“White Gold” theme trail

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1. Theme trail – logo

2. Theme trail – Orientation text
[auf jeder Tafel neben Themenweglogo und abstrakter Wegedarstellung]

“Rügen’s white gold, chalk. Find out and experience for yourself on the “White Gold” theme trail how chalk is woven into Rügen's history, culture, nature and economy”

3. Theme trail – Route and information board locations
4. Board 1: Route overview

“White Gold” theme trail – discover Rügen’s chalk

Route description and recommendations:

The theme trail connects the most important places and themes directly connected to chalk here on our Jasmund peninsula. It informs us with information boards on the spot about the development of the chalk deposits, the extraction and processing of the raw chalk and the impact on the regional vegetation.

The theme trail consists of two circular routes. It can thus be walked in a large circuit with a total length of 26 km; on the northern route with a length of about 22 km or on the southern and shorter route with a length of [13.5 km].

At roughly 22 km, the northern route already represents an average day’s hike. Only tried-and-tested hikers should therefore take on the complete circuit in a single day.

For a visit to the Gummanz chalk museum or the Königstuhl National Park Centre, hiking in sections and using local public transport is recommended. The following procedure is recommended in this case:

- Start: car park No. 5 “Alte Kiesgrube Sassnitz” or bus stop Waldhalle exit
- Walk the eastern section “coast” to Königstuhl National Park Centre (ca. 13.4 km)
- Walk the western section “Inland” to Gummanz chalk museum (ca. 9.5 km)
- Return transport: return trip by public transport is possible from the forecourt of the National Park Centre

Bildmaterial: Collage der Bilder aller Standorte

Standort: Parkplatz ehemalige Kiesgrube an der Straße nach Stubbenkammer/ Stadtrand Sassnitz

Anmerkungen: (Ausnahme)Genehmigung für die Tafel durch Nationalparkamt notwendig
5. Board 2a: The history of chalk quarrying until the 19th century

You are standing here in the old chalk quarry in Waldmeisterstrasse. Typical of pre-industrial chalk quarrying, this was one of the many sites of quarrying distributed over the Jasmund peninsula. Extraction took place here roughly from 1910 to 1962.

[Foto: alte Aussicht über Sassnitz vom Standort]

The outcroppings of writing chalk deposits in many places on the Jasmund peninsula are up to 90 m thick. These conditions, unique in Germany, predestined these deposits from the beginning for commercial chalk quarrying.

The development of chalk quarrying on Rügen from early times till 1832

The utilisation of chalk was known in the region at least from the end of the 11th century. As raw chalk it was used then just as now as a natural mineral fertiliser and, freed of impurities, as pigment in paints, primers and plasters. In 1720, the first substantiated lime kiln was installed, in which the chalk was burned to make lime mortar.

The 19th century was marked by the rapid development of whiting production from 1832, even though raw chalk production continued to rank first in terms of quantity. With a lime content of 98%, Rügen writing chalk in itself is already a very pure limestone and usable for many applications. However, aggregations of flint nodules occur in layers and can constitute up to 15% of the total rock. Removing the flint requires some work-intensive procedures. The raw chalk, still containing flint, is slurried in water, whereby the flint nodules, sands and fossil residue are deposited. The chalky water is guided over conduits into sedimentation tanks, where the chalk precipitates. The drained chalk slurry is air-dried in laterally opened drying sheds, then crushed and packed or shipped in bulk.

[Foto: Manueller Kreideabbau, Transport, Schlämmbottiche, Trocknung]

Beispielfoto:

Source: www.ruegen-web.de

**Bildmaterial:** im Bestand des Kreidemuseums; muss z.T. erst noch digitalisiert werden

**Standort:** alter Kreidebruch Waldmeisterstraße in Sassnitz
5. Board 2b: The history of chalk quarrying from the 19th century to today

The development of chalk quarrying on Rügen 1832 - 1962

In 1832, Friedrich von Hagenow acquired the rights of use for all Rügen chalk quarries and operated a chalk elutriation plant in Greifswald with specially developed machines and equipment.

