The „Sonnenberg“ agate deposit near Wonsheim – Diversity of Rhine-Hessian agates concentrated in a very small area

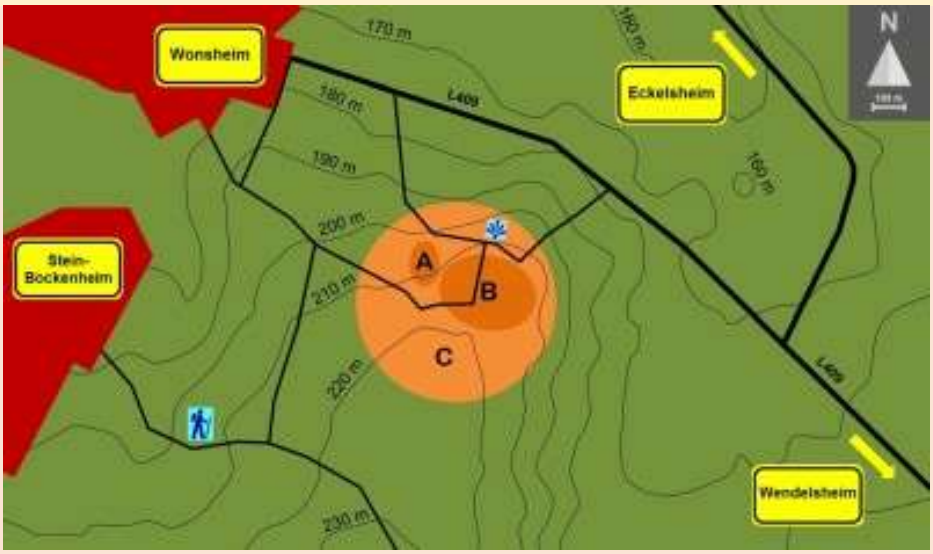
by Klaus Stubenrauch, Wiesbaden, Germany

For the author, collecting agates largely means searching for them at the sites where they are found. From around 2008 onwards, collecting in quarries was replaced by simply picking up agates in fields and vineyards. A successful search can thus be combined with relaxation from everyday stress. After countless collecting trips on weekends to nearby sites, it has become apparent that many small, beautiful and always „novel“ finds can complete a collection and, in total, can also be extremely informative. Without exception, all of the stones shown below were collected from February 2010 onwards by the author, his wife († 2025) and his sons (until approx. 2016) at the site discussed here.
An astonishing variety of beautiful and interesting agates has been collected over the years. This article is dedicated to my wife, who passed away too soon, as a token of gratitude for her many years of support for my passion for agates and her participation in the search. Relaxing times and many moments of happiness on the mountain dissolve into transience and eternity.

1. Recovery from everyday life was possible in many ways on the Sonnenberg. It wasn't always just about searching for agates... All photos in this article are by Klaus Stubenrauch.

The Deposit

Directly opposite the mountain „Steigerberg", probably the best-known agate site in the federal state of Rhinehesse, lies the mountain „Sonnenberg", an extinct volcano. It is located between the municipalities of Wendelsheim, Wonsheim and Stein-Bockenheim. An astonishing variety of interesting agates can be found on the mountain. Among the agates exposed on the ground – in all stages of weathering – there are also numerous rolled agates, which were probably rolled down not far away from their place of origin by the sea surf of the so-called „Rupelian Sea" after being exposed to the elements. There is no bedrock on the surface of the mountain, but fragments of melaphyre and basalt are present in the fields. All the distinct types of agates for which the federal state of Rhinehesse is famous can also be found on the mountain „Sonnenberg". All of the agates shown here come from an area of less than half a square kilometer, see area C in Fig. 1. Well over 90% of the finds come from sub-areas A and B, with only sub-area A containing agates rolled by the „Rupelian Sea".



2. Map of the discovery area.

3. View to Wonsheim over the southwestern mountain slope.

4. View of the mountain „Sonnenberg“ from the southeast.

5. February 20, 2010: During the first excursion, the snow cover was not continuous. The search for the location where the agates had rolled down was successful, and numerous excursions followed in the same year.

