

Via Ferrata as an innovative technology of health-improving physical culture

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Abstract. Via ferrata is a phenomenon that has long been known in mountain tourism and is becoming increasingly widespread every year. Currently, it is increasingly developing in Russia, and its popularity is actively growing. Via ferrata is a professional term. It marks a section of the rock route equipped with special metal structures. These devices on a difficult rocky area can significantly speed up passing along the route and save energy costs to overcome it. The purpose of the study is to develop a project that includes the development of this type of sports tourism in the Black Sea regions of Russia. The objectives of the study are to study the history and recreational potential of via ferrata, as well as to develop a project and justify its effectiveness. The subject of the study, as an example, is the designed via ferrata route along a natural formation on the eastern wall of the Ai-Petri rock massif in Crimea. The scientific and practical significance of this study lies in the development of a potentially interesting project from a recreational point of view, using a natural object of the Crimean mountain forest nature reserve, as well as the presence of a technical justification for it, which can subsequently be proposed for the project implementation.

Keywords: health-improving, physical culture, technology, via ferrata.

Introduction

ViaFerrata literally means “iron path” in Italian. In German via ferrata is called “Klettersteig”. In modern sports (climbing) jargon, 2 names are used for the “fanatics” of these areas: “Ferratist” and “Verticalo”, of which the first is more common.

A modern ferrata is a rock route laid along a permanently fixed steel cable stretched between metal stakes driven into the rock. If necessary, to facilitate the passage of the route, rods and brackets are driven in, steps and ladders are installed, additional cables and bridges are hung. Thus, via ferrata makes movement along a seemingly inaccessible rock safe and accessible even for those who have never tried themselves as a rock climber [1].

Thus, via ferratas can be anything from horizontal to vertical - and with all angles in between. Typically, they cross a mountain ridge, circle a mountain, or climb to a peak. The

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via ferrata route is safer than the rock climbing route, and is also faster and easier than rock climbing (no need to hang a lot of equipment or use a rope).

There are two main types of via ferrata:

- Routes that were originally created for sport climbing. There is another, easier route that can be taken to get from the beginning to the end of the via ferrata. For example, the via ferrata at the Honister Slate Mine in England could easily be walked if you just want to climb the mountain.

- Routes that make the only accessible route from point A to point B. This is the only way to get there without climbing equipment, and the via ferrata was created to make it safer for non-climbers. For example, the peak of Triglav, the highest mountain in Slovenia, can only be reached this way.

But you shouldn't treat ferratas as a banal attraction for beginners. Most routes take place in mountainous areas with difficult terrain and changeable climate, and ferratas of difficulty D and above can be a serious test for experienced climbers, even in ideal weather. But we'll talk about the gradation of ferrata complexity later [2].

Methods

Unlike classical rock climbing, climbers on the ferrata route have three important advantages:

- The athlete is always securely insured with at least one carabiner.
- Even on the most difficult ferratas, the climber has something to grab onto - at least a thick steel cable, as well as brackets, pins, and so on.
- No time and effort is wasted on organizing belay stations; they are already made, and in a thorough, ultra-reliable design.

Ferrate routes can be very different. These can be short twenty-minute tracks in the so-called ferrata arenas on rock walls with many routes of varying difficulty and a simple, convenient descent, and often with a cafe at the end of the tracks. There may also be long routes that take the whole day, with ascent to three-thousand-meter peaks and descent through glaciers. There may also be multi-day traks from shelter to shelter along a whole system of extended ferratas. The use of all European ferratas without exception is completely free [3].

There are several difficulty scales for ferrata routes - Italian, French, Austrian and two German (Hüsler and Werner).

Most publications and guidebooks use the Austrian scale (A-B-C-D-E) with intermediate values (for example, C/D).

The International Mountaineering and Climbing Federation UIAA tried to create a single scale, but it has not yet been recognized by all national associations, which has added further confusion. In the following, when describing the difficulty of ferrata routes, we use an international scale based on the Italian CAI classification, but with German/Austrian notations.

Rain greatly complicates any ferrata; wet surfaces, especially metal ones, slip. There is a risk of hypothermia; frozen hands no longer reliably hold support points.

Thunderstorms are a deadly danger on ferratas, especially on the peaks and ridges. A steel cable turns from a reliable insurance into a dangerous conductor of static electricity and, even in the absence of lightning strikes, can cause electric shock [4].

Snow makes it very difficult to move along the ferrata, covering the safety rope and preventing the carabiners from being pulled along it. Snow covered areas are very common in the Alps at the beginning or end of the season.

