreement, four systematized jobs were taken over. A month later, the Academy was asked to correct the minutes for three work positions, but the academician Branko Kesić refused to sign it.

The Balneological-Climatological Institute became part of a new institution for the second time. According to the Statute of the Faculty of Medicine, it is called the Department of Balneology and Physical Therapy. The seat of the Institute remained in its own building, Demetrova 18, and in the same premises. Prof. Dr. Radoslav Lopašić, Head of the Neuropsychiatric Clinic of the Faculty of Medicine and Dr. Tomislav Pinter, Head of the Department of Chemistry of the Faculty of Medicine were appointed as interim heads of the Department. For a brief period, Katarina Mirnik served as the head of the Balneological Laboratory and property manager, and then, on 26 May 1958, she handed over this function to Vinki Karas, mr. ph., scientific assistant of the Department of Chemistry of the Faculty of Medicine, until the head of the Laboratory was appointed, who would constantly and professionally lead the balneological part of the work. Only Đuro Domazet, administrator and facility manager, and Katica Grahovec, housekeeper, were constantly in the premises of the Institute, while Zdravka Roth, technician, left her post on February 1, 1958.

On December 9, 1958, the duty of the head of the Balneological Laboratory and Institute Property was taken over by Renata Novak, Mr. ph. At the beginning of the following year, the work of the Institute, laboratories, and the balneological service in Croatia would be revived. Renata Novak, alone, without an assistant technician, initially without much experience, began to

perform analyses of mineral and thermal waters and peloids, and to prepare the first expert opinions on the test results.

Later, Dr. Stanko Miholić and Dr. Leo Trauner occasionally came to the Institute and gave her advice and suggestions for further work. In 1960, Assistant Prof. Oskar Plevko, Ph.D., became the head of the Institute. That same academic year, 1960/1961, the Department of Physical Medicine and Rehabilitation was established at the Faculty of Medicine, which became part of the Department of Balneology and Physical Therapy.

According to the Statute of the Faculty of Medicine (letter no. 31/1-1963 of March 16, 1963), the former Balneological-Climatological Institute was renamed into the Institute of Physical Medicine and Rehabilitation. Renata Novak had been performing balneochemical analyses for almost four and a half years when, in the fall of November 13, 1963, Radovan Čepelak, a geology student, was hired at the Institute as a technician at the Balneological Laboratory at the suggestion and personal persuasion of the head of the Institute, Dr. Plevko. Dr. Plevko believed that geologists' knowledge would be useful in the field of balneological activities, and especially in the field related to the geochemistry of mineral and thermal waters. That same year, Dr. Plevko was awarded the academic rank of Prof. As a talented, ambitious, and hard-working man with managerial skills and a solid team, he improved the work of the Institute and, thus, the balneological service. However, Prof. Dr. Oskar Plevko's sudden death (1965) was a significant blow to the work of the balneological service and to the prosperity of the Institute.

Prof. Dr. Sergije Dogan became the next head of the Institute, and he remained in that position until July 20, 1966. After that, Assistant Prof. Dr. Theodor Diirrigl became the new interim director, who remained in that role until September 27, 1966. Assistant Prof. Dr. Veljko Mandić became the next interim director. In the following year, he was appointed head of the Department and, in 1969, he was awarded the academic rank of Prof. He would remain the head of the Institute for 22 years, until his retirement. In 1982, Renata Novak, head of the Balneological Laboratory and Property and senior expert associate of the Institute, retired.

With the approval of the head of the Institute, Prof. V. Mandić, the position of the head and property of the Institute was then taken over by Radovan Čepelak, as well as all other tasks at the Institute: library, fund of professional documentation and archives, balneological collection, and supervision of the building Demetrova 18. This was maintained until 2008, when R. Čepelak retired.

Prof. Dr. Veljko Mandić retired on September 30, 1988, but he continued to come to work regularly, and, as before, he participated in the preparation of balneological opinions and other professional work, until his death on July 27, 1992. By the decision of the Council of the Faculty of Medicine, the Department of Physical Medicine and Rehabilitation was disbanded in 1987 and should have formally stopped with its work; however, thanks to the persistence of its employees, this did not happen; the Institute was later formally integrated into the Department of Rheumatic Diseases and Rehabilitation. After the retirement of Prof. Mandić, the position of the head of the Department was taken over by Prof. Dr. Theodor Durrigl until 1 January 1993, followed by Prof. Dr. Zlatko Domljan until 31 December 1997 and Prof. Dr. Božidar Ćurković.

When analyzing the overall period of organized balneological service in Croatia from 1949 to 1999, it is noticeable that the most fruitful period of the Balneological-Climatological Institute, as the Department of Physical Medicine and Rehabilitation, was as part of the Faculty of Medicine despite all adversity which had accompanied it and the recent crisis. In that period, 254 balneological examinations (studies, studies, and other professional papers) were prepared, which are based on 384 balneological analyses (317 analyses of mineral and thermal waters and 67 analyses of peloids) made in their own laboratory. These professional activities, in addition to the professional and scientific approach to certain sources and sites, with relevant suggestions for further development, contributed to the material gain for the Institute, which is not a negligible fact given the Institute's capacities. It should be noted that the Institute, as part of the Faculty of Medicine, was much better known and appreciated outside of Zagreb and Croatia than within its home institution. Since the Department of Physical Medicine and Rehabilitation has been an integral part of the Institute since the beginning of the Institute's activities within the Faculty of Medicine, 19 generations of medical students and about 210 specialists have passed through the Institute. In addition, a large number of courses related to physical medicine, balneology, and others related to the field were held. In the professional and scientific field, as much work was done as possible and as much as the extremely modest material resources, equipment, and available time of the employees allowed. In addition to regular work, work of public benefit was performed. Thus, many citizens were provided with expert advice and answers to their questions, medical and other faculty students, high school students were helped to prepare a diploma or graduation thesis (supervision), etc. As much as it had been possible, activities were performed for economic, cultural, educational well-being of the citizens and institutions in Croatia, also indirectly in the Homeland War. Such a quality opus as well as the reputation of the Department (with such a small number of staff) could be

achieved, because of the people who, above all, understood and loved the job within the Institute. First and foremost, we should highlight the now deceased Renata Novak, who is spent an enormous number of hours outside of working hours for the success of the Institute.

It is necessary to say a few words about the then existing and the upcoming crisis. The flip side of the coin, contrary to the obvious success, is the chronic and, more recently, severe crisis in which the Institute had found itself. The first hints of the crisis arose at a time when funding from the budget, i.e., the state budget, was abolished; in other words, when the Institute became self-governed. The Institute, which at the time had seven systematized jobs, was faced with a new challenge! At first, the Management of the Faculty of Medicine showed a passive disinterest towards the Department but, in the late 1970s and early 1980s, this gradually grew into a more open repression by the Collegiate Management Body of the Faculty of Medicine. Unfortunately, this was happening at a time when the work of the Institute was practically in full swing. Initially, it was said that the Institute costs a lot, and just then the Institute had a solid income, 75% of which belonged to the Faculty of Medicine, and the remaining 25% was distributed to executors according to their share in work, as a variable part of personal income. Two work positions had been previously abolished, including the position of the administrator, so that all the office work, primarily typing, fell to the remaining few staff. With the retirement of R. Novak, Mr.ph., which in itself represented a great loss, the pressure on the Institute further increased. The attempt to retire Prof. Mandić early is closely related to the Decision of the Faculty of Medicine Council of 9 September 1987, according to which the Institute of Physical Medicine and Rehabilitation should be closed on 24 October 1987 due to (partly quoted): *"... non-compliance with material, personnel, scientific-teaching, and professional criteria for performing the work determined by the Law and the Statute of the Faculty..."* This Decision of the Council abounded in inaccuracies and was offensive to the staff of the Department, which honorably, professionally, and diligently met all work obligations, and more! The head of the Department, Prof. Dr. V. Mandić, had no choice but to turn to the competent authorities to save the Department, balneological archives, and other values from the balneological profession. Those were, at the time, the Court of Associated Labor, the Trade Union, the Ombudsman for Social Self-Government, which did not prove useful. More fruitful were Prof. Mandić's personal acquaintances with some members of the Croatian Parliament. An appeal was also sent to the then Yugoslav Academy of Arts and Sciences, which at one point included the Balneological-Climatological Institute, for the salvation of the Institute and the Balneological Service. After reviewing the Decision and the appeal, the

YAAS Management requested the Faculty of Medicine to return the Department (Balneological-Climatological Institute) and the building to Demetrova 18. As far as we are aware, the Yugoslav Academy of Arts and Sciences did not receive any response, so the issue of the Institute's return and the building remained open. However, it seems that the request sent by YAAS had the most significant impact that the Institute was saved from ruin, and thus, even in limited possibilities, the work of the balneological service. In the desire to resolve, or at least start resolving the issue of the crisis of the Balneological Institute, i.e., the Department of Physical Medicine and Rehabilitation, Prof. Dr. V. Mandić, just before retirement, sent the Proposal for urgent resolution of the status of the Institute to seven competent republic bodies and places by letter no. 26/1-1988 of 19 September 1988. The Institute never received a reply from those to whom the letter was sent, but after that there was a standstill in this regard until the spring of 1995. However, the attempt to liquidate the Department of Physical Medicine and Rehabilitation, as a successor to the Balneological-Climatological Institute, which culminated in 1987, left deep traces in later work that are still felt today. The number of executors has not increased, the equipment has not been renewed, and the existing equipment is becoming obsolete. In addition, exercises in balneology, which were part of the course Physical Medicine and Rehabilitation, are becoming scarce. In addition, connections with foreign countries that were established with related institutions and well-known experts through personal acquaintances (Plevko, Novak, Mandić) are being severed. The Medical Center for Human Rights is temporarily located in a part of the Department premises (three rooms) by the decision of the Management of the Faculty of Medicine.

Analysis of the negative events that have led the Department of Physical Medicine and Rehabilitation to a standstill in work activities and to its very edge of existence, and thus the implementation of the balneological service as well, reveals that, over time, the origin and initial task (role) of the Balneological Institute has been forgotten, and a misconception and the opinion have been created that the Institute of Physical Medicine and Rehabilitation, the successor of the Balneological Institute, is exclusively an internal matter of the Faculty of Medicine and that it is up to the Management of the Faculty of Medicine whether such a Department will exist or if its activities will be suspended forever.

3.4. Employees of the Department of Physical Medicine and Rehabilitation

A relatively small number of people have passed through the Department of Physical Medicine and Rehabilitation. Among the doctors who dealt directly or indirectly with balneology were:

- Prof. Dr. Radoslav Lopašić, head of the Department of Balneoclimatology and Physical Therapy from 1958 to 1960.
- Prof. Dr. Oskar Plevko, head of the Department from December 1, 1960 to April 24, 1965, and the first president of the Department of Physical Medicine and Rehabilitation, who significantly improved the work and activities of the Institute.
- Dr. Magda Vranić, assistant and trainee at the Department from March 1, 1962 to December 31, 1963.
- Dr. Vladimir Cvitanović, who specialized in Physical Medicine and Rehabilitation at the Department from September 1, 1962 to February 28, 1963. As he was skilled at electronics, he made several electronic devices, the most important of which are the chronaximeter, which was later taken to the University Hospital Center Rebro, and a rectifier for charging the apparatus used to determine the radioactivity of water. He participated in the calibration of the said apparatus and assisted R. Novak in determining the radioactivity of water. Later, he became the director of the Stubičke Toplice health resort for many years.

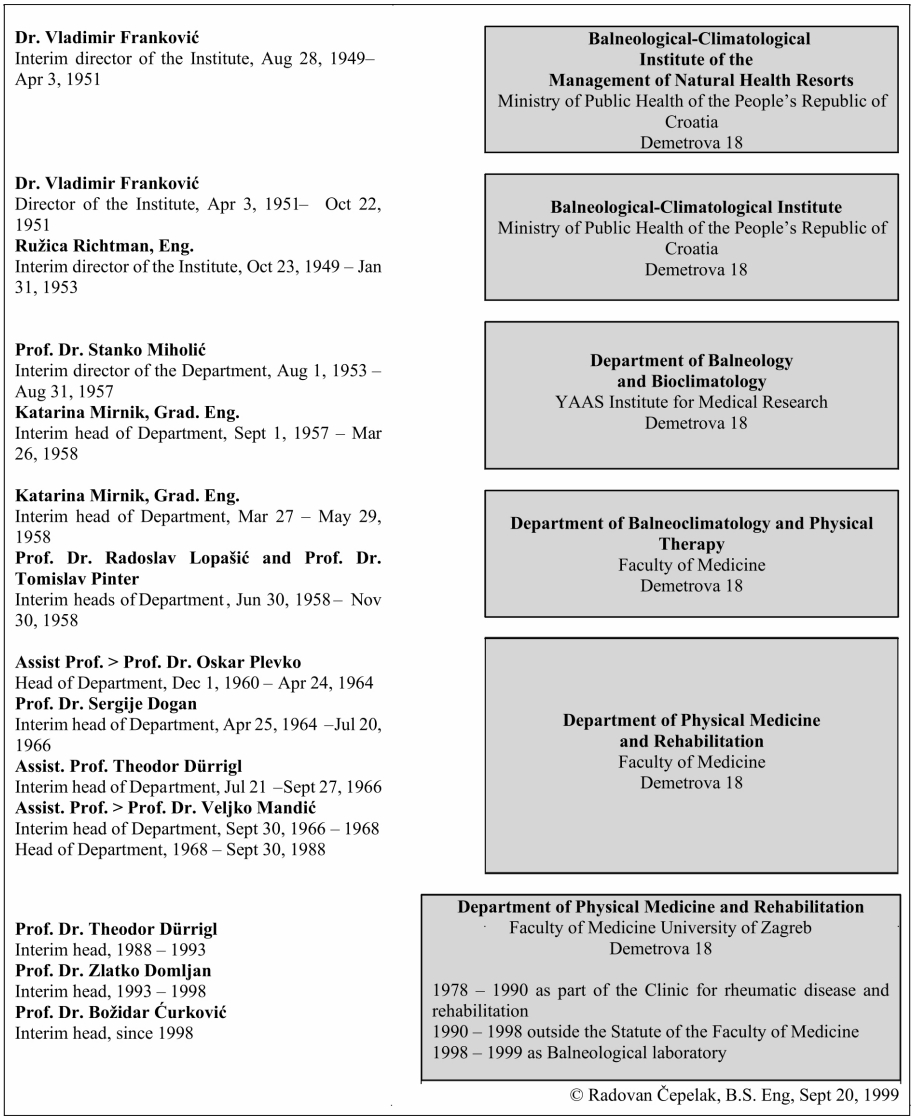

Image 3. Directors and heads of the Balneological-Climatological Institute – Department of Physical Medicine and Rehabilitation from 1949 to 1999