6. A weathered and still complete agate nodule.

7. Fully rolled and weathered agate nodule immediately after discovery.

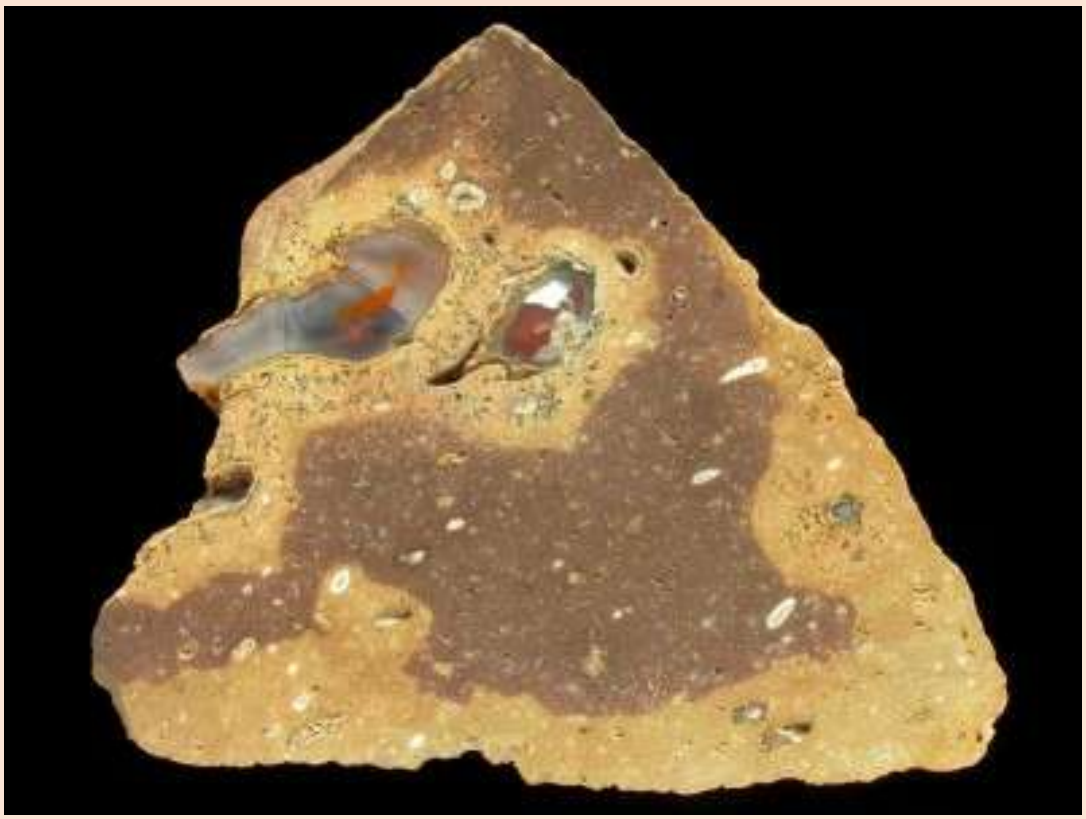
8. Large and somewhat rolled quartz crystal immediately after discovery.
Alle specimens Klaus Stubenrauch collection and photos.

9. Fossilized shell. 5.8 cm.

10. Fossilized, rolled wood (cut and polished). 3.8 cm.

11. Larger pieces of rock, mainly basalt and melaphyre, are removed from the vineyards. Among them are also a few "larger" agates...

12. Weathered melaphyre. 7 cm.



13. Melaphyr with agates in cross-section. The weathering process of the rock is clearly visible. 7.1 cm.

„Agate Pseudomorphs“

A distinction can be made between paramorphs, conversion pseudomorphs, displacement pseudomorphs, perimorphs and replacement pseudomorphs.

Furthermore, a distinction must be made as to whether:

a) agate replaces another mineral: pseudomorphosis of agate into „mineral X“
b) another mineral replaces agate: pseudomorphosis of „mineral X“ into agate (see section „calcite agates“ below).

It should also be noted that agate and other minerals often occur together and are often referred to as „agate pseudomorphs“.
On the mountain „Sonnenberg“, pseudomorphs of agate after presumably barite, calcite, skolecite and other zeolites occur. Among collectors, these variants are usually referred to as „skolecite agates“, presumably because in the polished section, flat crystals also appear as „needles“ and the actual crystal form is not visible...