In 1848, the original and still laborious form of elutriation in barrels was replaced by elutriation in vats, giving this process a certain continuity which only had to be interrupted for the vats to be cleaned.

In the period following, more and more factories were set up in the immediate vicinity of the deposits. In 1885, there were 23 factories on Rügen. By the start of the 20th century, the chalk deposits on Jasmund were allocated. New businesses had to make do with deposits outside Jasmund. After the end of the Second World War, 19 private companies took up chalk production again. In the following years, these were expropriated in parts and nationalised, so that from 1962 only VEB Kreidewerke Rügen was still producing.

The development of chalk quarrying on Rügen from 1962 to today

Despite technological innovations and improvements in operating procedure, chalk quarrying and whiting production remained a protracted (ca. 8 weeks) and physically demanding job. The fully mechanised process in use since 1962 has reduced the production time of the whiting to about 80 minutes.

[Fotos: Löffelbagger, Bandanlage, Groß-Lkw]

Today this old quarry is primarily of importance as a habitat. Numerous endangered species associate with each other on the dry, lime-rich soil of the dry calcareous grassland. You’ll learn more on the topic of chalk quarry habitat here at the board location in Wittenfelde.

[Abbildungen: Carlina vulgaris, Epipactis atrorubens, Dactylorhiza fuchsii.]

Beispielfotos:

www.saxifraga.de / www.en.wikipedia.org / www.floralimages.co.uk


Bildmaterial: im Bestand des Kreidemuseums; muss z.T. erst noch digitalisiert werden

Standort: alter Kreidebruch Waldmeisterstraße in Sassnitz
6. Board 3a: Cretaceous Period

“The Cretaceous” or “Cretaceous Period”

This is the name of a period in the Mesozoic, which began around 145.5 million years ago with the end of the Jurassic and ended about 65.5 million years ago. The German name for chalk, “Kreide”, probably comes from the Latin “terra creda” = sifted earth, because of the flint impurity removable by sifting. The end of the Cretaceous marked the start of the current Caenozoic.

Source: www.stromberg-gymnasium.de
The global climate at that time was considerably warmer and more humid than it is today. The average global temperature was about 18°C, that is about 4° higher than presently (14.3 °C in 2000). As no water was bonded in the polar icecaps, the sea level was around 100 to 300 metres higher than it is today. Rügen was then at the altitude of Madrid und Ankara today in the middle of a strait stretching from today’s Harz in the south and to Southern Sweden in the north.

[Abbildung: Lage Rügens während des Maastricht]

Chalk formation

The formation of Rügen's chalk dates back to the most recent stage of the Cretaceous Period, the Maastrichtian, approximately 69-67 million years ago. Lime (calcium carbonate) dissolved in water was used by marine fauna and flora to form their shells and skeletons. After their deaths, the remains sank to the seabed and formed a calciferous sediment. This was a very slow process, with an accretion of just 3.5 cm in 1,000 years. Thus for the up-to-90-m thick overground chalk deposits of Rügen a formation period of roughly 2.5 million years can be derived.

[Bild/Grafik: Veranschaulichung Kreidesediment / Kreidemeer]

Beispiel:

Source: www.scienceticker.info


Bildmaterial: wie vorgeschlagen vom Kreidemuseum lieferbar

Standort: Schotterplatz Sehlitz - Sammelstelle Kreideexkursionen
7. Board 3b: Fossils

As a biogenic sediment, approximately 73% of Rügen writing chalk consists of microscopically small (< 0.01 mm) calcium carbonate plates called coccoliths. These protect the colloidal bodies of single-cell free-floating (plankton) flagellate algae, which also appear in the seas of today. An approximate further 20% consists of the remains of foraminifera, likewise single-cell organisms, which produce a multi-chamber calcium carbonate shell. The final larger group, making up a proportion varying between 2% and 8%, are bryozoa or moss animals, colony forming organisms. Also within this groundmass are the fossil remains of a variety of other organisms.