- Prof. Dr. Irena Pučar, then an assistant at the Department, took office on May 16, 1964. She specialized in physical medicine and rehabilitation and during that time participated in several balneological examinations and field trips.
- Prof. Dr. Sergije Dogan, was the head of the Department from April 25, 1965 to 1966.
- Prof. Dr. Theodor Durrigl, interim head of the Department for two terms: 1966 and 1988-1993. He participated in the preparation of several balneological examinations and was a long-term president of the Department of Physical Medicine and Rehabilitation.
- Prof. Dr. Veljko Mandić, head of the Department for 22 years, from 1966 to 1988. He published 18 papers in the field of application of natural health remedies and participated in the preparation of 38 examinations of the Department. As a long-time head of the Department of Physical Medicine, he wholeheartedly advocated for the survival of the Department.
- Prof. Dr. Zlatko Domljan, head of the Department, from 1993 to 1998. He advocated and contributed a lot to the survival of the Department and the re-establishment of relations with foreign countries in the professional field.
- Primarius Dr. Goran Ivanišević has been an invaluable external associate of the Department since 1994. He has worked on reviving the work of the Department, restarted lectures and exercises in balneology within the course Physical Medicine and Rehabilitation, which takes place on the Department premises. Narrow specialty in natural health remedies. Member of the editorial board of the journal *Balneoklimatologija* since 1998.
- Prof. Dr. Božidar Ćurković has been the current head of the Department since 1998.

Among the experts with a university degree who worked in that period were:

- Prof. Dr. Tomislav Pinter, head of the Department of Inorganic Chemistry and Dr. Radoslav Lopašić, head of the Neurological Clinic of the Faculty of Medicine, both interim heads of the Department of Balneoclimatology and Physical Therapy from 1958 to 1960.
- Katarina Mirnik, Chem. Eng., interim head of the Balneological Laboratory, worked for a very short time (two months), in which she completed one water analysis.
- Vinka Karas, Chem. Eng., spent eight months as the interim head of the Balneological Laboratory.

- Renata Novak, Mr. ph., head of the Balneological Laboratory and Department Property from 1959 to 1982. She continued to work on balneological analyses and especially excelled in the systematization and classification of mineral and thermal waters and peloids. As a particularly meticulous, diligent, and conscientious person, she was the main organizer and spearheaded most of the work in the preparation of balneological expertise and all other tasks of the Department. She held classes and exercises in balneology as part of the course Physical Medicine and Rehabilitation. Outside the Institute, she was an external associate of the Medical Encyclopedia, working on rulebooks on mineral drinking water.
- Radovan Čepelak, Eng. Geol., continued the tradition and art of his predecessors in the analysis of mineral and thermal waters and peloids. He worked on the systematization of waters, the register of mineral and thermal waters and peloids in Croatia, and a study (museum) collection, which he largely completed, which was launched by the journal *Balneoklimatologija*. In very difficult conditions and with great effort, he attempted to maintain the Balneological Laboratory, which was the heart of the Institute's work, and the functioning of the balneological service.

Among the staff with secondary education at the Institute were: Radovan Čepelak as a health technician until 1971, chemical technicians Marijan Čepelak and Juraj Posarić. In charge of administrative affairs were office clerk and facility manager Đuro Domazet, office clerk Vedrana Kamenar, and Mira Obradović, the last administrator and typist until 1978 as no one else was later employed in that position. Auxiliary staff (cleaners in charge of cleaning and washing laboratory dishes): Katica Grahovec, Josipa Buretić, Katica Zoričić, Katica Cindrić, also a long-time housekeeper, and Ivka Zebec, cleaner.

An important and inseparable part of the Balneological Institute, and later part of the Department of Physical Medicine and Rehabilitation, is the balneological laboratory. At the time of the founding of the Balneological-Climatological Institute, in terms of equipment, it was a mediocre laboratory, equal to almost all such laboratories in other countries. It had, at that time, all the necessary laboratory equipment and technical means that were used for analytical purposes. Today, the existing laboratory equipment is somewhat outdated, and reminds of museum exhibits. In contrast, it should be emphasized that the expertise of the leading staff (previously Dr. S. Miholić, R. Novak, Mr. phil., and Radovan Čepelak, Eng.), who worked in this laboratory was at the highest level, which was reflected in the results, because the analyses were reliable, accurate, and relevant, which was confirmed both in practice and by

other experts. Today, the competence and reliability of balneological analyses unfortunately increasingly depends on more than thirty-five years of experience, skill, and talent of the analyst R. Čepelak, B.Sc. Eng., than on the equipment. Furthermore, it is important to mention that the manner of work and processing analytical data is in the spirit of balneological tradition that has been passed down from generation to generation, and that it is a place where balneological analyses can be authoritatively made and processed for the needs of balneology and the requirements of balneological services. Furthermore, the Department further prepares balneochemical analyses of peloids (medicinal sludges), which no other institution in Croatia performs! It should be highlighted that the so-called balneochemical laboratory does not perform the so-called routine analyses, i.e., serial analyses, although, in practice, there have been such analyses. The Department conducts analyses, whose purpose is the achievement of as high an accuracy as possible. If necessary, several different analytical methods are applied for the same parameter.

The processed data of balneological analyses are used for the preparation of balneological opinions or studies. These expert opinions were not only opinions on the chemical composition and properties of mineral and thermal waters, but were broader in scope, so that such opinions often suggested the potential construction of new health resorts and recreation centers or served as a basis for expanding existing natural health resorts. All these professional papers provide balneological characteristics and health assessment of natural health remedies, comparison with previous studies, which allows insight into the stability or variability of the composition of the substances present or physical properties. In the case of new springs or peloids, comparisons are made with known waters or peloids of similar balneological composition, which enables the assessment of a natural health remedy that has not yet been used and concluding on the quality and quantity.

Suggestions are provided for the equipping of the springs, i.e., sources, for the use of these curative health remedies in rehabilitation and treatment, health tourism, or sports recreation, as well as the recreation of healthy people. These opinions represent a substitute for the balneological service, i.e., they represent a disguised form of the balneological service because the mentioned balneological expertise roughly estimates that 80 or more percent of all questions are related to the service, which unfortunately cannot be officially implemented for now. In practice, the work in this area cannot be completely carried out, which has been confirmed many times without such a solid balneological opinion. This expertise, in addition to professional and scientific approach to certain sources and localities, with relevant suggestions for further development, has resulted

in material gain (a rough estimate being from 350,000 to 650,000 HRK), which is not a negligible fact given the small capacity of the Department.

3.5. Professional documentation fund

A professional documentation fund (balneological analyses and opinions) was gradually created during the work activities. On the other hand, due to the enthusiasm of the staff, other data related to this area were collected as well. In addition, external collaborators have collected and made some contributions in this regard. Through the Faculty of Medicine (May 11, 1966), the Department purchased Dr. Stanko Miholić's balneological archive, and later Dr. Leo Trauner's balneological archive as well. Later (January 19, 1994), the Department's archives included Renata Novak's invaluable balneological material, who bequeathed the said material to the Department before her death in 1993. Some of the materials related to balneology were brought to the Department by Dr. Stanko Jurdana from Crikvenica on several occasions. Prof. Dr. V. Mandić and Radovan Čepelak, Eng., continuously collected material that was constantly added to the overall Department archives. In this way, a valuable integral archival unit called "Professional Documentation and Archival Materials Fund" was created, which contains a lot of professional and historical data from balneology, physical medicine, climatology, rheumatology, orthopedics, and other related material. Although balneology is a very narrow area, the Department archives are of special value, both for balneology, balneological service, and for Croatian historical heritage in general. It can be assumed that few European countries have such rich archival material. If it exists elsewhere, at least Croatia does not lag behind others in this respect. Apart from Croatia, the balneological archive, i.e., the professional documentation and archival material fund also contains numerous data and documents from the former republics, today's states located on the territory of the former Yugoslavia, then from European countries, and some from the rest of the world. Archival data can be divided into:

- professional studies of the Department (professional documentation fund) prepared in the previous period, of which there are over 254, and published works (professional and scientific), Department employees and associates;
- chemical-analytical data on domestic and foreign mineral springs;
- historical data related to the development of natural health resorts, i.e., individual sources;
- photo documentation;
- various brochures, leaflets, advertisements, listings, etc., of our health resorts, as well as companies that have exploited mineral water;

- topographic maps, sketches, geological maps, etc.;
- newspaper and other articles that contain data from balneology, i.e., the area of Department work interest.

According to a free estimate, the entire archival material of the Department contains between 800 and 1,400 (it has not yet been determined), and perhaps more chemical analyses of mineral and thermal waters, both domestic and foreign. This is of great importance for the work, because, in this way, one can gain insight into the chemistry of these types of water through comparison. An excerpt from the Minutes of the Croatian Archives, dated September 11, 1990, can be cited as confirmation of the value of the Department's archives. after the expert examination of archival material, on the basis of Articles 19 and 41 of the Act on the Protection of Archival Material and Archives (OG no. 25/1978): *1/.....*

3/The Department is obliged to keep the archival material in its possession, regardless of whether it was created by its work or the work of other organizations and individuals, and the extraction of worthless material is performed only in accordance with the Regulations on the Selection and Exclusion of Registry Material (OG no. 36/1981). 4/..... Professional documentation is stored in a special filing cabinet. Files have been opened for all known deposits of thermal, mineral, and mineral and thermal waters in Croatia, and for some of such deposits in other republics. Since the files are filed according to a pertinent system, it is possible to find in them documents created before the establishment of the Department, and even from the pre-war period. It is a very valuable documentary whole, which, in addition to professional documents (analyses, studies, reports, etc.), contains histories of individual health resorts, photographs, sketches, maps, and newspaper clippings." 5/.....

6 / .....

Zagreb, September 11, 1990

Signed for the Croatian State Archives by Damir Validžić

Unfortunately, due to lack of staff and time, this precious material is far from organized as it should be. The professional (or manual) Department library contains more than 1,000 titles, various publications (books and journals), mostly related to the medical profession, primarily in the field of balneology, climatology, physical medicine, rheumatology, orthopedics, etc. Furthermore, there are publications in chemistry, analytical chemistry, physical chemistry, hydrology and hydrogeology, geochemistry, meteorology, etc. Titles related to the field of balneology form a rich and valuable whole.

Already during the founding of the Balneological-Climatological Institute, a museum collection was planned among all the tasks that were provided for in the work regulations! However, in the further course of events, no one worked on it more seriously. Many years later, R. Čepelak began collecting items related to the wider field of balneology, and more intensively only since 1993. Today, the museum or studio collection consists of more than 350 items. The collection is thematically divided into several parts: research and production of mineral and thermal water and peloids, exploitation, and marketing of mineral and thermal waters and peloids. The museum exhibits consist of bottles of mineral water, boxes of peloids intended for the consumer market, stone cores, glasses, and other items associated with this area. Although the museum collection is not large, and the exhibits themselves are mostly of more recent date, it visually complements the archival material.

As mentioned earlier, the Department contains a large number of analyses and other data on mineral and thermal water springs. In order to gain an overview of this content, the plan is to establish a file, i.e., a register of all mineral and thermal water phenomena, as well as peloid sites, primarily from Croatia. For this purpose, the creation of cards was conceived. Each card would contain between 30 and 50 of the most important information about a spring or peloid site. This endeavor, which would be of great benefit, requires a lot of time, and with the current insufficient number of executors, would not be easy to achieve.

In the past 60, two balneoclimatological editions have been launched. Practically at the very beginning (l952), the Yearbook of the Balneological-Climatological Institute of the People's Republic of Croatia was launched, with Dr. B. Haramustek, Dr. S. Miholić and Dr. L. Trauner as its editors. Only one 162-page issue was published, in which a significant part of the Balneological-Climatological area was addressed, with descriptions of 29 sites in Croatia with balneological analysis. Many years later, in 1997, the Department of Physical Medicine and Rehabilitation launched the journal *Balneoklimatologija*, whose editor-in-chief was R. Čepelak, and the members of the editorial board included Dr. G. Ivanišević and Dr. N. Pleško. So far, two years have come out with a total of eight issues.