14. Raw stone, pseudomorph of agate (chalcedony) after calcite (?). 3 cm.

15. Raw stone, pseudomorph of agate (chalcedony) after barite (?). 3.9 cm.

16. Raw stone, pseudomorph of agate (chalcedony) after skolecite (?). 2.5 cm.

17. Tumbled stone with pseudomorphs of agate after scolecite (?). 3.2 cm.

18. Detail from the image above. 0.8 mm.

19. Cut and polished stone with pseudomorphs. 3.1 cm.

20. Cut and polished stone with pseudomorphs. 3.7 cm.

21. Tumbled stone with pseudomorphs. 2.7 cm.

22. Tumbled stone with pseudomorphs. 2.9 cm.

23. Cut and polished stone with pseudomorphs. 2.5 cm.

24. Cut and polished stone with pseudomorphs. 5 cm.

25. Cut and polished stone with pseudomorphs. 5.6 cm.

26. Cut and polished stone with pseudomorphs. 4.7 cm.

Raw stones left in their natural state

Colourful agates are often referred to as works of art created by nature and compared to modern paintings. In a similar vein, the structures and shapes of natural weathered agates can be compared to modern sculptures.
Rolled agates from river sediments and sea surf are particularly suitable for collecting without any processing. Although they lack the lustre or colourfulness of cut and polished agates, the weathered structures are beautiful to look at. The colours, if any, are usually hidden inside.
Among agate collectors in Germany, uncut and/or unpolished agates are rarely, if ever, considered as collectibles. In other countries, however, certain agate deposits are traditionally collected in their natural raw state. These agates are often oiled to conceal cracks or enhance the colours. The most notable examples are the „Lake Superior agates“ and „Fairburn agates“ from the United States, as well as the „Rain Flower Pebbles“ from China.
Leaving agates in their natural state makes perfect sense, apart from aesthetic considerations. This was already noted over a hundred years ago by LIESEGANG (1915): *„In collections, more attention should be paid to raw stones than has been the case up to now. For there are many interesting things to be observed on weathered surfaces.“*

27. Raw stone (natural) with weathered relief. 3.1 cm.

28. Raw stone (natural) with weathered relief. 2.3 cm.

29. Raw stone (natural) with weathered relief. 3.1 cm.

30. Raw stone (natural) with weathered relief. 2.6 cm.

31. Raw stone (natural) with weathered relief. 3.2 cm.

32. Raw stone (natural). 2.3 cm.

33. Raw stone (natural) in two views. 2.3 cm.

34. Raw stone (natural). 1.7 cm.

35. Raw stone (natural). 1.7 cm.

36. Raw stone (natural). 1,9 cm.

37. Heart-shaped rough stone. (natural). 2.6 cm.

38. Heart-shaped rough stone. (natural). 2.2 cm.

39. Raw stone (natural) with weathering patina. 5.4 cm.

40. Raw stone (natural) with weathering patina. 7.6 cm.

41. Raw stone (natural) with green weathering patina. 3.5 cm.

Tumble-polished stones

Those who search for agates themselves will not only find the „top pieces“ in impressive sizes. Instead, smaller finds will predominate. It therefore makes sense to refine some of the finds by tumbling them rather than cutting everything. This approach saves time and money. The small pieces are particularly suitable for this purpose.
Furthermore, cut surfaces are created parallel to the banding or parallel to the outer skin of the agate nodule. This often results in rather unusual views of the existing agate structures and, in some cases, completely new appearances.

42. Tumbled stone. Gewicht 0,85 g. 1.4 cm.

43. Comparison: Rough stone (left). Tumbled stone (right). 5.5 cm.

44. Tumbled stone in two views. 2 cm.

45. Tumbled stone in several views. 3 cm.

46. Tumbled stone. 2.1 cm.

47. Tumbled stone. 1.3 cm.

48. Tumbled stone with eye textures. 1.6 cm.

49. Tumbled stone with eye textures. 3.6 cm.

50. Tumbled stone with eye textures. 2.3 cm.

51. Tumbled stone. 1.8 cm.

52. Tumbled stone. 2.1 cm.

53. Tumbled stone. 2.1 cm.

54. Tumbled stone. 1.7 cm.

55. Tumbled stone. 1.6 cm.

56. Tumbled stone. 1.6 cm.

Cut and polished stones

Nowadays, agates are mainly collected in this processed form...