The negative air temperature greatly complicates the use of metal elements of the ferrata; wet gloves stick to them, practically eliminating the use of staples by hand. Gloves and an ice ax help.

Heavy fog, twilight and darkness can dramatically complicate movement along the ferrata, since the routes are not designed for such conditions and are not equipped with reflective markings.

The customers for the construction of via ferratas are, as a rule, national mountaineering associations. In the design and installation of a via ferrata, the first section of the route is usually more or less equal in complexity to the most difficult sections of the entire route. Thus, a climber who has climbed this part of the ferrata can count on the fact that he will not encounter any more difficult sections than the one he has just climbed[5].

Mandatory equipment for ferrata routes

To safely pass the ferrata, a special kit is required, consisting of a harness, a climbing helmet and special ferrata mustache shock absorbers (Figure 1). The whiskers have two safety-locked K-type carabiners and a dynamic energy absorber that softens the jerk in the event of a stall.



Fig. 1. In order from left to right: harness, climbing helmet, ferrate mustache

Absorption of falling energy occurs during the rupture of the seams with which the durable tape is stitched inside the absorber. If it fails, the absorber is destroyed and must be replaced.

All equipment must comply with the requirements of the International Federation of Mountaineering and Climbing UIAA and be certified [6].

The logic behind using a ferrata kit is that at every moment you are on the ferrata you must be covered by at least one strand that is why there are two of them in a ferrata kit. When you reach the end of the section, you need to sequentially click both carabiners from one section of the steel cable to another - and with two carabiners you will not be left without insurance for a second.

Results

The real ferrata boom began in 1970. The first routes similar to those we see now began to appear. By the beginning of 2000, there were already more than a hundred of them in France alone [7].

Currently:

There are more than 400 via ferratas in Italy, more than half of them are located in the Dolomites.

With more than 550 “klettersteig”, Austria is perhaps the country that has embraced via ferrata most enthusiastically. Together with regional branches of the OAV (Austrian Alpine Club), the Austrian via ferrata is promoted as a way to get to know nature.

There are approximately 180 via ferratas in Germany. Most of them can be moved without special equipment. Many of them are located in the southern regions, close to the Austrian border.

In Russia, the first via ferrata can be considered the Skoba route, located near the Altyn-Kez rock, also called Morcheki’s Tooth in the Crimea. The “Skoba” trail is mentioned in the geological reports of the early 30s of the Kuchuk-Koy landslide station. Geologists climbed along it to carry out routine observations of the giant landslide. According to other information from local residents, the brackets were laid by Quarry workers for hunting. The Skoba trail begins at the fork of the Parkovy and old Sevastopol highway above the village of Beketovo.

The first via ferrata in Russia, created according to European standards, was created in 2006 by the guides of the Adventure Workshop in Sochi, in the Krasnaya Polyana region. Over the next decade, 4 more routes were established in the same area.

In 2019, the Via Ferrata “Canyon” was created in the Aktru Valley in Altai, with a total length of 700 meters. The route line is laid along one of the most beautiful canyons of the South-Eastern slope of the Kzyltash peak. The via ferrata is equipped with a metal safety rope and brackets in difficult places. There are observation decks and places to relax. The via ferrata ends on a simple gentle slope, from where you can start descending on foot towards the Aktru base or continue the pedestrian part up to Lake Tronova. Provision of work and management was carried out by the International Academy of Mountains. In 2020, 2 more route branches were added. At the end of the summer of 2023, another line was added to the three existing via ferratas in the Altai region of Aktru. A 300-meter route was installed on the rocky southern slope of Mount Kzyltash. The via ferrata turned out to be simple, entry-level with observation platforms and a suspension bridge. The route was given the name “Forest”, because most of the way climbers move along picturesque sloping terraces, surrounded by cedars and larches.

The opening of the first route of the Crimean via ferrata on Mount Ilyas-Kaya (section A-B) took place during the “Great Sevastopol Trail 2018” festival. The route was visited by more than 300 people during three days. In January - March 2019, as part of the development of the Great Sevastopol Trail (GST) project, a new route was equipped - a via ferrata along the lower part of the South Wall of Delikli-Burun with access to the beginning of the already existing via ferrata along the horizontal ridge of Delikli-Burun - Ilyas-Kaya. Thus, the length of the existing via ferrata increased to 2300 meters [8, 9].

