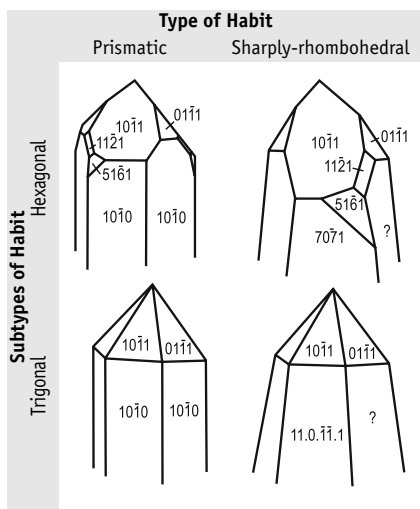




← Fig. 53. Smoky quartz (twisted crystal).
10 x 6.5 x 3 cm. Puiva.
Vernadsky State Geological Museum, RAS,
no. MN-50648.
Photo: M.B. Leybov.

The data on the mineralogy of the rock crystal deposits of the Subpolar Urals were published by G.G. Lemmlein (1933, 1936₁, 1936₂, 1937, 1939₁, 1939₂, 1941, 1944, 1945), G.G. Lemmlein and B.A. Osadchev (1945), I.I. Shafranovskii (1937, 1940₁) and others. Thus, axinite was described by M.F. Belyakov (1940) and also by V.A. Maslenikov and L.N. Nikulina (1940); scheelite by V.A. Vakar (1943); titanite by E.M. Bonshtedt-Kupletskaya (1943); and calcite by B.A. Osadchev and I.I. Shafranovskii (1944). Data on quartz crystals are presented in the articles of G.G. Lemmlein (1946, 1948, 1951), I.I. Shafranovskii (1940₂, 1943, 1944, 1945, 1949, 1954), A.E. Karyakin (1948, 1954, 1955₂), E.D. Inshin (1959), A.A. Korago (1971), A.A. Korago and T.A. Karyakina (1972), V.V. Bukanov (1974). The works of D.P. Grigoriev (1946, 1947, 1958, 1959, 1960, 1961), A.E. Karyakin (1949, 1953₁, 1953₂, 1954, 1955₁, 1955₃, 1958₁, 1958₂, 1959, 1960, 1962), A.E. Karyakin and A.V. Piznyur (1965), A.V. Korago (1969), V.Yu. Eshkin (1960) are devoted to mineralogy and genesis of the rock crystal nests. The data on 26 minerals of the Alpine-type veins of the Subpolar Urals are presented in the summary of G.G. Lemmlein (1954). Brookite is described in detail by N.Yu. Ikornikova (1946, 1948₁₋₄); chlorite was studied by S.V. Grum-Grzhimailo and T.K. Kozhina (1958); apatite by V.V. Bukanov (1961); and stolzite by V.Yu. Eshkin (1962). References on recent publications are presented in the descriptions of minerals.

Fig. 54. Sketch of habits of quartz crystals.



Quartz SiO₂

As a result of mineralogical explorations at the rock crystal-bearing deposits of the Subpolar Urals (Bukanov, 1961, 1974; Kuznetsov *et al.*, 1988), it was found that, depending on genetic conditions, quartz crystals have one of two types of habit – prismatic or sharply-rhombohedral (Fig. 54), after the most developed faces. By the ratio of the development of faces of the main rhombohedrons two subtypes of habit can be distinguished – hexagonal and trigonal. At the same time, a main regularity of evolution of quartz habit and color is noted: from hexagonal-prismatic crystals with colorless and smoky color to trigonal sharply-rhombohedral crystals with citrine-smoky color. A return to the hexagonal-prismatic habit, but with an amethyst-smoky color (Fig. 55), is typical for the final stage of the rock crystal formation. Crystals of prismatic habit have well developed main rhombohedrons r {10-11} and z {01-11} along with faces of the hexagonal m {10-10} prism; the trigonal s {11-21} dipyrmaid and x {51-61} trapezohedron occur among additional faces. More rare additional faces appear, as a rule, at the final stage of growth. Sharp rhombohedra do not observed on the crystals and predominantly occur in

Table 1. Minerals of the rock crystal deposits and occurrences of the Subpolar Urals