57. Cut and polished stone (Rough piece see page 4, image 6). 7.5 cm.

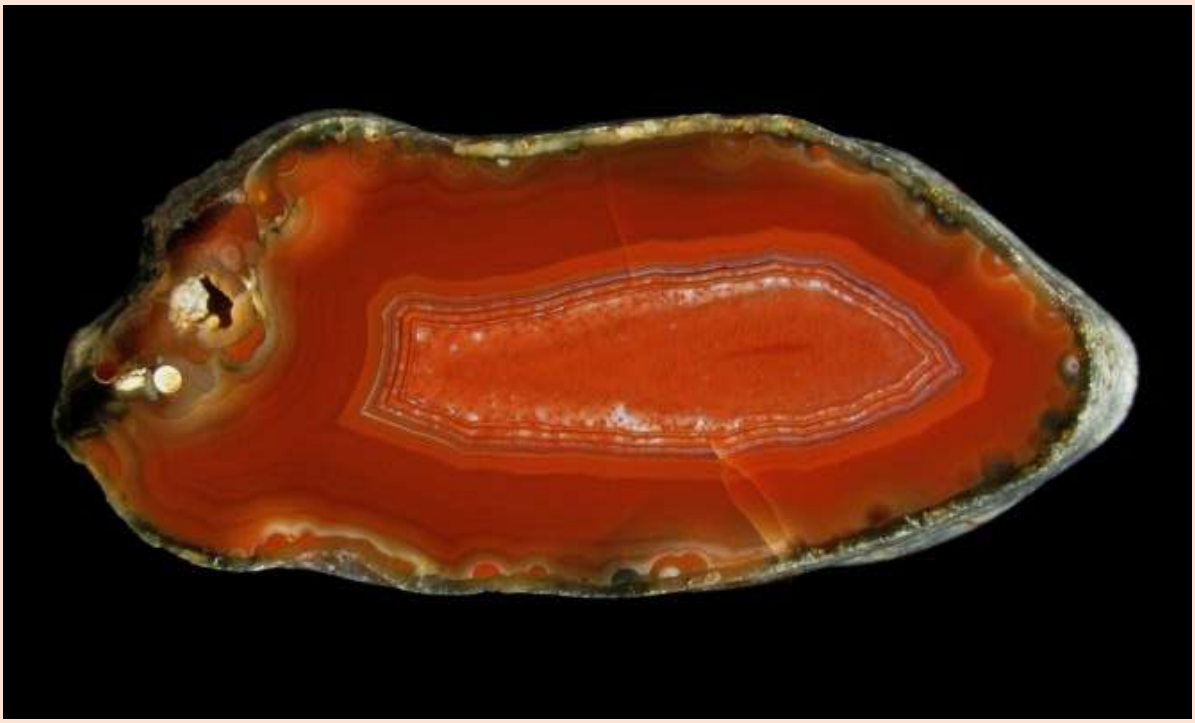
58. Cut and polished stone. 2 cm.

59. Cut and polished stone. 1.7 cm.

60. Cut and polished stone. 1.7 cm.

61. Cut and polished stone. 2.3 cm.

62. Cut and polished stone. 3.1 cm.



63. Cut and polished stone. 3.1 cm.

64. Cut and polished stone. 3.7 cm.

65. Cut and polished stone. 4.9 cm.

66. Cut and polished stone. 3 cm.

67. Cut and polished stone. 3.3 cm.

68. Cut and polished stone. 4.9 cm.

69. Cut and polished stone. 3.8 cm.

„Calcite agates“

REIS (1916/17) was the first to describe „calcite agates“ as independent formations with banding according agates and cleavability of calcite, or consisting predominantly of calcite. „Calcite agates“ are now generally understood to be (partial) pseudomorphs of calcite after agate, cf. also WALGER and LANDMESSER. A „short definition“ as a (partial) pseudomorph is certainly accurate, provided that agate has been replaced by calcite. This can occur in partial areas or to a large extent and affect the entire piece.
Pseudomorphs after agate are much more common than previously recognised and assumed. Pseudomorphs appear to occur most frequently in carbonates. These include „calcite agates“, which are the easiest to recognise and distinguish from agates.