3.6. Department of Physical Medicine today

Today, the Department of Physical Medicine, the successor of the Balneological-Climatological Institute of the People's Republic of Croatia, is no longer on the same premises (11 rooms with a total area of 253 m^2) and in the same building (Demetrova 18), which from 1950 to 1996 had been entered in the land register as the governing body. In this building, the Department occupied approximately 40% of the total business space of the building. In fact, the Department is still part of the Faculty of Medicine. The staff receives personal income from the Faculty, and the inventory of the Department is kept in the material accounting of the Faculty. Of the staff, only two executors work in the Institute: Radovan Čepelak, B.Sc. Eng., who is also the Head of the balneological laboratory, archives, library, and museum (study) collection and the Department property manager, and Ivka Zebec, cleaner. The interim head of the Department is Prof. Dr. Božidar Ćurković, head of the Chair of Physical Medicine and Rehabilitation, Faculty of Medicine, University of Zagreb, and the head of the Clinic for Rheumatic Diseases and Rehabilitation, University Hospital Center Zagreb.

The Department of Physical Medicine and Rehabilitation has not existed as an independent working unit since 1987. According to the latest Statute of the Faculty of Medicine, it is run only as a Balneological Laboratory. The Department's premises include balneological laboratory, staff rooms, a lecture hall for students. The room of the head of the Department, the dispensary, and the office are temporarily rented to the Medical Center for Human Rights. The Department has a professional library, valuable archival material from the balneological area, a professional documentation fund, and a small museum collection. The Department accommodation is satisfactory, because there is enough space for solid work of such a department. From all the above, it is clear that the position of the former Balneological-Climatological Institute, current Department of Physical Medicine and Rehabilitation, is in a difficult and poor condition despite its significant results and social role, with the always looming possibility of physical liquidation.

When discussing the future of this institution, it should be known that the Department-Institute of Balneology still has the same tasks as before. Those include:

- performing balneological analyses of mineral and thermal waters and peloids;
- assessing the values of natural health remedies, as well as the possibility of application, and forming an expert opinion on this;
- keeping data on natural health remedies;

• working in the field of balneology and climatology;
• cooperating with other institutions of a similar nature;
• cooperating with the competent republic bodies, primarily the competent ministries;
• taking care of the location of 145 already known sites and places of application of natural health remedies;
• educating those interested in the practical application of natural health remedies and more.

These are all tasks of the balneoclimatological service, so it can be said in short that the work of the balneological-climatological service should continue. Special attention should be paid to the fact that the Department of Balneoclimatology, with the appropriate support and renewal of professional staff, should become a reference center for all questions related to the application of natural health remedies. The more we are aware of our natural potentials, the more rationally and purposefully we will use them and the richer the country and nation will be. It was to be hoped that the relevant institutions would address this problem and enable the revitalization of the Department of Balneology, supplement or redefine its basic tasks if necessary, and include it in the program of national interest as part of Croatia's economic development.

On 15 April 2008, the public was informed that organizational changes had taken place, i.e., that the Department of Physical Medicine and Rehabilitation (formerly the Balneological-Climatological Institute) based in Zagreb, Demetrova 18, had changed its name and seat to the Department of Balneoclimatology, under the Department of Environmental and Occupational Health of "Andrija Štampar" School of Public Health, Rockfellerova 4, Zagreb. Due to the constant need to organize and conduct a balneological service in Croatia, the activity remains the same, now in a modern laboratory. Based on the chemical testing of mineral and thermal waters, the Department compiles a balneological analysis and prepares a balneological expertise (in cooperation with prim. Goran Ivanišević, M.Sc.) for the application of mineral and thermal waters and other natural health remedies in health resorts in Croatia and other countries.

The Balneological-Climatological Institute was established about 60 years ago out of a need to solve all important issues in the field of balneology and climatology in one place. Although the name of the Balneological Institute has changed since then, including the manner of its financing and management, the tasks and their fulfillment have remained the same for a full five decades. Frequent crises caused by accident, or due to a lack of understanding brought the work of the Institute-Department almost to the brink of non-existence.

Thanks to a small number of employees, the crisis was overcome, but precious time and energy were wasted, which could have been used more purposefully. In the end, we can be not only satisfied, but also proud that significant success has been achieved with little investment. More than 400 balneochemical analyses of mineral and thermal waters and peloids were performed, many scientific, professional, and other papers in the field of balneoclimatology were published, with more than 254 expert opinions (expertise), a Balneological-Climatological library established, a professional documentation and archives fund established, as well as a museum or study collection, many hours of classes, lectures, and courses and other activities from the specified area were held. The very fact that such an institution exists, ranks Croatia among the European countries that nurture the balneological tradition. The competent state bodies are are tasked with revitalizing the balneoclimatological institution as the holder of the same-named service. The issue of revitalization of this Department should be included in the national program due to:

1. health issues in the field of balneology and climatology related primarily to the preventive protection of the citizens of the Republic of Croatia;
2. the role of the Department as the central reference balneoclimatological institution;
3. conducting a balneoclimatological service and maintaining links with the same or similar institutions in Europe;
4. much-needed information in crisis conditions and the like;
5. finally, as a matter of tradition, as proof that Croatia has always belonged to Europe (balneology is a European specificity).

Such quality work, as well as the reputation of the Department (with such a small number of staff), could be achieved because people who above all understood and loved the job worked within the Department. In the first place, we should point out the now deceased Renata Novak, who spent an enormous number of hours outside her working hours for the success of the Department.

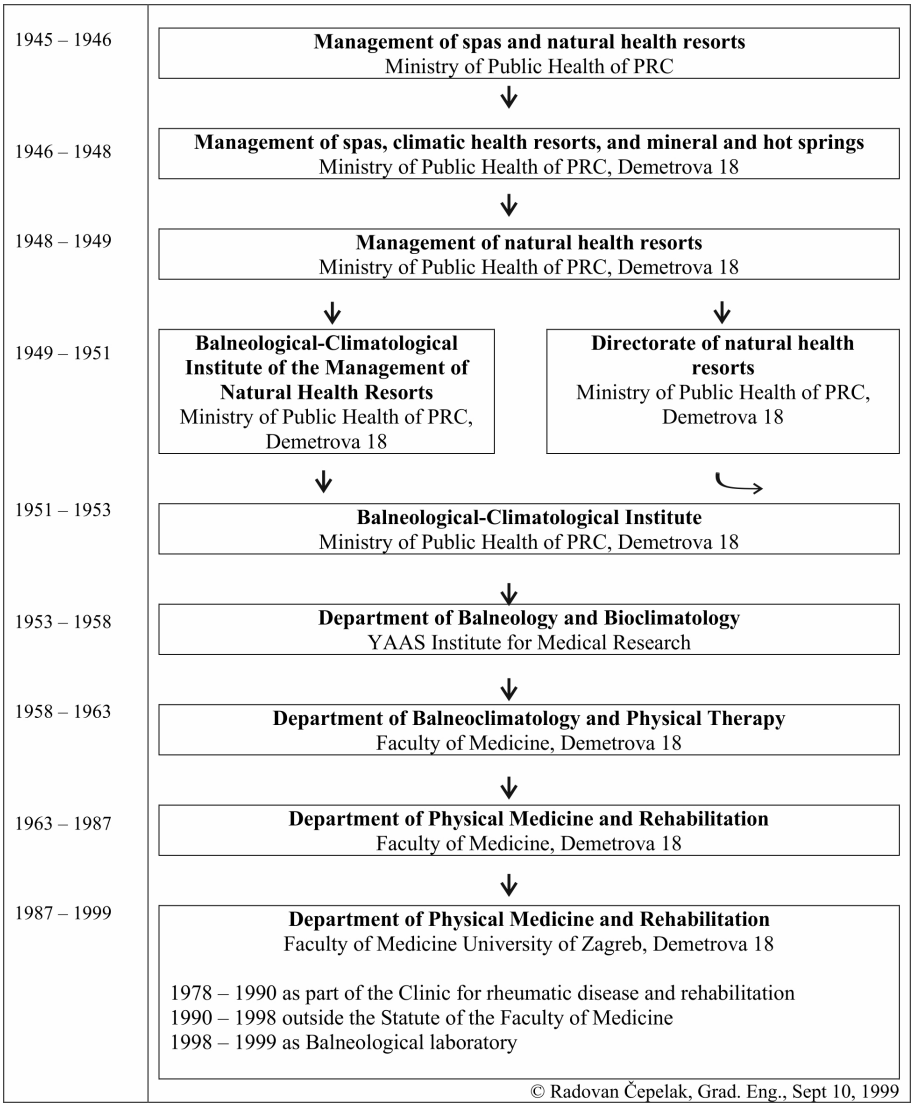

Image 4. Development path of the Balneological-Climatological Institute

4. CLIMATIC-MEDICINAL TOURISM ON THE EXAMPLE OF EUROPE

One hundred years ago, European tourist trends used to be seasonal; summers were spent in the mountains and winters on the Mediterranean shores as the tourist trends at the time were driven by these climatic features. It was a kind of aristocratic tourism that was enjoyed only by individuals at the top of the social ladder. At the same time, air temperature was considered the most important climatic component. In the summertime, people fled from the cities to escape the heat, logically, to the mountains, while in the winter period, they fled from the cold and fog to the Mediterranean shores, where the temperature was more pleasant. However, today, we are witnessing a reversed trend; one which is contrary to the logic of thermal comfort – heading for the coast during the greatest heat and to the mountains during the greatest cold. This trend can be said to have started at the end of the First World War, i.e., in the 1920s.

In their inception, these destinations were health places known for the healing properties of the area, regardless of if they were health resorts managed by doctor or not. Later, such places grew into medicinal tourist places by building and expanding the existing accommodation capacities in health resorts or hotels.

In the late 19th and early 20th centuries, a large number of books and travelogues were published describing health places throughout Europe, Asia, and even North and South America. Some experts and doctors shared health places regardless of their affiliation. This means that they were climatic coastal, climatic mountain, or spa health places, summer and winter health places. These were, of course, experiential (empirical) categories given the medical and general knowledge at the time. A coastal (or mountain or spa) place could be a winter or summer health place, or even both. Predictions were even made that included the months of the year (from-to) during which it was most convenient to visit a particular health place. For example, a larger number of mountain health places belonged more to summer than to winter tourist destinations. Some of the criteria for winter health places were the number of sunny days, cloudless days, the number of days and hours during which people with disabilities could exercise or spend outdoors. Little importance was attached to total precipitation because the nature and slope (inclination) of the soil could cause a rapid disappearance of water from the surface. Also,

some researchers classified the climate (climatic features) therapeutically according to: 1. the suitability for long-term or temporary stay, permanent or seasonal; 2. the position into mountainous, coastal, oceanic, semi-coastal, and inland (continental) or extreme; 3. the effect on the human body into fresh (invigorating), relaxing, adventurous, or soothing. Rare and sometimes unique features of the area worked in such a way that some tourist places had a climate with healing features, so it is important to describe some features of the space by tourist place. It can be assumed that only recent and new comprehensive bioclimatic and medical studies would provide an answer to the extent to which such places have retained or lost the status of a medicinal tourist place.

4.1. Coastal areas

In the coastal areas, we come across former health resorts, which have now become popular tourist places such as: Malaga, Alicante, Grado, Cannes, Berck-sur-mer, Sanremo, Antalya, Alanya and others. Nowadays, as had been the case in the past, the Spanish, French, Italian, and Turkish Riviera are mentioned among the tourist rivieras.

Ajaccio is a city located on the west coast of the island of Corsica, in France. It is located in the northwest of the Gulf of Ajaccio, in a sheltered position at the foot of a wooded hill. It is protected from the north, northeast, east, and southeast winds due to the mountains that rise about thirty kilometers from the city and are covered with snow all year round. Precisely because of its protected position, Ajaccio has a particularly mild temperature, but it is sometimes exposed to strong southwestern Mediterranean winds. Ajaccio has a large number of sunny days and a more humid climate than the nearby Riviera, but not as much as Madeira.

Alasio is located on the shores of the Gulf of Genoa, about 40 kilometers from San Remo. The town is located in a bay that is protected from the south and east by two capes, Capo del Male and Capo di Santa Croce. From the north, it is protected by hills that surround it at a short distance from the coast. This town is not as warm as San Remo because it is more open to northeast winds and because the northern hills are not as high. Alassio is one of the few places on this part of the coast that has a natural sandy beach.

Amalfi is located on the northern shores of the Gulf of Salerno. It lies at the mouth of a deep gorge, at the foot of Monte Cerreto (1,315 meters), surrounded by cliffs and coastal landscapes. In the 1920s and 1930s, Amalfi was a popular holiday destination for the British upper class and aristocracy. It is the capital of the Costiera Amalfitana coast on which it is located. Today, it is an important

tourist center, along with other nearby cities such as Positano, Ravello, and others. Amalfi is protected by mountain slopes that rise sharply, which protects it from the cold northern winds as well as in the spring when strong winds like the tramuntana blow. Amalfi is considered one of the sunniest places in Italy.