**Cretaceous organisms and their fossil traces**

Hearing the terms Cretaceous or Cretaceous Period, the first thought is that this was the age of the "thunder lizards", the dinosaurs, and that during this period the chalk deposits that gave it its name accrued.

As the region of the present Isle of Rügen lay under water during the Cretaceous Period, there are only traces and remains of water dwellers here, which have been found in surprising numbers and variety in the chalk quarries and on chalk coasts. Some of the most impressive are corals, sponges, bryozoa, brachiopods, scallops, snails, echinoderms such as starfish and sea urchins und cephalopods such as ammonites and belemnites.

Source: [www.koenigsstuhl.com](http://www.koenigsstuhl.com)

On the basis of rare tooth finds, as well as sharks and bony fish, the mosasaur, an approximately 10- to 15-metre-long predatory marine scaled lizard has been detected in the Rügen chalk.

Source: [www.web-kuchi.ch](http://www.web-kuchi.ch)
8. Board 4a: Dry calcareous grassland

“Dry calcareous grassland – colourful diversity through chalk and light”

A distinctive feature of the chalk landscape of the Jasmund peninsula is the dry calcareous grassland. There are communities of plants that are reliant on very specific local conditions: a lime-rich and rapidly draining soil, warmth and plenty of light. The south-exposed bluffs of the coast are therefore the natural habitats of these plant communities.

[Foto: Kalktrockenrasen oder waldfreier Kreidehang]

The diversity of species on these expanses, with orchids a particular adornment, is surprising, especially for the layman. Dry calcareous grasslands are among Central Europe’s most species-rich plant communities. The variety of grasses, herbs, perennials and orchids is complemented by a not less large number of animal species, which are also adapted to the specific local conditions or reliant on the plants that only occur here.

The Lady Orchid, for instance, grows nowhere in the state but on Rügen. Other dry calcareous grassland plants, which are generally only to be found in the abandoned chalk quarries because of the strong erosion of the chalk bluff, include the centaury herb, oregano and Carline Thistle. Other plants, some of which are endangered of even threatened with extinction, are the Dark Red Helleborine, the Military Orchid, the Marsh Helleborine, the Grass of Parnassus and the Southern Adderstongue. Among the butterflies and moths, the 

agapetes galathea and 
zygaenidae particularly love the vegetation of the chalky soil.

[Fotowelt aus 6-8 Makroaufnahmen; Flora und Fauna]
Beispielfotos:

Source: www.de.wikipedia.org

Sources: Manfred Kutscher: Flora und Fauna an der Ostseeküste von Mecklenburg - Vorpommern, Demmler Verlag, 1995 and www.nationalpark-jasmund.de

Bildmaterial: im Bestand des Kreidemuseums; muss z.T. erst noch digitalisiert werden

Standort: Volkvitz
9. Board 4b: The development of dry calcareous grasslands in the chalk quarries

*Dynamics of development*

Dry calcareous grasslands are only an episode in vegetation development (succession). Without interferences into the natural dynamics, trees would soon spring up here too, cast a shadow over the earth and displace herbs and grasses. The end of this development would be a beech forest community.

[Foto: Offenland contra Sukzession]

*Chalk quarry as habitat*

The chalk pits on Jasmund resulting from chalk quarrying offer the same local conditions as the chalk coast. With the end of quarrying, therefore, they offer themselves as pioneer locations for colonisations by dry calcareous grassland species. The former Wittenfelde chalk quarry is thus – where it has not been flooded – a diverse and species-rich habitat. To be found here are:

[„Fotowelt“ aus 6-8 Makroaufnahmen; Flora und Fauna]

As there is little or no erosion in chalk pits, the process of vegetation here runs from the species-rich pioneering vegetation of the dry calcareous grassland through stages of succession (scrub encroachment) to pre-forest and forestation stages. Many of Jasmund’s 40 abandoned chalk quarries have thus already “disappeared” under woodland, a development which is also pending here at the Wittenfelde quarry.

Calcareous neglected or dry grasslands are protected biotopes under the European Union Flora-Fauna Habitat (FFH) directive, which are to be preserved. Appropriate care plans therefore exist for the chalk quarries in Jasmund National Park selected as buffer zones. For the others, the community has yet to shoulder its obligations.