In June 2019, another route was added (D - F). It begins on a wooded shelf under the upper tier of the South Wall of Delikli-Burun and passes through the vertical upper tier of the South Wall. This route also goes to the existing via ferrata “Delikli-Burun - Ilyas-Kaya”, but not to its beginning, but to the highest point of its horizontal ridge. Thus, a full-fledged route for advanced via ferrata climbing enthusiasts appeared.

In October 2019, in preparation for the festival "Great Sevastopol Trail 2019", section W-E was added, thus increasing the total length of the via ferrata on Ilyas-Kaya to 3300 meters. The new section is designed for less prepared tourists, including children.

The routes were created by the Morcheka Technology group of companies commissioned by the Sevastopol Tourism Development Center.

In 2019, the Morcheka Technology group of companies, commissioned by the Sevastopol Tourism Development Center, equipped 10 routes for sport climbing with bottom and top ropes of various difficulty categories (from F5b to 6b) on the eastern wall of Orta Kaya, as well as a training via ferrata. This mountain route includes an ascent along a vertical rock wall about 30 meters high, a horizontal crossing on steel ropes about 30 meters long, a 40-meter traverse along rock shelves and a descent to the starting point. This via ferrata is accessible to almost everyone, including children over 6 years old. It can be used as a training route before climbing the longer and more difficult sections of the via ferrata on Mount Ilyas Kaya [11, 12].

Also in May-June 2021, a complex of via ferrata routes "Batiliman – Laspinsky Pass" was equipped, with a total length of about 1200 meters. One of the main advantages of the Batiliman – Laspinsky Pass via ferrata is the close proximity of the starting and ending points to roads, parking lots, public catering outlets and other infrastructure.

Discussion (Promising project "Via ferrata at Miskhor Grottoes" in Crimea)

The Miskhor grottoes are an amazing natural formation on the rock wall of the Ai-Petri massif (Eastern Wall). The Ai-Petri Plateau is a yayla (plateau) in the western part of the Main Range of the Crimean Mountains. In the southwest it borders on the Baydarskaya Yayla, in the northeast it smoothly turns into the Yalta Yayla. The average height is from 1200-1300 m above sea level in the east to 600-700 m in the west. The highest point of the yayla is Mount Roka (1349 m, located in the extreme northeast of the yayla), the second highest mountain Bodene-Kyr is 1320 m, and the most famous is the picturesque peak of Ai-Petri (1234 m). The average height of the plateau gradually decreases from 1200-1300 to 600-700 meters above sea level from Mount Roka in the east to the Baydar Gate in the west. In the vicinity of Kastropol, Mukhalatka and Foros, the yayla cliffs come very close to the seashore. Most of the yayla (south, in the territory of the Yalta urban district) is part of the Yalta Mountain Forest Reserve, the western part in the territory of Sevastopol is occupied by the Baydarsky reserve, the eastern part in the Bakhchisaray district is occupied by the Ai-Petrinskaya yayla reserve. The Miskhor grottoes are part of the cave system of the Ai-Petri karst plateau. But as a result of the landslide cavities, usually hidden in the depths, turned out to be exposed towards the southern coast of Crimea. These cave formations were first explored by the legendary pioneers of Crimean rock climbing and speleology in 1960.

The grotto system consists of 3 halls deep in the massif and one very large and very shallow grotto. In fact, it is just a recess in the wall. There are no stalactites and stalagmites in the Miskhor grottoes, but there are various influxes of rocks created by water during thousands of years. The largest underground hall is 15 m wide and up to 50 m long. But the most interesting is the third, lower, hall with "windows" - three openings to the outside. From these "windows" a beautiful panorama of the South Coast opens [13].

The main problem due to which this object remains inaccessible to a large number of tourists is its technical complexity. Due to the fact that the grottoes are located on a steep wall, it is possible to get there only with the help of climbing equipment, descending by rope from the plateau. This method of visiting requires the accompaniment of a certified instructor who has all the necessary skills. Thus, this facility remains inaccessible to a large

number of people. Equipping this facility with a via ferrata will not only increase the flow of tourists passing through it, but also everyone will be able to learn new skills in moving along rocky areas and enjoy the nature of Crimea and its recreational properties [14].

The approach to this route passes along the Koreiz trail - it, like many Crimean walking trails, was laid not for pleasure, but for the healing of walkers. By passing them, a person provides himself with enhanced ventilation of the lungs with air filled with pine phytoncides, sea salt and other substances beneficial to health. Thus, the recreational effect of this route increases (Figure 2).