Archacon is located in southwestern France on the coast of the Atlantic Ocean, about 50 kilometers from Bordeux. The town serves as an example of a soothing microclimate, surrounded by a dense pine forest that protects it from winds coming from the east and southeast. In front of the place there is a sea basin, a bay ("Bassin d'Archacon") protected by a peninsula that allows entry from the Atlantic Ocean only from the south. The largest sand dune in Europe, the Dune de Pyla (or du Pilat) is located at this southernmost entrance from the Atlantic Ocean. It is nearly 3 kilometers long, 500 meters wide, reaching 107 meters in height, and moving inland at a speed of 5 meters per year, which adds to the attractiveness of the place. North and northeast winds must pass through the bay and therefore become somewhat warmer in winter, while their irritating dryness decreases as they collect the salty atmosphere, making this microclimate particularly suitable for lung diseases such as drought (tuberculosis). It should also be said that there is a uniform temperature as in other places on the coast, with the air in Archacon containing more moisture due to westerly and southwesterly winds from the Atlantic that bring rain and fog. Due to the extreme soil porosity, the falling water recedes from the surface, so there are never stagnant water surfaces. The air in the pine forests is potent in essential oils that are felt when tourists walk in the woods. The climate in Archacon is moderately mild and especially suitable for cases of irritating bronchial and laryngeal catarrh and cases of early tuberculosis.

Berck-sur-mer, sometimes abbreviated to Berck, is located on the banks of the Dover Strait in France. This commune was known for the Marine Hospital for children suffering from lung diseases (tuberculosis), and it had great success in treatment.

Biaritz is a city located in the Bay of Biscay, in northwestern France, on the Atlantic Ocean not far from the border with Spain. There is very little rainfall, and it is fully protected from the east winds. It is located on a cliff facing east, so it is constantly sunlit. Compared to Arcachon, it has no protection from the pine forest and is more exposed to winds blowing from the Atlantic. When the westerly winds blow, they are cold winds. The climate is soothing and suitable for patients with depression and nervous diseases.

Bordighera is a town in Italy, near the border with France. Historically, it has been a favorite winter resort, especially for visitors and retirees from England. It is one of the few places located on the cape, while most of the health

places are located in bays or depressions; therefore, it is more exposed to winds blowing from the sea. In the north, Bordighera is well protected by mountains where cold winds blow. All the winds that reach Bordighera must come from the seaside so that all the winds are enriched by the sea salt air; this makes the microclimate unique compared to other nearby health resorts. Furthermore, the temperature is more uniform throughout the year – warmer in winter and colder in summer than in other places on the coast. The treatment here is considered to be suitable for lung diseases and anemia, but not for patients suffering from nervous diseases.

Boulogne-sur-mer is a city located in the very north of France. The climate here is quite dry, with more sun and drought than places on the opposite coast of the United Kingdom. One of the attractions is the beach with fine sand. The place currently includes two health centers.

Dover is a town in the county of Kent in south-east England. The climate is considered mostly dry and tonic and is not recommended for stays in all seasons. It is very cold in January, windy in March, and warm in July. The microclimate is very pleasant from May to July and from August to October. Diseases that are suitable to treat here include the early-stage tuberculosis, bronchial catarrh in young people, dyspepsia, loss of appetite, depression, chronic diarrhea, and consumption (tuberculosis) in children. It is protected by hills in the background somewhat from winds coming from the north, northeast, and northwest. The sublayer is chalk, although the houses are built on flint and sand. The soil is porous, and the rain quickly disappears from the surfaces. The English Channel (Dover Pass) is used by many ships and passengers every day, which enables good transport connections.

Eastbourn is located on the coast of Sussex. It is known for a large number of sunny days and is promoted as "The Sunshine Coast." Air dryness is often present, probably because the upper parts of Eastbourne lie on chalk and the lower parts on very porous alluvial soil. This resort town is suitable for the treatment of tuberculosis, cases of slow convalescence from injuries, and anemia.

Folkestone, in the UK, is very well connected by rail, which greatly facilitates access for tourists. It is built on a cliff and exposed to southwest winds, while the hills in the background protect the place from north winds coming from the mainland. Annual rainfall is very low for a place on this coast. The climate is considered suitable for the treatment of chest diseases, cases of early drought, chronic diseases with catarrh as well as some forms of asthma. The arrival of the railway, the construction of the ferry port, and the growing

importance of the place as a summer resort has conditioned the accelerated development of the city.

Grado in Italy, on the Adriatic coast, is today officially advertised as a city that in 1892 was declared an official health resort by the Austro-Hungarian Monarchy. It used to be a fishing center, but today it is a popular tourist destination known as L'Isola del Sole (Sunny Island). Grado is the center of a lagoon known for its unpolluted nature.

Huelva is a city in Andalusia, in southwestern Spain, located along the coast of the Gulf of Cadiz, at the mouth of the Odiel and Tinto rivers, about 30 kilometers away from the border with Portugal. The famous Rio Tinto mines are about 20 kilometers away from the city. Huelva has a humid, warm, and moderate climate and it should be said that it never snows there.

Hyères is one of the oldest and most famous health resorts in France. In front of the coast is the Îles d'Hyères (Porquerolles, Port-Cros, and Île du Levant), which serves as protection from the winds from the sea, while the city itself is located at the foot of rocky hills, which contributes to the climatic quality of the place. The climate is especially mild and dry in winter, with snow falling once every few years.

La Spezia, also known as Spezia, is a city in Liguria, Italy. It was built on the northwest corner of the deep bay of La Spezia, with a rocky cape to the west, about seven kilometers long. The western part of the bay is rugged and hilly, while the eastern part is flatter in the length of about five kilometers, and as such it is suitable for walks and other similar activities. The city and the bay are open to the south and southeast but are protected from the north and west by steep and high mountains, which plunge all the way to the sea. La Spezia has a typical Mediterranean climate, with hot summers, fairly warm winters, and very rainy autumns and springs. Snow rarely falls, once or twice a year, and the air is dust-free.

Malaga in Spain is located right on the coast. It is characterized by the fact that it has very mild temperature levels in winter. In summer, the wind, blowing from the direction of the Mediterranean Sea, lowers the temperature, while other cities, located a little further inland, sometimes suffer from unbearable heat.

Menton is considered the warmest and most protected health place on the Western Riviera and the least dry, with the exception of San Remo. Menton is located 20 kilometers from Nice and stretches along the road from Nice to Genoa, so it is located on the French Riviera, along the French-Italian border, nicknamed La Perle de la France ("Pearl of France"). The town is well sheltered by a semicircular ring of mountains that rise to 600 meters.

Precisely because of such protection from most winds, while the winds blow with all their might in unprotected surrounding areas, there is always complete silence in the bay, while the sea is choppy but only several kilometers from the coast. The only winds to which Menton is exposed are south, southeast (wide) and southwest, which are otherwise warm winds so as not to disturb visitors and residents. The warmth of the winter climate is equal to that of Palermo, which is geographically located five degrees lower. The mentioned heat of the microclimate is favorable for the cultivation of lemons, mandarins, and oranges, with lemon being an urban symbol. The western Riviera was considered to be the Mediterranean coast from Cannes to Toulon. The central one encompassed the coast from Nice to Menton and the Eastern Riviera was from the Italian border to below Genoa.

Montpellier in the south of France was once one of the most famous and most visited health resorts, and later it was surpassed in visits by some other famous places. The city is located on a hill in the middle of a sandy plain and has a warm but variable winter climate. The atmosphere is dry and warm and is especially suitable for asthmatics.

San Remo is located on the shores of the Ligurian Sea, with the high Alps rising behind it. It is well protected from northern winds, is warmer, and has a more moderate climate than most other places. The cold northeast wind blows in winter and spring and sometimes blows the mistral. San Remo is suitable for the treatment of nervous diseases. It is a well-known tourist destination on the Italian Riviera, known for its cultivation and flower shows (it is also called the City of flowers).

4.2. Mountain areas

Some mountain areas have been recognized as health places and declared as such. At the beginning, they were available only to a narrow circle of aristocracy and only later did they become available to a wider circle of people, i.e., tourists. Today, mountain resorts are mostly ski destinations.

Arco is located on the north side of Lake Garda at an altitude of 100 meters. It is a well-protected place, not only from the north but also from the south and east winds and has lots of sun. The town is suitable for lung patients, especially in the fall and summer, but it is not as warm in winter as the Riviera. Tourism is an important part of the local economy, with many Germans and Austrians coming across the Brenner Pass from Austria.

Arosa is located in Switzerland at an altitude of 1,775 meters, in a bay that opens to the west. Arosa was discovered as a health resort by German doctors in 1883 and the first sanatorium was opened in 1888. Arosa is about a five-hour walk away from Davos. It is believed that Arosa is more protected than Davos in the high mountains, and the infamous fen wind is much less problematic than in Davos and Wiesen. Fen (foehn or föhn) is a dry and warm wind that occurs in the lee of a mountain. This wind is characteristic on the northern side of the Alps and on the Swiss plateau, causing sudden changes in temperature. Winds of this type are called "snow eaters" because of their ability to melt or sublimate snow quickly. The snow melts late, which allows guests to visit the resort in the spring. Compared to Davos, Arosa has less temperature variation and less cloud cover, as well as more hours of sunshine per year. Skiing in Switzerland has received a great boost in England from Sir Arthur Conan Doyle, author of a series of short stories about Sherlock Holmes. Doyle, an avid athlete, spent winters in Davos. For fun, he ordered some ski "boards" from Norway and climbed the mountains with two local guides. They went down the slopes of Arosa, ending their trip with lunch at a local inn, the Seehof, the first hotel in Arosa. Doyle wrote about his pioneering ski venture in Davos and Arosa in the British magazine, *Strand*, in 1894, and the story later attracted British skiers to Switzerland.

Beatenberg, also known as St. Beatenberg, lies on a long natural terrace in the northern part of Lake Thun, Switzerland. It is well protected by mountains in the background from the west and east and is open to the south and southwest. The climate is mild with a lot of clouds in winter. As a healing place, it was used in the treatment of chronic catarrh, early drought and in slow convalescence in pleurisy (inflammation of the lung membrane), and lung diseases in general, as well as in anemia and some heart diseases.

Courmayeur is a city in northwestern Italy. It is located at the foot of Mont Blanca, the highest mountain in Western Europe, in the Graian Alps, and intersected by the Dora Baltea (which later flows into the Po River). A picturesque mountain landscape and healthy mountain air make it an attractive destination all year round. It is one of Europe's most famous ski destinations. In the city, there is also a botanical garden, "Alpino Saussurea," which is described as the largest European botanical garden. The place is sheltered from the north winds by the Mont Blanc Mountain. Sometimes it is very warm in summer, while the mornings and evenings are cold, and the dryness of the air makes the heat in the middle of the day easier to bear. The climate is mild. Courmayeur is well connected with northwestern Italy and through the Mont Blanc tunnel the whole region has a connection with France.

In Davos, Switzerland, according to the Baedeker travel guidebooks from 1911, there were nine medical facilities according to Baedeker's 1911 guide. The valley stretches in a direction from northeast to southwest, with mountains rising, protecting the valley, to 1500 meters above the valley. Davos was a famous health resort for tuberculosis and today it is a famous ski resort. Monitoring of meteorological conditions and local climate has been performed since 1865. Davos is located at an altitude of 1,562 meters. Precisely its location in a valley that is protected from the local prevailing winds gives special climatic characteristics to this place. It should be noted that the climate is very dry in winter, which then contributes to the perception of thermal sensation when the temperature is lower than it would be if the climate were more humid. Davos consists of five parts (Davos-Dorf, Davos-Platz, Frauenkirch, Glaris, and Monsteinand), of which Davos-Dorf and Davor-Platz stand out as health resorts.

Engelberg is a leading mountain health resort in central Switzerland. Since the 19th century, Engelberg has been internationally known as a health resort, but it is also visited for skiing and clean air. With its combination of modern sports facilities and alpine locations, Engelberg is attractive for summer and winter tourism. The nearest cities are Lucerne and Zurich. The place lies in a green valley, almost fully surrounded by high mountains, which makes it well protected from the winds. The valley itself is ten kilometers long and two kilometers wide. The climate is mild but somewhat fresh (invigorating). The town has good transport links.

In Falkenstein, near the Taurus Mountain range, near Bad Homburg, Germany, a sanatorium was established that was open in both winter and summer. The place is located at an altitude of 400 meters, protected from north and east winds and surrounded by forest, which provides shelter from the sun and wind and allows outdoor exercise.

In earlier years, Leysin was known for its sanatoriums for the treatment of tuberculosis. However, today, it is a destination for year-round mountain sports and recreation. It is a sunny spot on the eastern end of Lake Geneva near Montreux, Lausanne, and Geneva. Located in the Bernese Alps, Leysin has a spectacular view across the Rhone River valley, which undoubtedly contributes to the additional attractiveness of the place itself. Fog is rare, usually only in summer. As far as wind is concerned, Leysin is considered one of the most protected places in the Alps.

Macugnaga is located in the Anzasca Valley at an altitude of 1,327 meters, near the Monte Rosa Mountain range in Italy. It lies on the south side of the Monte Rosa Mountain range and enjoys a milder climate than places that are at the same altitude but further north. The climate is slightly fresh

(invigorating). The area offers many opportunities for skiing in winter and hiking and mountaineering in summer.

Merano, in Italy, is located in a depression, at the foot of mountains that reach more than 3,300 meters, at the entrance to the valleys of the Passiria (which passes the river Passer), Venosta and d'Ultimo. In the past, Merano was a popular residence for scientists, writers, and artists, such as Franz Kafka, Ezra Pound, and others who appreciated the mild climate of the place. Merano is protected from all winds except the south and has a dry climate with little rain.

Montana is located not far from Leysin, at an altitude of 1,527 meters. The place is located high on a mountain range, which forms the northern boundary of the Rhone River valley and therefore has a completely southern orientation. The environment can be described as a natural park with grassy plains and pine forests, as well as small shallow lakes.