**Sources:** Manfred Kutscher: Flora und Fauna an der Ostseeküste von Mecklenburg - Vorpommern, Demmler Verlag, 1995 and www.nationalpark-jasmund.de

**Bildmaterial:** im Bestand des Kreidemuseums; muss z.T. erst noch digitalisiert werden

**Standort:** Kreidebruch Wittenfelde (bei Promois)
10. Board 5: Medicinal chalk

Rügen medicinal chalk – history and significance

It is called Rügen’s “white gold”, Rügen Dreikronen medicinal chalk. The fine, snow-white material is extracted from 69- to 67-million-year-old deposits of Rügen writing chalk and used in numerous medical, cosmetic and wellness facilities. Medical chalk cleanses the skin, warms and detoxifies the body, alleviates pain, all the while conjuring up soft and tender skin.

[Photo: Kreideabbau]

Beispielfotos:

Source: www.br-online.de

On the history of medicinal chalk

Medicinal chalk was already being used successfully at the Baltic Sea resort of Sassnitz from 1910. In 1932, Prof. Dr. Payer from the Chemical-Physical University Institute in Breslau delivered the first scientific studies on the effects of Rügen medicinal chalk. Towards the end of the 1960s, however, treatments with medicinal chalk declined sharply and were finally discontinued. Modern, fast medicine had arrived. Medicinal chalk on Rügen was not rediscovered until 1995.

[Fotos: aus der Geschichte der Heilkreide, möglichst Zeit des Bädertourismus des frühen 20. Jhd, Darstellungen der Anwendungen]

Beispielfoto:

Source: www.heilkreide.de

Composition and applications

In the dry state, medicinal chalk consists of ca. 98.2 % pure calcium carbonate (CaCO3) and small parts of silicium, magnesium, aluminium, iron, iodine and phosphorus compounds. It is used as a chalk bath or chalk pack. Through its composition and particular capacity to store warmth or cold, medicinal chalk exhibits a beneficial, relieving and pain-reducing effect with rheumatic illnesses, joint complaints, osteoarthritis, sciatica, neuralgia and a large number of skin diseases.

Sources: www.heilkreide.de
Bildmaterial:
- z.T. im Bestand des Kreidemuseums;
- Fotorechte zur Heilkreideanwendung über den Verein Rügener Heilkreide e.V. erwerben (Kontakt: Dieter Hoffmann, 1. Vorsitzender, Schulstraße 90, 18551 SAGARD, Kontakt: info@heilkreide.de, Telefon: 038393 – 91132, Fax: 038393 – 92030, Homepage: www.ifa-ruegen-hotel.com, eMail: dhoffmann@ifahotels.com

Standort: Standort Stadtgebiet Sassnitz, z.B. Kurplatz, Richtung Strandweg
11. Board 6: The formation of Rügen

From the geological point of view, the Pomeranian Bodden (bay) landscape and also the Isle of Rügen are still very young. Decisive for their formation were events during the three great Ice Ages, especially those of the last “Weichselian glaciation”, as Scandinavian glaciers advanced over the present Baltic Sea region, which was still land at the time. On the one hand, the glaciers ground down the land mass, but on the other hand they moved huge quantities of pulverised rock, which were deposited in the end, lateral and ground moraines. In places where the glacier tongues divided and the glacier apparently ground to a halt, because the thawing of the edge offset the flow of the ice, particularly large quantities of the glacial shift were deposited. The pressure on the substratum, here the chalk too, was so great that it was arched and cast upwards in less encumbered areas.

[Bild/ Karte: Weichseleiszeit im Pommerschen oder Mecklenburger Stadium]

Beispiel:

Jasmund was thrown up the most and has had since then the highest elevation, 161 metres, with the Piekberg near Hagen. On Jasmund too, a particularly large quantity of chalk was thrown up, some of which reached the surface, thus laying the groundwork for later chalk quarrying. Late glacial glaciers left behind a hilly landscape, with moraines, glacial tongue basins and sub-glacial channels. 13,000 years ago at the latest, the region of the Baltic Sea coast was again completely ice-free. The numerous erratic boulders and the famous chalk cliffs with their fossils and flint deposits are well-known traces of Rügen’s eventful past in this regard.