70. There is a stone with a calcite segment (white) below the agate centre (in the marked rectangle). 3.4 cm. The marked area was photographed in detail in reflected light. This makes the surface structure clearly visible. Any unevenness on the polished surface is highlighted using this viewing method. The banding present in the calcite segment, which would otherwise remain hidden to the eye, is now also clearly visible. The hardness relief is created during the polishing process, as areas of different hardness are removed to different depths. The example shows that in a „calcite agate“, banding that is still present after agate formation is not always easily recognisable.

71. Cut and polished stone. 5.5 cm.
This stone is a typical example of „calcite agate“ – exactly the type first described by REIS (banded like agate and cleavable like calcite; typical colour: here beige-brown).

Horizontally banded agates (also known as Uruguay-agates or onyx banding)

New findings regarding agate deposits at a site often only emerge once a large number of pieces have been collected and evaluated. In relation to the site under consideration here, a proportion of agates with horizontal banding was determined to be approximately 1%. This statistically determined value was based on one thousand tumbled stones.
On the contrary, it is rather the case that once wrong statements have been introduced into the scientific literature, they become established in the long term. For example, LIESEGANG writes: *„J. Noeggerath commented on the occurrence of gravity-induced horizontals: „It is most remarkable that such horizontal bands, as regularly occur in those Brazilian nodules, are never found in those of the Nahe region. All horizontality is completely excluded in these formations.*
L. v. BUCH has already pointed out (1824) that horizontal deposits in the agate nodules occur neither in Germany nor in France, but that horizontal formations of this kind are observed everywhere in the British Isles and in the north of Europe. What is always striking is the fact that horizontality in the agate nodules appears to be completely excluded for entire countries.“ If silicate plants were able to form in the Nahe region, horizontal bands would theoretically also be possible there. But their actual occurrence there is not yet completely certain, although, for example, three pieces in the Bonn Mineralogical Collection alone are labeled with the location Oberstein.”

72. Cut and polished stone. 4.5 cm.

73. Cut and polished stone. 4.6 cm.

74. Cut and polished stone. 4.2 cm.

75. Cut and polished stone. 4.1 cm.

76. Cut and polished stone. 4.8 cm.

77. Cut and polished stone. 3.1 cm.

Tubular and moss agates, tubular and stalactite-like agates

Due to their diverse appearances, agates are inevitably classified or categorised in an attempt to group them according to various criteria. When categorising, different terms are often used synonymously (species, type, shape, etc.) and the categories can overlap. Classifications are often arbitrary and made without any intention of using an existing classification or even meeting scientific standards. Intentions with regard to the best possible marketing have also always played an important role.
Frequently used terms in classification are:
- according to structure (e.g. horizontally banded agate)
- trade names (e.g. carnelian)
- according to imagination (e.g. landscape agate)
- according to origin (e.g. Lake Superior agate)
- natural state of discovery (e.g. tumbled agate)
- Trade and fantasy names with deliberately misleading context regarding origin

The primary classification according to structure is practical and can be applied to almost any agate. The structure and formation of an agate are causally related. Over a hundred years ago, LIESEGANG (1915) classified agates into the following groups with regard to this:

1. Simple agates (fortification agates, banded agates)
2. Moss agates
3. Tubular agates
4. Tubular and stalactite-like agates
5. Agates with horizontal layers (Onyx banding)
6. Dendritic agates
7. Fragmentary agates