Montreux is located on the northeast shore of Lake Geneva at 400 meters above sea level and has long been one of the most popular health resorts in Switzerland. The climate of Montreux is considered dry, with lots of sunny days although there is plenty of rainfall but with little fog. Montreux climate is thought to be beneficial for people with common chronic laryngitis, chronic laryngopharyngitis, granular pharyngitis, in cases with recurrent bronchial catarrh or a tendency to catarrh, in chronic pleurisy, early tuberculosis in which general health is good and not accompanied by fever, with chronic empyema that is healing slowly in cases of cardiac diseases of rheumatic origin. In the 19th century, tourism became a major industry with luxury hotels that attracted wealthy tourists from Europe and the United States.

Pau is located on a hill 200 meters above the valley through which the mountain river Gave de Pau passes. Pau is 100 kilometers from the Atlantic and 50 kilometers from the Pyrenees. The mountain river Gave de Pau, which becomes a torrent when the snow melts from the mountain, springs into the Cirque de Gavarnie. The position in the north of the Pyrenees, not far from the Atlantic Ocean, and the elevations in the north contribute to the fact that Pau has a mild, rather mitigating winter climate. The winter climate is not so warm, but it is milder than the climate of the Western Riviera. There is more rain in Pau and less sun, cold winds blow less often than on the Riviera. There are far fewer winds than there are in most health resorts. The British discovered Pau and its climatic characteristics and left their influence, in part because General Wellington left the garrison stationed at the site in 1814, during the war in France.

Seewis, also called Seewis im Prättigau, is located 937 meters above sea level, in Switzerland, located on a plain on the right side of the Prättigau

valley, at the very entrance to the valley. Such accommodation enables efficient drainage after the snow melts or after large amounts of rain. This village has a complete southern orientation and offers a wide view of the lower part of the Prättigae valley. It is considered to be the most suitable place for a tourist stay in spring and early summer. Walks in the woods are possible in all directions. It is protected from the north and east by the 3,050-meter high Scesaplana mountain, so it has a mild climate, especially free from the influence of winds.

St. Moritz was named after St. Maurice, a Roman Catholic saint. It is located in the Engadine Valley in southeastern Switzerland at an altitude of 1,822 meters. Nearby is a small lake St. Moritz. Behind the place to the northwest rises Piz Nair, a mountain that is very easy to climb and continues to the surrounding peaks Piz Padella and Piz Ot. The highest peak in the Eastern Alps, Piz Bernina is located a few kilometers south of the town. St. Moritz developed rapidly in the late nineteenth century. St. Moritz is suitable for pulmonary patients, as well as for those suffering from overall weakness. Although the place had some visitors during the summer, the origins of the winter resort date back to September 1864, when the hotel manager and pioneer, Johannes Badrutt of St. Moritz, made a bet with four British guests to return in the winter and if they were not satisfied, he would pay the cost of their trip from London and back. If, however, they found St. Moritz attractive even in winter, they were invited to stay as his guest for as long as they wished. This marked, in fact, not only the beginning of winter tourism in St. Moritz, but also the beginning of winter tourism in the whole Alps. The first tourist office in Switzerland was established the same year in this place.

Wiesen is about two hours away from Davos, at an altitude of 1,430 meters above the river Landwasser. It is better protected from north winds than Davos and suffers less from wind dryers during the winter and spring than Davos. The climate is dry with plenty of sun.

5. CLIMATIC-MEDICINAL TOURISM IN CROATIA AND THE PRIMORJE-GORSKI KOTAR COUNTY

Climate in Croatia is determined by its unique position in the northern temperate latitudes and the associated weather processes of large and medium scale. The most important climate modifiers for Croatia are the Adriatic and the wider Mediterranean, the orography of the Dinarides with its shape, altitude, and position according to the prevailing current, the openness of the northeastern regions to the Pannonian plain, and the diversity of vegetation. Continental Croatia is located in the circulation zone of temperate latitudes throughout the year, with changing atmosphere marked by a variety of weather situations with frequent and intense changes during the year. These changes are caused by high- or low-pressure systems, often similar to vortices up to hundreds of kilometers in size. The climate of continental Croatia has been modified by the maritime influence from the Mediterranean, which stands out more strongly in the area south of the Sava than in the north and weakens more towards the eastern area. Orography is the next local climate modifier (Medvednica, mountains in Hrvatsko zagorje, and around the Požega valley) which, among other things, leads to increased short-term heavy rainfall on the leeward side of the obstacle or the creation of a precipitation shadow in the lee. At the higher altitudes of the Dinaric mountains in Gorski kotar, Lika, and the Dalmatian hinterland, there is a mountain climate that differs from the wider area primarily in temperature and snow incidence. Coastal Croatia is located for most of the year also in the circulation area of temperate latitudes, with frequent and intense weather changes. In summer, on the contrary, under the influence of the Azores anticyclone, which prevents the penetration of cold air into the Adriatic, the area comes under the influence of the subtropical zone. One of the most important climate modifiers in this area is the sea, so it can be considered coastal.

With the direct influence of the cyclogenetic activity of the northern Adriatic, the climate of this area is markedly modified by the highly developed orography of the Dinaric Mountain range. That is why long-term clear weather that favors tourism prevails in the Adriatic in the summertime as well.

At the end of the 19th century, when certain places were declared health resorts in Croatia, they were visited exclusively by the aristocratic class, whether they were healthy individuals or those with health problems. Later, it

spread to all those tourists who could pay for a stay in health resorts. The use of natural health remedies in Croatia lasted until 1965, when the regulations of the former state put the use of natural health remedies outside the medical framework. Until then, very important works were published, books on climatotherapy, thalassotherapy and balneotherapy in Croatia, as well as the Yearbook of the Balneological-Climatological Institute. During the Homeland War, the former hospitals in health resorts were declared special hospitals for medical rehabilitation, and this has continued without progress until today. Today, there are 17 special hospitals in Croatia – natural health resorts with various climatic or thermal health institutions (Table 14). In all health resorts in the Primorje-Gorski Kotar County, as well as in Croatia, tourists can choose (for a fee) between certain medical examinations and procedures.

Table 16. Active natural health resorts in the Republic of Croatia

Location	**Type of health institution**	**Health remedies***
Biograd	Special Hospital for Orthopedics	CT
Bizovac	Polyclinic "Bizovacke Toplice - medical rehabilitation" Health resort	Btmw
Crikvenica	Special hospital for medical rehabilitation Thalassotherapia	CT
Daruvar	Special hospital for medical rehabilitation Daruvarske Toplice	Btw
Ivanić Grad	Special hospital for medical rehabilitation Naftalan	Btmwn
Krapinske Toplice	Special hospital for medical rehabilitation	Btw
Lipik	Special hospital for medical rehabilitation	Btmw
Makarska	Special hospital for medical rehabilitation Biokovka	CT
Nin	Specialist outpatient clinic	CTl
Opatija	Special hospital for medical rehabilitation, heart disease, lung, and rheumatism Thalassotherapia	CT

Rovinj	Orthopaedic and Rehabilitation Hospital "Prim. Martin Horvat"	CTs
Sv. Stjepan, Livade	Health resort Istarske Toplice	Btmwp
Stubičke Toplice	Special hospital for medical rehabilitation	Btw
Topusko	Health resort	Btw
Varaždinske Toplice	Special hospital for medical rehabilitation	Btmp
Vela Luka	Special hospital for medical rehabilitation Kalos	CTl
Veli Lošinj	Health resort for allergic diseases of the respiratory organs and skin	CT

* C - climatotherapy, T - thalassotherapy, B - balneotherapy
tw - thermal water, tmw - thermomineral water, *p* - peloid, *l* - liman, *s* sand, *n* – naphtalan

Source: Ivanišević G. Prirodna lječilišta u Hrvatskoj. In: Ivanišević G, ed. *Lječilišta, zdravlje i stres*. Zagreb: Akademija medicinskih znanosti Hrvatske. 2007:106.

The climate diversity in the relatively small area of the Primorje-Gorski Kotar County (county with the most climate types in Croatia) is a consequence of orographic differences as well as the influence of land and sea. Inhomogeneous climates in tourism studies of some destinations in the world are not considered obstacles but advantages, and places where the distance between the various climate types is relatively small are rare. Climatic conditions in this area are very favorable for the development of tourism and enable year-round tourism business. In the Primorje-Gorski Kotar County, there are only three climatic health resorts, i.e., hospitals for medical rehabilitation: in Crikvenica, Opatija, and Veli Lošinj, which is certainly too small a number of facilities for this area with these climatic health characteristics. All three spas are located in coastal tourist places, which testifies to the fact that mountain health resorts are unfairly neglected in this regard.

The warming of the Earth's atmosphere is accompanied by global changes such as rising sea levels, cultivation of crops not previously grown in higher latitudes, sea warming (shifting the line of bathing tourism to the north), changes in living and non-living environment, changes in socio-economic systems, and other. All these changes also affect tourism. Expected climate change on a regional scale is derived from global climate models. In the maritime area of Kvarner, warming will affect the change of the landscape so that the influences

of the Csa climate (Mali Lošinj and Veli Lošinj) will spread. In conditions of greater drought, the need for freshwater increases, as well as water that is used for the sustainability of vegetation. In the conditions of global climate change, it is more difficult to predict the duration of the bathing season because the transitions from one season to another have become significantly less precise.

5.1. Legal regulation and condition

The last legal acts, ordinances, and lists of health resorts date back to 1936. The list of health resorts included the following places in the Primorje-Gorski Kotar County: Baška, Bakar, Brod na Kupi, Cres, Crikvenica, Crni Lug, Čabar, Delnice, Fužine, Lokve, Kraljevica, Malinska, Mali Lošinj, Mrkopalj, Novi Vinodolski, Njivice, Omišalj, Opatija, Punat, Ravna Gora, Selce, Skrad, and Veli Lošinj. It should be noted that several places have been added, because they had been located in the area of the then Italy.

The Ordinance on the Proclamation of Tourist Municipalities and Cities prescribes the criteria, conditions, and data that such places must meet as well as the resulting benefits. With this Ordinance, health-tourist places are classified into climatic coastal, climatic mountain, and spa health-tourist places. Regarding the climatic health-tourist places (coastal and mountainous), the criteria were as follows, i.e., it was necessary to have verified data on: 1) the climate based on multi-year monitoring; 2) a favorable assessment of therapeutic value, i.e., indications and contraindications; 3) the geographical position of the place (altitude, terrain configuration, etc.); 4) a favorable sanitary or health condition of the place, or rather the population in the place (mortality, morbidity, etc.); 5) a favorable hygienic condition (water supply, sewerage, etc.); 6) at least one adequately arranged artificial or natural public park and bathing place on a sea, lake, river, or pool; 7) installed electric lighting in the place; 8) at least one catering facility, a hotel, boarding house, restaurant, or inn and a sufficient number of private rooms; and 9) suitable traffic routes and connections (railway, air, etc.). These data indicate that the criteria included a wide range of conditions that had to meet the health-tourist places. The following figure shows the current structure of the Primorje-Gorski Kotar County with marked towns and municipalities that belong to it today (Figure 5).

Image 5. Territorial structure of the Primorje-Gorski Kotar County

Source: Archives, Administrative Department for Spatial Planning, Construction, Environmental Protection and Nature Conservation. Primorsko Goranska County. 2010

The first legal acts regulating relations in tourism began to appear in health-tourist places located along the coast. In 1868, the "Hygiene Society" was founded in the town of Hvar, which is the first tourist organization on our coast. The Statute itself speaks of foreigners – tourists, and the care for their health. Article 2 of the Statute reads: "The purpose of the Society is to provide foreign patients with all those means that may be useful for the recovery of their health. Therefore, in the healing climate of Hvar, the Society will obtain appropriate locations and attempt to equip them appropriately." However, it should be emphasized that the Hvar Statute is not fully original, because it relies on other similar documents that had already existed in Venice, Pisa, and Nice.

According to the Ordinance of 1936, the criteria for health-tourist places with a spa character include the following data: 1) the geographical position and geological data; 2) a favorable balneological analysis, i.e., favorable physicochemical properties of mineral and thermal waters; 3) a suitable manner of catching mineral and thermal waters and adequate arrangement of balneotherapy spaces; 4) at least one adequately arranged artificial or natural public park; 5) a favorable sanitary or health condition of the place, or rather the population in the place (mortality, morbidity, etc.); 6) a favorable hygienic condition (water supply, sewerage, etc.); 7) installed electric lighting; 8) at least one catering facility a hotel, boarding house, restaurant, or inn and a sufficient number of private rooms; 9) suitable traffic routes and connections (railway, air, etc.).

Declared health resorts had the opportunity to determine and charge the tax per stay per person and per day. Also, the Ordinance stipulated that the collected tax would be used exclusively for the promotion of tourism, and only in the place where it was collected, as well as for the operating costs of those local tourist boards that belong to those places. In all this, the state's interest in promoting such places is clear.