Bildmaterial: Wagenbreth- Schema

Standort: Standort Stadtgebiet Sassnitz, Strandnähe (Kalktuff)
12. Board 7: Coastal dynamics

“Permanence lies only in change”
(Arthur Schopenhauer, German philosopher and private scholar, 1788-1860)

Landscapes too are subject to constant change, as they are subject to the impact of the elements, the climate, the flora and fauna, and the people.
Natural change often takes place rather slowly and gradually and thus inconspicuously. Changes become particularly visible and memorable when they occur suddenly and on a large scale. Then talk from the human perspective is often of catastrophe.
In national parks, natural change is a process that must not be halted.

The bluffs of the Isle of Rügen have been exposed to constant erosion from the start. Frost wedging leads in winter to parts of the chalk shore breaking off and to the formation of chalk scree at the foot of the bluff. These form and/or formed the natural habitat for the pioneer plants of the neglected calcareous grasslands.

Since larger boulders before the coast were taken away in the 19th century to be used for the construction of roads and harbours, the erosion of the coast has increased. The boulders before the chalk cliffs functioned as natural breakwaters and, since their removal, the water of the Baltic Sea can, with unfettered force, wash away from before the bluff the chalk scree slopes created by frost damage in winter as well as larger breakages caused on the land side.

[Fotos & Abbildungen: Panoramafotos der Steilküste, Hangabbruch, Schema der Entstehung eines Hangabbruchs]


Anmerkung:
Das Thema „Küstendynamik“ ist pädagogisch sehr interessant und prinzipiell sehr gut für den Themenwanderweg geeignet. Der Tafelstandort sollte sich aber in unmittelbarer Nähe zur Kreideküste befinden, was gegenwärtig nicht gegeben ist, da keine neuen Tafeln im Gebiet des Nationalparks aufgestellt werden dürfen. Tafel 7 hat daher nur Vorschlagscharakter/ befindet sich im Rohentwurf. Als Standort bietet sich der Bereich um das Nationalparkzentrum oder auf dem Hoch Selow mit Blick zur Boddenküste an..
13. Board 8a: Fire stones

Fire stone (or flint) is a hard, microcrystalline mineral, which is made of chert (quartz). It was created during the transmutation of the siliceous skeletons of creatures (e.g. siliceous sponges) under specific bacterial and physical-chemical conditions with the involvement of organic substance. This led to a solution of the skeleton substance, its enrichment and transformation into flint.

Typical for Rügen are parallel embedded bands in the writing chalk of irregularly formed flint nodules. The overall proportion of the flint can be up to 15 % per unit of volume of quarried chalk. For commercial chalk mining, therefore, flint primarily represents an impurity, which needs to be laboriously removed during the production of fine whiting.

[Foto: Kreideaufschluss mit Feuersteinbändern.]

Beispielfoto:

Source: [www.fh-rottenburg.de](http://www.fh-rottenburg.de)

**Using flint**

Flint was already being used by humans in the Stone Age long before chalk. Owing to its great hardness and immensely sharp edges, flint was an important raw material in the Stone Age for producing tools and weapons. It is however uncertain whether Rügen’s relatively brittle flint was used to manufacture weapons and tools. What seems clear is that this brittleness made it unsuitable for use in flintlock pistols. In the 18th century, a Potsdam Büchsenschäfter (weaponsmith) commissioned by Friedrich Wilhelm I manufactured test weapons from local flint, “but they cracked after the second shot and the whole affair got stuck as a result”.

[Foto: Feuerstein mit Abschlägen]
Did you know?

It is not possible to create sparks to start a fire by striking flints together. Also needed is iron or ferruginous mineral, which is also present in writing chalk. When the flints strike each other, splinters are knocked out of the iron as sparks.