This via ferrata passes not only along the outer side of the rock, but also through speleological objects, since after the first rope, on the rock shelf there is a well that opens into the cave. There are two more wells in the cave: the first is about 20 meters deep and ends in a dead end, although it has the potential to reveal an entire system. The second one is small, only 5 meters deep, it opens into a hall in which there are three windows opening onto the panorama of Greater Yalta. From the hall there is a final well about 15 meters long, ending in a small rock shelf. From there, to the very base of the rock, the route goes along the outer wall.



Fig. 2. Scheme of the Crimean new via ferrata route (author's project of 2017, modified in accordance with modern technical conditions)

Conclusions

Summarizing the results of the study, we can highlight the factors confirming the relevance of the implementation of this project:

-Thanks to its very beautiful location, this via ferrata has a unique aesthetic effect on a person, it may be of interest to a large number of tourists, since it is located on the most popular mountain of Crimea, and will easily fit into a number of other tourist attractions on Ai-Petri, such as a cable car, a bridge on battlements, Ai-Petrin caves and paths.

-The via ferrata at the Miskhor grottoes has a noticeable recreational effect, since being outdoors in one of the sunniest places in Russia, a person receives a dose of vitamin D, and also, moving along the via ferrata, or along a path, the tourist actively breathes, filling the lungs with healing Crimean air, the restorative properties of which were studied back in the 19th century.

-Also, walking the via ferrata is an excellent workout that helps strengthen the muscles of the legs, arms, back, buttocks and abdominals. Via Ferratas help to improve strength and endurance while also burning calories and maintaining a healthy weight. In addition, such loads help improve the functioning of the cardiovascular system, increase the body's endurance and improve overall physical fitness.

References

1. M. Widya, et.al., "Risk Management in Via Ferrata Cliff Climbing Tourism Activities In Mount Mendelem, Pemalang Regency." International Journal of Sustainable Competitiveness on Tourism (2023) DOI:10.34013/ijscot.v2i01.1273
2. G. Denysik, A. Kizyun, I.M. Voyna, *Regional features of the development of extreme tourism within podillia*. The scientific issues of Ternopil Volodymyr Hnatiuk National Pedagogical University. Series: Geography (2023): DOI:[10.25128/2519-4577.23.1.12](https://doi.org/10.25128/2519-4577.23.1.12)
3. S. Soleimani, et.al., Current Issues in Tourism, **22**, 2299 - 2314 (2019).
4. Tri Octavia Lestari, et.al., International Journal of Sustainable Competitiveness on Tourism, **1(01)**, 47-50 (2022). <https://doi.org/10.34013/ijscot.v1i01.766>
5. C.M.D. de Espada, et.al., Guide for the Design and Calculation of Via Ferrata (2018). DOI:10.20944/preprints201805.0235.v2
6. A. Prabowo, et. al., *Sport Development Strategy for Rock Climbing at Central Bengkulu Regency*. Jp.jok (Jurnal Pendidikan Jasmani, Olahraga dan Kesehatan) (2023): DOI:[10.33503/jp.jok.v7i1.3226](https://doi.org/10.33503/jp.jok.v7i1.3226)
7. UNWTO. Global Report on Adventure Tourism (2014).
8. M.V. Podsolonko, Culture of the peoples of the Black Sea region **44**, 3, 132-133 (2020)
9. N. Shashkova, Ye. Lukyanova, M. Shulga, A. Kazak, I. Bukreev, V. Fastunova, BIO Web Conf., **84**, 01028 (2024) DOI: <https://doi.org/10.1051/bioconf/20248401028>
10. A. Kazak, E. Sergeeva, Z. Kushkhova, O. Ryvkina, E. Tsay, E3S Web Conf. **371**, 05009 (2023) DOI: <https://doi.org/10.1051/e3sconf/202337105009>
11. A.A. Dorofeeva, E.Yu. Ponomareva, A.N. Kazak, N.N. Oleinikov, A.A. Kazak, *Features of the tourism industry development in the context of overcoming the consequences of COVID-19* "5th International Scientific and Practical Conference "Distance Learning Technologies", DLT 2020"; 2914:307-315, (2021). CEUR Workshop Proceedings2021 | Conference paper EID: 2-s2.0-85111406625
12. L. Musikanski, et al., International Journal of Community Well-Being **2**, 359-371 (2019). DOI:10.1007/s42413-019-00038-6
13. V. Michalička, "Impact forces at improvised via ferrata." International Journal of Mountaineering and Climbing (2021). DOI:10.36415/dagecilik.1028991
14. M. Ströhle, et al., International Journal of Environmental Research and Public Health **17** (2019). DOI:10.3390/ijerph17010103