5.2. Coastal health-tourist places

According to the latest valid, previously mentioned Ordinance, the following places are included in the coastal climatic health-tourist places in Croatia: Bakar, Baška, Crikvenica, Jablanac, Karlobag, Kraljevica, Lopar, Malinska, Novalja, Novi Vinodolski, Njivice, Omišalj, Pag, Rab, Selce, Senj, Vrbnik, Baška Voda, Biograd na Moru, Bol, Brela, Gradac, Hvar, Jelsa, Kaštel Lukšić, Kaštel Novi, Kaštel Stari, Kaštel Štafilić, Komiža, Korčula, Krilo, Jesenice, Lumbarda, Makarska, Milna (Brač), Omiš, Podgora, Punat, Silba, Stari Grad (Hvar), Supetar, Sutivan, Vela Luka, Vis, Vrbovska, Babino Polje,

Cavtat, Goveđari, Koločep, Kupari, Lokrum, Mlini, Srebreno, Lopud, Luka Šipanska, and Orebić. To these should be added the places that were at the time under Italian rule, such as: Cres, Lovran, Opatija, Mali Lošinj, Veli Lošinj, and some other places. The list of health-tourist resorts includes 12 of the 56 in the Primorje-Gorski Kotar County, namely: Bakar, Baška, Crikvenica, Kraljevica, Malinska, Novi Vinodolski, Njivice, Omišalj, Punat, Rab, Selce and Vrbnik, to which should be added Cres, Lovran, Opatija, Mali Lošinj, and Veli Lošinj. Thermal-geographical features of the area have provided some tourist places with a climate with health resort characteristics.

Bakar is located on a hill in the northwestern part of the Bakar Bay. It is surrounded by hills up to 300 meters above sea level. The whole area is rich in sources of drinking water, covered with deciduous trees and low vegetation, which has contributed to it being declared a health resort. The first beach on the island of Krk was officially opened in Baška in 1908.

Baška abounds in about 30 pebble beaches that are accessible to swimmers of all ages, and the beaches can be reached on foot or by boat. Tourists like to visit Baška at any time of the year, precisely because of the pleasant climate, many sunny days a year, the possibility of walks and excursions around the town and on the island. Baška has the characteristics of a Mediterranean climate, pleasant springs, warm summers with minimal rainfall, mild falls, and windy winters.

Due to its favorable natural position, Mediterranean climate, beautiful beaches, and good ferry connections with the mainland, Cres has great preconditions for the further development of tourism.

Crikvenica is located at the foot of hills 200-300 meters high, which in the winter months protect it from cold northeast air currents, and on the southwest side protect the island of Krk from stronger south winds. One of the first experts and scientists who studied the climatic features of Crikvenica was Johann Frischau from Graz, who in 1891 published a guidebook in German entitled "Klimatischer Kurort und Seebad Crikvenica" (*Climatic Health Resort and Sea Bath Crikvenica*). On March 25, 1906, Crikvenica was declared a climatic health resort and seaside resort in accordance with applicable regulations. The health resorts operated within the Therapia and Miramare hotels and were intended for elegant and wealthy tourists and guests. In 1970, when the accommodation facilities of Thalassotherapia Crikvenica were renovated, they were originally named Hotel Hippocrates, in honor of Hippocrates, who dealt with the impact of the environment on health, i.e., the beginnings of health ecology. For the rainy Crikvenica, it is climatically characteristic to be

dominated by clear, dry, and hot summers and cloudy, rainy, relatively mild climate with a characteristic windy winter.

In Kraljevica, in the Oštro Bay, the German Olschbauer founded one of the first baths in Primorje, as well as the Hotel Liburnija in 1904, which was later turned into a sanatorium for tuberculosis of bones and joints. The climate in Kraljevica is pleasant, Mediterranean, with a large number of sunny days a year. The most common winds are jugo and bura, and in summer, the freshness from the sea to the mainland is brought by burin and maestral.

At the beginning of the twentieth century, while Opatija was developing as a very dynamic and fashionable center, Lovran retained the reputation of a refined and somewhat isolated health resort in whose tranquility many dignitaries of high society found refuge. In 2009, a round table "Century of health and bathing tourism in Lovran: One hundred years since the issuance of the first rulebook on therapy" was organized in Lovran, which marked two important anniversaries. The first anniversary was the centenary of the Rulebook regulating activities in the health resort town of Lovran (*Regolamento di cura per il distretto di cura di Lovrana*), while the second was the 150th anniversary of Dr. Albin Eder (Vienna, 1859 - Lovran, 1916), who founded the sanatorium in Lovran and managed it from 1909 to 1916. Initially, Lovran was a winter resort, and after the Second World War it developed into a summer resort.

Malinska is located in a wooded bay of the island of Krk. Thanks to its numerous beaches and mild climate with lots of sunny hours, at the turn of the 19th and 20th centuries, it was declared an ideal place for health tourism.

Mali Lošinj is currently the largest settlement on the island of Lošinj and the largest settlement on all Adriatic islands. Meteorological measurements by Ambroz Haračić (1855-1904), Prof. at the Maritime School at the time, which began on 1 August. In 1880, as the publication of their results in the Vienna Meteorological Yearbooks, they attracted the attention of many Austrian doctors. Among them was Conrad Clar (1844-1904), who was looking for a suitable place to treat his son who was suffering from a sore throat. On January 21, 1885, Conrad Clar arrived in Mali Lošinj with his son, and after a three-week stay, his son made a full recovery. Clark published the results of his stay later in an Austrian journal, which attracted the attention of other Austrian doctors. Among them was Leopold Schrötter (1837-1908), who visited Lošinj later that year. The very next year, 1886, Schrötter visited Lošinj in the company of several doctors. Clar and Schrötter were prominent advocates of Lošinj and in their lectures and papers, they emphasized the climatic benefits of the island of Lošinj. In 1892, Mali Lošinj, like Veli Lošinj, received the status of a climatic health resort and convalescent resort.

In Novi Vinodolski, tourism began in 1878 when the first beach supports were placed on the sandy seabed of the port, which held several wooden bathing platforms. Soon, bathing beaches were built in the nearby bay (Lišanj), where the construction of the first hotel was set up, and Novi Vinodolski developed into an attractive health resort and bathing place for Austrian, Hungarian, and Czech guests. Novi Vinodolski has a stable and mild Mediterranean climate with mild and pleasant, warm sunny summers, whose daily temperature is mitigated by the sea breeze.

Njivice is characterized by beautiful beaches, clean sea, and mild climate, with plenty of shade as well as good accommodation facilities that attract tourists. Njivice is becoming an increasingly important tourist center.

Omišalj is located at an altitude of 85 meters, on the northwest side of the island of Krk and dominates almost three kilometers long bay.

In Opatija, in 1850, Juraj Matija Šporer initiated the establishment of a company for the construction of Opatija and advertising for its healing properties. Šporer helped to promote Opatija among sea baths in Viennese medical circles. Along with him, we should also mention Julius Glax, who worked there for more than 30 years. Glax invested his knowledge and efforts in the organization of this climatic health resort, whose favorable results he published in more than 60 scientific papers.

Just above the town of Punat is the highest mountain on Krk, with the peaks of Veli Vrh (541 meters above sea level) and Obzova (568 meters above sea level). In 1908, the Society for the Beautification of Places was organized, and the first serious steps were taken in order to raise the level of hospitality, as a condition for the development of tourism.

As for Rab, it should be said that, in 1889, the local council declared it a bathing and health resort. Rab has a temperate Mediterranean climate, dry and warm summers, and mild rainy winters. The Kamenjak mountain range is holding back the blows of the cold bura wind on the island of Rab, and the south winds disturb the islet of Dolin and the branch of the island of Pag.

Due to the mild Mediterranean climate, Selce has developed into a health resort suitable for the treatment of heart, rheumatic, and respiratory problems.

Ambrozije Haračić's research and news about Lošinj's climatic conditions in Veli Lošinj prompted the Austrian Archduke Karl Stephan to build a castle with a well-kept garden full of exotic plants in 1886 on the slopes of Kalvarija, in the Podjavori area of Veli Lošinj. Today, it houses the Health Resort for Allergic Respiratory and Skin Diseases. The castle was sold in 1893 with the intention of building a new villa in the upper part of the park, which never

happened. In 1892, Veli Lošinj received the status of a climatic health resort and convalescent resort.

Vrbnik is located on a steep rock 50 meters above the sea level on the island of Krk, opposite the town of Novi Vinodolski on the mainland. It should be mentioned that there are no hotels or camps here, so the accommodation capacity is exclusively private.

5.3. Mountain health-tourist places

In the previously mentioned ordinances, the following places in Croatia are included in mountain climatic health-tourist places: Brestovac, Brod na Kupi, Crni Lug, Čabar, Delnice, Fužine, Lokve, Mrkopalj, Orahovica, Plitvička jezera, Ravna Gora, Samobor, Skrad, Imotski, and Vrlika. Of the 15 places mentioned here, as many as nine of them belong to Gorski kotar, i.e., Primorje-Gorski Kotar County: Brod na Kupi, Crni Lug, Čabar, Delnice, Fužine, Lokve, Mrkopalj, Ravna Gora, and Skrad.

The old name of Brod na Kupi was Ribarsko. More intensive tourism development began after the renovation of the Kupa boarding house in 1953. Brod na Kupi is the largest settlement along the upper reaches of the river Kupa.

Crni Lug is connected to the Risnjak National Park and is a clear example of the contact between continental (subalpine and Dinar) and maritime climate influences.

Čabar is rich in natural beauty (Risnjak National Park, Snježnik, unpolluted rivers, and beautiful springs of the Kupa and Čabranka rivers). It has relatively good climatic conditions, and there are no large industrial plants that would be potential polluters of the environment and nature. Čabar, as a mountain town, away from the railway, has been sheltered from the stronger influences of modern urbanization.

Delnice is the central and largest settlement of Gorski kotar and there is a typical mountainous continental climate. Until the Second World War, Delnice had a wide tourist market, as tourists came from all over the region.

Fužine is located 730 meters above sea level and is surrounded by picturesque mountains, the silence of centuries-old coniferous forests, and the beauty of its lakes. From the very beginning of the town's existence until today, Fužine's development largely relies on a very good traffic position and proximity to transit routes – once the Carolina Road, which connected the interior with the coast, as well as the railway. As for the climate, summer

temperatures rarely exceed 30 degrees, and warm nights are almost non-existent, so the summer climate is extremely pleasant, as are stable winter days with plenty of snow. Fužine is known for its clean mountain air precisely because of the bura wind, which is the prevailing wind for anticyclones. The basic accommodation capacities in Fužine were holiday resorts.

Lokve are located in the heart of Gorski kotar, at the foot of the peaks of Risnjak. The climate of this area is extremely mountainous: summers are short, fresh, and pleasant compared to long and harsh winters with plenty of snowfall. The tourist beginnings of this area are evidenced by the existence of the Society for the Beautification of Places as well as old postcards from 1898. It is necessary to mention the year 1953, when the route of the Louisiana road was changed. The hydro-accumulation Omladinsko (Lokvarsko) Lake was created, and Golubinjak became a protected good. All this has led to changes in the microclimate, which is now characterized by higher humidity and a more moderate course of temperatures.

Mrkopalj is known as the cradle of skiing in Croatia. Nearby is the natural phenomenon of the White and Samarske Rocks. Mrkopalj is a pleasant summer resort, as well as a ski resort in Gorski Kotar.

Ravna Gora is a younger Gorski kotar settlement whose origin is connected with the construction of the Karolina Road in 1725. Ravna Gora is located in the central part of Gorski Kotar on a plateau with an average altitude of 700-900 m. It is surrounded by hills – Bjelolasica, Višnjevica, and Suhi Vrh, on the one hand, and Javorov Kos and Kosica, on the other.

Skrad is located in the central mountain area along the Louisiana road (Cro. *Lujzijana*), which separates the place itself. Skrad has been known as a climatic recovery and resting resort since the end of the 19th century. Boarding house, later hotel "Zeleni Vir," was opened in 1919. The city of Zagreb built a resort in Skrad in 1933, and in 1938, a naval military resort was built. Primarius Dr. Slavko Basta (1922-2007) should be mentioned given that he spent years as the head of the Department of Pediatrics in Skrad (former military resort). From the former naval resort in the ancient pine forest, Primarius Basta gradually built an exemplary ward for, at that time very numerous, children with eating disorders, underdeveloped due to inadequate nutrition or poor social conditions, children suffering from asthma and recurrent respiratory infections and health conditions that could be improved by adequate nutrition and living in Gorski kotar, whereby he especially highlighted the favorable influence of climatic health remedies of Gorski kotar. He developed the entire system needed so that the Department could work all year round and have enough staff from Skrad and the surrounding area. In addition, he tried to make Skrad and its possibilities

known to other doctors. With that in mind, in 1982, he organized a symposium on children's respiratory diseases and climate treatment options, which was attended by dozens of pediatricians and school doctors from all over Croatia and other parts of the country.

It should be emphasized that the accommodation capacities in Skrad, Delnice, Fužine, and Lokve were established before their proclamation as climatic health resorts, and in Brod na Kupi, Crni Lug, Čabar, Mrkopalj and Ravna Gora after the proclamation. Gorski kotar can potentially develop as a destination of health and health resort tourism because it has opportunities and enough potential to improve and develop these specific forms of tourism.

Image 6. Health-tourist places in the Primorje-Gorski kotar County

Source: Modified according to the Primorje-Gorski kotar County, Archives Administrative Department for Spatial Planning, Construction, Environmental Protection and Nature Conservation, 2010.