Sources:
Gerhard Priewe, Jürgen Bummert: “Hühnergötter - Glückssteine vom Strand”; Hinstorf Verlag GmbH, Rostock 2007;


www.dbu.de/1339.html

Bildmaterial: z.T. im Bestand des Kreidemuseums;

Standort: Ortsausgang Hagen, Ausgang zu den Wanderwegen in die Stubbenkammer
14. Board 8b: Hagstones

**Hagstones** are up-to-fist-size flints with a naturally created hole through them. Significantly larger ones are called “Sassnitz flowerpots” or *paramoudras*.

**What do hagstones effectuate?**

In both Slavic and Germanic deisms, the “hole” stones played an important role against evil spirits and were worn as lucky or protective amulets. They also inspired the livestock to better performances. In earlier times, farmers on Rügen are supposed to have milked through the stones, so that the milk didn’t go off. The custom of looking at the sun through the hole and making a wish is however better known.

There is a wide variety of names for the stones by region: Druden or Trudensteine, Schratensteine, Alpfüsse, etc. They generally indicate that the stones were supposed to protect against evil spirits like the Trud, Mahr and Alp or against the evil eye.

[Photo: Verschiedene Größen und Formen von Hühnergöttern]

Beispielfoto:

Source: [www.wikipedia.de](http://www.wikipedia.de)

**Where do hagstones come from?**

The German term for hagstone, “Hühnergott” (chicken god), is a direct translation of the Russian “kuriny bog”, which likewise describes a magical stone with a hole which, when placed in a henhouse, was supposed to increase the chickens’ laying output.

**Rügen’s flint fields**

This geological feature in the northern part of the Schmale Heide, south of Mukran, was created approximately 4,000 years ago by a series of storm surges, which washed and heaped up the stones from the chalk coast of the Jasmund peninsula. The deposited pebble-sized stones are predominantly flint. The so-called “Stone Sea” (ca. 40 ha) is today a nature reserve.

[Foto: Steinernes Meer]
Beispielfoto:

Source: www.ruegencenter.de

Sources:
Gerhard Priewe, Jürgen Bummert: “Hühnergötter - Glückssteine vom Strand”; Hinstorf Verlag GmbH, Rostock 2007;


www.dbu.de/1339.html

Bildmaterial: z.T. im Bestand des Kreidemuseums;

Standort: Ortsausgang Hagen, Ausgang zu den Wanderwegen in die Stubbenkammer
Dry and neglected grassland: natural disappearance or artificial preservation through maintenance?

Rügen’s dry and neglected grassland came into being through human exploitation such as agriculture and grazing after deforestation of the original woodlands. This created extreme local conditions such as dry and nutrient-deficient soil, which are however prerequisite for a diversity of rare species of plants and animals that are adapted to the conditions.

**Natural consequences**

Through the abandonment of the previous exploitation, e.g. the change to industrialised agriculture, natural succession set in. Nutrients and humus accumulate in the soil and offer more competitive plants conditions for life. The process passes into scrub formation and pre-forest stages, and ultimately the formerly neglected location is covered in forest.

A similar situation pertains in the abandoned chalk quarries. Pioneer colonisation through dry calcareous grassland after mining stops is followed by gradual afforestation. Most of Jasmund’s roughly 40 chalk quarries have already disappeared again under the trees.

[Foto: Gegenüberstellung Trockenrasen und Verbuschung]

Beispielfotos:

![Example photos](www.ruegencenter.de)

This natural dynamic is an express goal, particularly in national parks, and thus also signifies the natural disappearance of such human-engendered habitat and its dedicated species.

Nevertheless, the rarity of the remaining neglected locations and their often extinction-threatened biodiversity makes their protection and preservation a worthwhile task.

**Sources:**
Manfred Kutscher: Flora und Fauna an der Ostseeküste von Mecklenburg - Vorpommern, Demmler Verlag, 1995 and [www.nationalpark-jasmund.de](http://www.nationalpark-jasmund.de)

**Bildmaterial:** z.T. im Bestand des Kreidemuseums;

**Standort:** Kreidemuseum