78. Cut and polished stone. 6.7 cm.

79. Cut and polished stone. 2.6 cm.

80. Cut and polished stone. 3.3 cm.

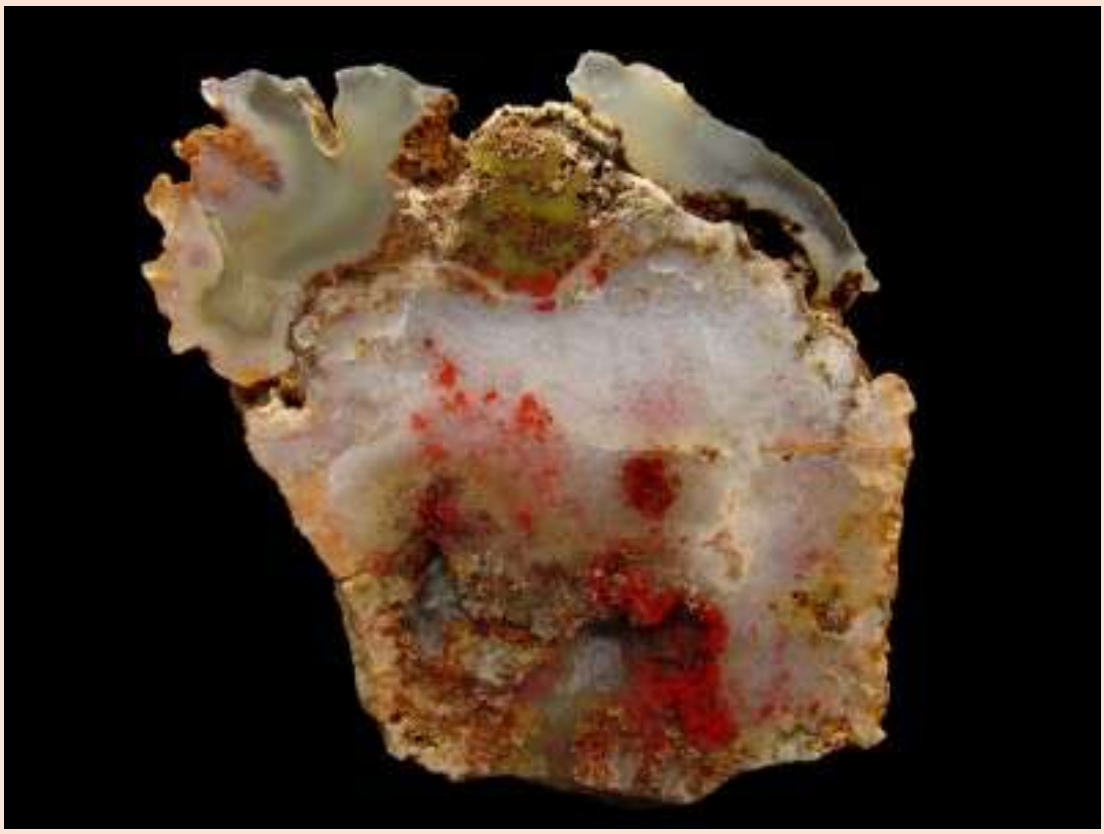
81. Cut and polished stone. 3.7 cm.

82. Cut and polished stone. 3.8 cm.

83. Cut and polished stone. 5.4 cm.

84. Cut and polished stone. 6.6 cm.

85. Cut and polished stone. 2.3 cm.



86. Cut and polished stone. 5.2 cm.

87. Cut and polished stone. 2.5 cm.

88. Cut and polished stone. 4.6 cm.

89. Cut and polished stone. 4 cm.

90. Cut and polished stone. 5.6 cm.

91. Cut and polished stone with stalactitic textures. 5 cm.

92. . Cut and polished stone with stalactitic textures. 5.1 cm.

93. Raw stone (natural) with stalactitic textures. 2.7 cm.

Summary

The variety of agates found at this small site in the Federal state of Rheinhessen is so diverse that a collection from this location can never be complete. Furthermore, it has been shown that the finds have not decreased over time, even in this small area and despite repeated visits.
On the contrary, with increasing experience, it becomes apparent after a few minutes of searching whether it is advisable to move to another location, as continuing to search under poor conditions only wastes valuable time. On the next visit, the stones may be clearly visible again and new pieces may have come to the surface. The interplay of external influences (agricultural cycles in conjunction with the weather a few days or weeks before the visit and even the lighting conditions on the day of the search) determine the chances of finding stones far more than the actual presence of agates or the motivation of the searcher.

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