REFERENCES

1. Alfier D. Pokušaj dijalektičkog objašnjenja pojave turizma. Turizam: Izbor radova. Zagreb: Institut za turizam. 1994: 152.
2. Amundsen AH, Klæboe R, Aasvang GM. Long-term effects of noise reduction measures on noise annoyance and sleep disturbance: The Norwegian facade insulation study. J Acoust Soc Am 2013;133(6):3921-8.
3. Andrija Štampar. Zagreb: Izdavački zavod Jugoslavenske Akademije - Tiskara Zagreb. 1958:54.
4. Arachon. Available at: http://en.wikipedia.org/wiki/Arcachon (accessed on 1 May 2022)
5. AromaVita učilište za aromaterapiju. Available at: http://aromavita.net/edukacija.html (accessed on 1 May 2022)
6. Archives of the Croatian Institute of Public Health. 2010.
7. Balabanić J. Simbolizam vode. Hrvatske vode 2003;11(44):219.
8. Beck EC. The Love Canal Tragedy. Available at: http://www.epa.gov/history/topics/lovecanal/01.html (accessed on 1 May 2022)
9. Bender T. et all. Hydrotherapy, balneotherapy, and spa treatment in pain management. Rheumatol Int 2005:220.
10. Berr C. et all. Olive oil and cognition: results from the three-city study. Dement Geriatr Cogn Disord 2009;28(4):363-64.
11. Buka okoliša - javnozdravstveni problem. Hrvatski časopis za javno zdravstvo Available at: http://www.hcjz.hr/old/clanak.php?id=12975.
12. Boylan M. Hippocrates. Internet Encyclopedia of Philosophy. 2006. Available at http://www.iep.utm.edu/h/hippocra.htm (accessed on 1 May 2022)
13. Bratović E. Thalassothepia Opatija 1957.-2007. Rijeka: Adamić. 2007:13.
14. Brozičević I. U povodu stote godišnjice zdravstvenog turizma u Crikvenici. Reumatizam 1988;35(2):3.
15. Capak K, Petrović G. Environmental health in Croatia – current status and perspectives. Period biol 2009;111(1):14.
16. Capak K. Zdravstvena ekologija - povijesni pregled i perspektiva. Farmaceutski glasnik 1999; 4:150-6.
17. Cappelli G, Dlaka I, Margan-Šulc A, Šimičić Đ, Šolić S, ed. Ljekoviti otok Lošinj. Zdravstveni turizam i prirodni ljekoviti činitelji lošinjskog otočja. Mali Lošinj: Grad Mali Lošinj, Jadranka d.d. Turistička zajednica Grada Maloga Lošinja. 2013.
18. Car A. et al. Thalasotherapia Crikvenica: stoljetna tradicija zdravstvene djelatnosti. Rijeka: Adamić. 2009:15.
19. Courmayeur. http://en.wikipedia.org/wiki/Courmayeur.

20. Covas MI. Benefits of the Mediterranean diet on cardiovascular disease. Future Cardiol 2007;6(3):577-578.
21. Cullimore HD. The book of climates: acclimatization, climatic diseases, health resorts and mineral springs, sea sickness, sea voyages, and sea bathing. Amazon. co.ok, Ltd. 2009:81.
22. Čepelak R. Balneološka (balneokemijska analiza termomineralnih voda i peloida. In: Ivanišević G, ed. Topličkі ljekoviti činitelji u Hrvatskoj. Zagreb: Akademija medicinskih znanosti Hrvatske. 2001:29.
23. Čepelak R, Domljan Z. Balneološki institut - potreba hrvatskog zdravstvenog turizma. In: Zbornik radova 1. Međunarodnog simpozija Opatija promotor zdravstvenog tuizma 1996:99-104.
24. Čepelak R. Sadašnje stanje balneoklimatologije u Hrvatskoj. Balneoklimatologija 1997;l(1):2-4.
25. Čepelak R. Kratki povijesni pregled istraživanja termomineralnih voda u Hrvatskoj. Balneoklimatologija 1998;2(1):3-8.
26. Čepelak R. Revitalizacija balneološke službe, put pravilnom gospodarenju termomineralnim vodama Hrvatske. Zbornik radova 2. Hrvatske konferencije o vodama. Dubrovnik 1999:1097-1104.
27. Čepelak R. Revitalizacija Zavoda za fizikalnu medicinu i rehabilitaciju ranije Balneološko-klimatološkog instituta i dalje neriješeno pitanje? Balneoklimatologija 1998;2(2):23.
28. Čorak S. et al. Hrvatski turizam - plavo, bijelo, zeleno. Zagreb: Institut za turizam. 2006:215.
29. Čvoriščec B. Predgovor. In: Skupnjak B, Čvoriščec B, Ivanišević G, ed. Klimatske promjene i njihov utjecaj na zdravlje. Zagreb: Akademija medicinskih znanosti Hrvatske, Hrvatsko društvo za zdravstvenu ekologiju Hrvatskoga liječničkog zbora. 2002:7.
30. Ćurković B et al. Fizikalna i rehabilitacijska medicina. Zagreb: Medicinska naklada. 2004:49.
31. Davos as a health resort, handbook. 1907.
32. de Lorgeril M et all. Mediterranean diet and the French paradox: two distinct biogeographic concepts for one consolidated scientific theory on the role of nutrition in coronary heart disease. Cardiovasc Res 2002;54(3):515.
33. Do we need a new holistic approach. Available at: http://www.ismh10en.com/2010/02/15/do-we-need-a-new-holistic-approach-to-health-resort-medicine-balneology-medical-hydrology-and-climatology (accessed on 1 May 2022)
34. Dubrović E (ed.) Opatija promotor zdravstvenog turizama. Knjiga spomen izložbe u povodu izložbe Opatija promotor zdravstenog turizma. 1996:1-40.
35. Environmental Change and Forced Migration Scenarios (EACH-FOR). Available at: http://www.each-for.eu

36. Fatović-Ferenčić S, Ivanišević G, ed. Zbornik radova. Liječenje vodom: pristupi i paradoksi, Zagreb 2003. Hrvatske vode 2003;11(44):209-364.
37. Five reasons to go to Grado. Italy. http://www.tntmagazine.com/travel/destinations/europe/italy/feature/Five-reasons-to-go-to-Grado_2C00_-italy.aspx.
38. Foehn. Available at: http://www2.snowfactory.com/news/hr/news/foehn-storm-over-the-alps/.
39. Professional documentation fund and archives of the Institute of Physical Medicine and Rehabilitation.
40. Frosch WA. "Taking the waters" - springs, wells, and spas. FASEB J 2007 Jul;21(9):1948.
41. Master plan for the development of tourism in the Primorje-Gorski Kotar County. Annex I – destination: Gorski kotar, Rijeka, 2005:55. http://www.uniri.hr/gprt.
42. Yearbook of the Balenological and Climatological Institute Zagreb. 1952.
43. Goldberg J, et al. O klimatoterapiji našega mora. Zagreb: Naklada Liječničkog vijesnika. 1940.
44. Gorski kotar. http://www.gorskikotar.hr/DestinationDetails/41/lang/Croatian/Crni-Lug.wshtml. Turistička zajednica općine Fužine. http://www.fuzine.hr.
45. Grossi F. Parks and hydro-mineral springs in the classical world and in the contemporary era. Place in therapeutics. Clin Ter 1997;148(11):549-65.
46. Hardwicke HJ. Health Resorts and spas, or climatic and hygienic treatment of disease. General books LCC. United Kingdom. 2009:39.
47. Haramustek B, Miholić S, Trauner L, ed. Godišnjak Balneološko-klimatološkog instituta NR Hrvatske. Zagreb: Ministarstvo narodnog zdravlja NRH. 1952:1-162.
48. Hunziker W, Krapf K. Grundriss der allgemeinen Fremdenverkehrslehre. Seminars für Fremdenverkehr und Verkehrspolitik an der Handels-Hochschule St. Gallen. Zurich: Polygraphischer Verlag AG. 1942.
49. Ivanišević G. (ed.) 300 godina balneoloških analiza u Hrvatskoj. Zagreb: Akademija medicinskih znanosti Hrvatske; 2009.
50. Ivanišević G. Iskorištavanje ljekovitih klimatskih činitelja u medicini. In: Skupnjak B, Čvoriščec B, Ivanišević G, ur. Klimatske promjene i njihov utjecaj na zdravlje. Zagreb: Akademija medicinskih znanosti Hrvatske, Hrvatsko društvo za zdravstvenu ekologiju Hrvatskoga liječničkog zbora; 2002:75-85.
51. Ivanišević G, ed. Lječilišna medicina, hidroterapija, aromaterapija. Zagreb: Akademija medicinskih znanosti Hrvatske; 2008.
52. Ivanišević G, ed. Lječilišna medicina i turizam. Zagreb: Akademija medicinskih znanosti Hrvatske; 2010.
53. Ivanišević G. Lječilišna medicina u Hrvatskoj. In: Ivanišević G, ed. Lječilišna medicina, hidroterapija, aromaterija. Zagreb: Akademija medicinski znanosti Hrvatske. 2008.
54. Ivanišević G. (ed.) Lječilišta, zdravlje, stress. Zagreb: Akademija medicinskih znanosti Hrvatske; 2007.

55. Ivanišević G. Pojmovnik balneoklimatologije i prirodnih ljekovitih činitelja u Hrvatskoj. Zagreb: Akademija medicinskih znanosti Hrvatske; 2001.
56. Ivanišević G. (ed.) Prirodna lječilišta - hrvatski brand. Zagreb: Akademija medicinskih znanosti Hrvatske; 2009.
57. Ivanišević G. (ed.) Prirodni ljekoviti činitelji u Hrvatskoj. Zagreb: Akademija medicinskih znanosti Hrvatske; 2000.
58. Ivanišević G. Prirodni ljekoviti činitelji u liječenju reumatskih bolesti. Priručnik za bolesnike. Zagreb: Društvo reumatičara za djecu i odrasle; 2007.
59. Ivanišević G. Prirodni ljekoviti čimbenici (činitelji) u medicini. In: Đurđica Babić-Naglić et al. Fizikalna i rehabilitacijska medicina. Zagreb: Medicinska naklada. 2013:191-196.
60. Ivanišević G. Prirodni ljekoviti činitelji u hrvatskoj medicini. Medix 1999;5(24):86-89.
61. Ivanišević G. (ed.) Prirodni ljekoviti činitelji u promicanju zdravlja čovjeka u 21. stoljeću. Zagreb: Akademija medicinskih znanosti Hrvatske; 2002.
62. Ivanišević G. (ed.) Morski ljekoviti činitelji u Hrvatskoj. Zagreb: Akademija medicinskih znanosti Hrvatske; 2000.
63. Ivanišević G. (ed.) Talasoterapija, kineziterapija i aromaterapija u Hrvatskoj. Zagreb: Akademija medicinskih znanosti Hrvatske. 2013.
64. Ivanišević G. (ed.) Topli̇čki ljekoviti činitelji u Hrvatskoj. Zagreb: Akademija medicinskih znanosti Hrvatske; 2001.
65. Ivanišević G. (ed.) Zdravlje i turizam u Hrvatskoj. Zagreb: Akademija medicinskih znanosti Hrvatske; 2012.
66. Ivanišević G. (ed.) Zdravlje, kultura, priroda. Zagreb: Akademija medicinskih znanosti Hrvatske; 2009.
67. Ivanišević G. (ed.) Zdravlje - kvaliteta života. Zagreb: Akademija medicinskih znanosti Hrvatske; 2006.
68. Ivanišević G. (ed.) Zdravstveni turizam i prirodni ljekoviti činitelji u Hrvatskoj. Zagreb: Akademija medicinskih znanosti Hrvatske; 2003.
69. Ivanišević G. (ed.) Zdravstveni turizam u Hrvatskoj. Zagreb: Akademija medicinskih znanosti Hrvatske; 2001.
70. Ivanišević G. (ed.) Zdravstveni i lječilišni turizam - metode i programi. Zagreb: Akademija medicinskih znanosti Hrvatske, 2005.
71. Ivanišević G. Zdravstveni turizam i Akademija medicinskih znanosti Hrvatske. Zagreb: Akademija medicinskih znanosti Hrvatske; 2003.
72. Ivanišević G. (ed.) Zdravstveni turizam i baština. Zagreb: Akademija medicinskih znanosti Hrvatske; 2012.
73. Ivanišević G. (ed.) Zdravstveni turizam i vrednovanje prirodnih ljekovitih činitelja u Hrvatskoj. Zagreb: Akademija medicinskih znanosti Hrvatske. 2002.

74. Ivanišević G. (ed.) Zdravstveni turizam: medicina i kultura. Zagreb: Akademija medicinskih znanosti Hrvatske; 2010.
75. Ivanišević G. (ed.) Zdravstveni turizam, prehrana, kretanje i zaštita okoliša u rvatskoj. Hrvatskoj. Zagreb: Akademija medicinskih znanosti Hrvatske. 2004.
76. Ivanišević G. (ed.) Zdravstveni turizam: zdravlje, voda, kultura. Zagreb: Akademija medicinskih znanosti Hrvatske. 2011.
77. Ivanišević G. (ed.) Zdravstveno-lječilišne destinacije u Hrvatskoj. Zagreb: Akademija medicinskih znanosti Hrvatske; 2011.
78. Jeger EI. Naftalan. Zbornik. Tbilisi. 1904.
79. Jones W.H S. Hippocrates. Collected Works I. Cambridge: Harvard University Press. 1868. Available at: http://daedalus.umkc.edu/hippocrates/HippocratesLoeb1/page.ix.php (accessed on 1 May 2022)
80. Jurdana S. Aus der Geschicte der thalassotherapeutischen Kangress und Tagungen, Thalassotherapie. Immenstadt, Grabe – Verlag. 1993:40.
81. Jurdana S. Klimatski i meteorološki faktori Crikvenice. Reumatizam 1988;35(2):93.
82. Kesić B. Zdravlje. Medicinska enciklopedija 1970;6:623-624.
83. Klarić I, Jurdana S, Klarić I. Hipokratova talasoterapija od antike do modernog talasoterapijskog centra u Crikvenici. Acta medico-historica Adriatica 2007;5(1):128.
84. Knežević R, Knežević, D. Pravilnik o proglašenju turističkih mjesta iz 1936. godine i njegov utjecaj na razvitak zdravstvenog turizma u Planinskoj Hrvatskoj. 2010.
85. Knežević R. Analiza zdravstvenog turizma u Gorskom kotaru. In: Ivanišević G.(ed.) Prirodna lječilišta - hrvatski brand. Zagreb: Akademija medicinskih znanosti Hrvatske. 2009:131.
86. Kraml O, ur. I. Balneološki skup "Dr. Ivan Šreter." Lipik: Specijalna bolnica za medicinsku rehabilitaciju Lipik. 2012:1-64.
87. Kušen E. Klima – važan čimbenik turističke ponude. Ugostiteljstvo i turizam 1995;(7/8):20.
88. Lelas V. Uloga Hrane u zdravlju čovjeka, In: Ivanišević G. (ed.) Lječilišta, zdravlje, stres. Zagreb: Akademija medicinskih znanosti Hrvatske. 2007:74.
89. Lopašić R. Važnost balneoterapije u Modernoj medicini. Liječnički vjesnik 1938;60(8):1-9.
90. Linn T. The health resorts of Europe, a medical guide to the mineral springs, climatic, mountain, and seaside health resorts, milk, whey, grape, earth, mud, sand and air cures of Europe. D. Appleton and company, New York. 1891:168.
91. Health resort Lošinj. Available at: http://www.ljeciliste-veli-losinj.hr (accessed on 1 May 2022)
92. Malaga. Available at: http://www.malaga.com/v/geography (accessed on 1 May 2022)

93. Fragrances and Flavors of Lošinj. Available at: www.tz-malilosinj.hr/MiomirisiIOkusiLosinja.aspx (accessed on 1 May 2022)
94. Fragrant island garden. Available at: http://www.miomirisni-vrt.hr (accessed on 1 May 2022)
95. Miholić S. Povijest mineralnih voda u Hrvatskoj. In: Iz Hrvatske medicinske prošlosti. Zagreb: Spomen knjiga zbora liječnika Hrvatske. 1954:107-114.
96. Mirić D, Vlahović D. i suradnici. Zdravlje i turizam. Split: Hrvatsko kardiološko društvo - ogranak Split, Turistička zajednica Županije splitsko - dalmatinske. 1998:I-XVI,1-452.
97. Mirić D, Vlahović D. et al. Suvremeni život i srce. Split: Hrvatsko kardiološko društvo - ogranak Split, Turistička zajednica Županije splitsko - dalmatinske. 2001:I-XVII,1-615.
98. Naftalan Special Hospital for Medical Rehabilitation. Available at: http://www.naftalan.hr/
99. Novak R. Fizikalna svojstva peloida s posebnim svojstvom osvrtom na muljeve Jadranske obale i otoka. Zdravstvo 1981;23(11-12):1064.
100. Novak R. Razvitak i zadaci kemijske analize ljekovitih voda. Bilten Udruženja prirodnih lječilišta NRH 1959;5(7):3-10.
101. Novi Vinodolski. Available at: http://hr.wikipedia.org/wiki/Novi_Vinodolski
102. Peloid. Available at: http://www.merriam-webster.com/medical/peloid (accessed on 1 May 2022)
103. Pepeljnjak S. Pregled antimikrobnog djelovanja eteričnih ulja bilja Hrvatske. In: Ivanišević G, ed. Zdravlje, kultura, priroda. Zagreb: Akademija medicinskih znanosti Hrvatske. 2009:35.
104. Pepeljnjak S, Šegvić Klarić M. Aromaterapija – hrvatski brand: antifungalno djelovanje aerosola eteričnih ulja. In: Ivanišević G, ed. Prirodna lječilišta - hrvatski brand. Zagreb: Akademija medicinskih znanosti Hrvatske. 2009:46.
105. Perko S, Perko G. Aromaterapija i stariji ljudi u zdravstvenom turizmu. In: Ivanišević G. (ed.) Zdravstveni turizam i prirodni ljekoviti činitelji u Hrvatskoj. Zagreb: Akademija medicinskih znanosti Hrvatske. 2003:167.
106. Perko S. et al. Aromaterapija i njene mogućnosti u obogaćivanju ponude zdravstvenog turizma. In: Ivanišević G. (ed.) Zdravstveni turizam i vrednovanje prirodnih ljekovitih činitelja. Zagreb: Akademija medicinskih znanosti Hrvatske. 2002:296.
107. Pleško N, Goldner V, Hančević J. et al. Karakteristike vremenskih prilika u sedmodnevnom periodu s velikom brojem infarkta miokarda u Zagrebu. Acta Med Jug 1983;13-17.
108. Podobnik-Takač T. Prirodni ljekoviti činitelji Ivanić-Grada. In: Ivanišević G, ed. Topli čki ljekoviti činitelji u Hrvatskoj. Zagreb: Akademija medicinskih znanosti Hrvatske.2001:75.
109. List of tourist places in Yugoslavia from 1936. Turizam. 34(9):293-296.

110. Population growth. Available at: http://en.wikipedia.org/wiki/Population_growth
111. Potrebica S, Luetić A. Prirodni ljekoviti činitelji Varaždinskih Toplica. In: Ivanišević G. (ed.) Topli čki ljekoviti činitelji u Hrvatskoj. Zagreb: Akademija medicinskih znanosti Hrvatske. 2001:110.
112. Ordinance on Scientific and Artistic Areas, Fields and Branches. Official Gazette n. 118, 2009. Available at: http://narodne-novine.nn.hr/clanci/sluzbeni/2009_09_118_2929.html (accessed on 1 May 2022)
113. Ordinance on the Proclamation of Tourist Municipalities of 1936. Turizam. 34(10):263-264.
114. Available factors of Kvarner tourism development. Master plan for tourism development of the Primorje-Gorski Kotar County. Rijeka. 2005:67. http://www.uniri.hr/gprt.
115. Reich MR. Environmental politics and science: the case of PBB contamination in Michigan. Am J Public Health 1983;73(3):302-13.
116. Roša J, Ajhner G. Šume u funkciji zdravstvenog turizma otoka Lošinja. In: Ivanišević G. (ed.) Zdravstveni turizam, prehrana, kretanje i zaštita okoliša u Hrvatskoj. Zagreb: Akademija medicinskih znanosti Hrvatske. 2004: 125.
117. Roša J. Biološka raznolikost šuma u Hrvatskoj i njihovo korištenje u lječilišnoj medicini (toplicama). In: Ivanišević G, ed. Lječilišna medicina, hidroterapija, aromaterapija. Zagreb: Akademija medicinskih znanosti Hrvatske. 2008:31.
118. Roša J. Šuma - hrvatski ekološki brand. In: Ivanišević G, ed. Prirodna lječilišta - hrvatski brand. Zagreb: Akademija medicinskih znanosti Hrvatske. 2009:54.
119. Roša J. Zdravstvena funkcija šuma. In: Ivanišević G, ed. Zdravlje - kvaliteta života. Zagreb: Akademija medicinskih znanosti Hrvatske. 2006:50.
120. Rožanić I, ed. I. međunarodni simpozij Opatija-promotor zdravstvenog turizma. Zbornik radova. Opatija: Thalassotherapia, Hotelijerski fakultet Opatija, Hrvatsko-austrijsko društvo. 1996:1-347.
121. Rožanić I. (ed.) Zbornik radova. Treći znanstveno-stručni skup "Zdravstveni turizam za 21. stoljeće". Opatija: Thalassotherapia, Fakultet za turistički i hotelski menadžment Opatija. 2000:I-XII,1-390.
122. Scarmeas N et al. Mediterranean diet and Alzheimer disease mortality. Neurology 2007;11(69):1085.
123. Simper S. A century of health and sea bathing tourism in Lovran: one hundred years from issuing the first therapy regulations (1909-2009). Acta medico-historica Adriatica 2009;7(1):145.
124. Singer C, Ashworth Underwood E. Short History of Medicine. Oxford University Press. Library of Congress ID: 62-21080. 1962. written at New York and Oxford.
125. Skupnjak B, Čvoriščec B, Ivanišević G, ed. Klimatske promjene i njihov utjecaj na zdravlje. Zagreb: Akademija medicinskih znanosti Hrvatske, Hrvatsko društvo za zdravstvenu ekologiju Hrvatskoga liječničkog zbora. 2002:1-87.

126. Stilinović B, Vodopija I, ed. Aromaterapija, zaštita zdravlja i obogaćenje turističke ponude Hrvatske. Zagreb: Družba braće hrvatskog zmaja. 1998:1-182.

127. tilinović B, Pepeljnjak S, ed. Aromaterapija i biljni lijekovi u zdravstvenoj ponudi Hrvatske. Ičići: Revelin d.o.o. 2001:1-185.

128. Šeparović A. Vela Luka, turizam i zdravstveni turizam. Vela Luka: Matica Hrvatska. 2005: 84.

129. Šimičić Đ. Miomirisi i okusi Lošinja. In: Ivanišević G, ed. Lječilišna medicina, hidroterapija, aromaterapija. Zagreb: Akademija medicinskih znanosti Hrvatske. 2008145-146.

130. "Andrija Štampar" School of Public Health. Available at: http://www.snz.hr

131. Šuma. Available at: http://hr.wikipedia.org/wiki/šuma

132. The European Charter and commentary. Copenhagen. WHO Regional. Office for Europe. 1990. (European Series No. 35).

133. Tomek-Roksandić S. et al. Aromaterapija i hidroterapija hrvatskog mora – izazov razvoja zdravstvenog turizma za europsko starije pučanstvo. In: Ivanišević G, ed. Lječilišna medicina, hidroterapija, aromaterapija. Zagreb: Akademija medicinskih znanosti Hrvatske. 2008:129.

134. Trauner L. Razvoj balneoklimatologije u Hrvatskoj u poslijednjih 80 godina. In: Iz Hrvatske medicinske prošlosti. Zagreb: Spomen knjiga Zbora liječnika Hrvatske. 1954:271-275.

135. Trichopoulou A, Bamia C, Trichopoulos D. Anatomy of health effects of Mediterranean diet: Greek EPIC prospective cohort study. BMJ 2009:23.

136. Tourist Board of the town of Kraljevica. Available at: http://www.tzg-kraljevica.hr/znamenitosti.php.

137. Tourist Board of the town of Raba. Available at: http://www.tzg-rab.hr/hrv/otok/press.php.

138. Tourist Board of the municipality of Baška. Available at: http://www.tz-baska.hr.

139. Tourist Board of the municipality of Omišalj. Available at: http://www.tz-njivice-omisalj.hr.

140. Tourist Board of the Primorje-Gorski kotar County. Available at: http://kvarner.hr/staze-setnice/gorski.html.

141. Association for the Medical Tourism Development. http://www.umt.hr.

142. Decree on the Balneological-Climatological Institute in Zagreb. Official Gazette 1951;113 /9/:(20): 90.

143. Uremović V, Vukelić I, Gobić J. Počeci i razvoj talasoterapije i zdravstvenog turizma u Crikvenici. Acta medico-historica Adriatica 2006;4(2):249.

144. Turizam. Opća enciklopedija Jugoslavenskog leksikografskog zavoda 1982;8:340.

145. Valić F. et al. Zdravstvena ekologija. Zagreb: Medicinska naklada. 2001:65.

146. Vrgožić P, Jakić-Razumović J, Pašić A. Učinak naftalana na epidermalnu proliferaciju i broj CD3, CD4 i CD8 limfocita. MEDIX 2003;9(50):63.

147. Waterman E, Lockwood B. Active components and clinical applications of olive oil. Altern Med Rev 2007;12(4):342.

148. Weber H. Climathotherapy and Balneotherapy; the climates and mineral water health resorts (spas) of Europe and North Africa, including the general. General Books, Memphis, USA. 2010: 63.

149. Vegeta Mediteran – Vegeta. Available at: http://www.vegeta.com.hr/products/vegeta-mediteran (accessed on 1 May 2022)

150. Wigle DT, Arbuckle TE, Turner MC, Bérubé A, Yang Q, Liu S, Krewski D. Epidemiologic evidence of relationships between reproductive and child health outcomes and environmental chemical contaminants. Toxicol Environ Health B Crit Rev 2008 May;11(5-6):373-517.

151. Yarnell JW, Evans AE. The Mediterranean diet revisited--towards resolving the (French) paradox. QJM;93(12):783-785.

152. Yeo I B. The therapeutics of mineral springs and climates. Milton Keynes. United Kingdom. 2010:538.

153. Yeo IB. Climate and health resorts. GmbH, Leipzig, Germany. 2009:361.

154. Food Act. Official Gazette 46/2007.

155. Forest Act. Official Gazette 140/2005.

156. Zaninović K. et al. Klimatski atlas Hrvatske. Zagreb: Državni hidrometeorološki zavod. 2008:15-17.

157. Zima Z. In memoriam, nekrolog Prim. dr. Slavko Basta 1922.-2007. Paediatria Croatica 2008;52(2):123.

158. Wintering Abroad: The French Riviera. Available at: http://www.jstor.org/stable/20421489.

ISBN 978-953-8447-02-0
Faculty of Health Studies Rijeka

ISBN 978-953-8341-32-8
Faculty of Medicine Rijeka