Deposits	Kozhim	Cheln-Iz	Pelengichei-3	North Lapcha	Nikolai-Shor	Granitnoe	Vodorazdel'noe	Khasavarka	Sura-Iz	Zhelannoe	Piramida	Upper Parnuk	Skalistoe	Omega-Shor	Central Patok	Dodo	Khus'-Okka	Puiva	Pyrtindyma	Pridorzhnoe
Number on Fig. 24	0	7	4-5	9	16	23	24	20	13	11	44	41	49	56	60	64	65	67	72	31
Native Elements and Carbides																				
Gold			x							x										
Graphite	x															x				
Moissanite											x					x		x		
Halides																				
Fluorite	x		x							x						x	x	x		x
Sulphides																				
Chalcopyrite			x	x	x				x	x				x		x	x	x		x
Galena	x		x		x				x					x				x		
Pyrite	x		x	x	x	x	x	x	x	x			x	x	x	x	x	x		x
Pyrrhotite			x						x					x		x		x		
Sphalerite			x	x				x						x		x		x		
Tetrahedrite			x					x						x		x		x		
Analogues of Sulphides																				
Arsenopyrite			x		x											x				
Bornite			x													x				
Breithauptite																		x		
Boulangerite																x				
Chalcocite			x	x												x		x		
Cobaltite																x				
Cosalite																x				
Covellite			x						x							x		x		
Meneghinite																x				
Ullmannite																		x		
Sulphates, Tungstates, Vanadates																				
Anhydrite			x					x								x		x		
Anglesite			x													x		x		
Gypsum			x													x		x		
Jarosite									x											
Melanterite								x								x				
Molybdenite			x																	
Scheelite			x														x			
Stolzite			x																	
Vanadinite			x																	
Phosphates																				
Apatite	x	x	x	x	x	x	x	x	x	x	x			x	x	x	x	x		x
Florentite-(Ce)								x		x	x	x								
Lazulite									x	x										
Monazite-(Ce)			x	x	x				x	x	x	x		x	x	x	x			x
Svanbergite								x		x	x									
Turquoise										x										
Xenotime-(Y)		x								x	x	x				x				x
Carbonates																				
Ankerite			x		x	x		x								x		x		
Aragonite	x		x							x										
Azurite			x					x	x	x						x		x		
Dolomite	x		x					x	x											x
Calcioancylite-(Ce)																x		x		
Calcite	x	x	x	x	x		x	x	x		x		x	x	x	x	x	x		
Cerussite			x											x		x		x		
Malachite			x	x					x							x		x		x
Parasite-(Ce)																x				
Rosasite			x					x												
Siderite				x														x		
Smithsonite			x													x				
Synchysite-(Ce)																			x	
Oxides																				
Anatase			x	x	x	x	x		x	x		x		x	x	x		x		x
Brookite				x	x	x			x		x			x	x	x	x			x

Deposits	Kozhim	Cheln-Iz	Pelegichei-3	North Lapcha	Nikolai-Shor	Granitnoe	Vodorazdel'noe	Khasavarka	Sura-Iz	Zhelannoe	Piramida	Upper Parnuk	Skalistoe	Omega-Shor	Central Patok	Dodo	Khus'-Oka	Puiva	Pyrtindyrma	Pridorozhnoe
Number on Fig. 24	0	7	4-5	9	16	23	24	20	13	11	44	41	49	56	60	64	65	67	72	31
Corundum																X				
Goethite			X	X	X	X		X	X	X	X	X		X	X	X	X	X		X
Hematite			X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Ilmenite				X	X	X	X	X	X	X	X			X	X	X	X	X		X
Magnetite			X				X				X					X				X
Pyrolusite					X															
Romanechite					X				X							X				X
Rutile		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X		X
Silicates																				
Actinolite			X				X		X					X	X	X	X			
Almandine					X		X			X	X			X	X			X		X
Anthophyllite																X				
Apophyllite			X													X		X		
Hemimorphite				X				X												
Datolite																	X	X		
Kainosite-(Y)																		X		
Kyanite										X										
Manganaxinite																	X			
Prehnite							X													
Titanite			X		X	X	X	X	X		X			X		X	X	X		X
Tremolite			X						X								X	X		
Tourmaline (Schorl)			X		X	X	X	X	X	X	X	X								X
Ferroaxinite																	X	X		
Chrysocolla			X	X					X							X				
Zircon			X							X										X
Feldspars																				
Albite		X		X			X	X	X	X		X								
Oligoclase					X	X														
Orthoclase (adularia)				X				X		X					X	X	X	X	X	X
Phyllosilicates																				
Biotite			X																	X
Chlorite		X	X	X	X	X	X	X	X	X	X		X	X	X	X	X	X	X	X
Dickite					X	X		X												
Kaolinite					X	X		X												
Montmorillonite					X	X							X			X				
Muscovite			X	X	X	X	X	X	X	X	X	X		X		X				X
Paragonite					X	X														
Phlogopite			X																	
Pyrophyllite		X									X							X		
Rectorite					X	X										X				
Stilpnomelane																	X	X	X	
Talc		X	X																	
Epidote group																				
Allanite-(Ce)			X		X				X							X				X
Clinozoisite																	X	X		
Epidote		X	X		X	X	X	X	X	X	X	X				X	X	X		X
Piemontite																	X			
Zoisite						X												X		
Zeolites																				
Harmotome																				
Heulandites							X											X		
Laumontite																		X		
Stilbite															X			X	X	
Thomsonite																		X		
Chabazite														X						
Silica																				
Quartz (Amethyst)						X		X		X						X				
Quartz (Rock crystal)	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Quartz smoky	X	X	X	X	X	X	X	X	X	X	X			X	X	X	X	X	X	X
Quartz (Citrine)			X			X	X	X		X	X	X				X		X		
Opal			X													X				



Fig. 64. Rutile in quartz.
13.5 x 8 x 7 cm. Feiko-Shor.
Vernadsky State Geological Museum, RAS,
no. MH-52720, 1970, donated by V.M. Chalisov.

Photo: M.B. Leybov.

⌞ *Fig. 65. Citrine.*
6 x 3.5 x 2 cm. Khasavarka.
Vernadsky State Geological Museum, RAS,
no. MN-53528.

Fig. 66. Quartz with inclusions of chlorite.
20 x 18 x 10 cm. Nikolai-Shor.
Vernadsky State Geological Museum, RAS,
no. M-0051, 2011, donated by S.M. Mironov.





Fig. 67. Quartz with channels formed after dissolved inclusions.
5.5 x 3 cm. Maly-Nyrd Ridge. Specimen: A.V. Kozlov.

↑ *Fig. 68. Quartz*, sceptor-shaped crystal.
9 x 8 x 7 cm. Khasavarka.
Vernadsky State Geological Museum, RAS, no. MN-47001, 1961.

Fig. 69. Quartz with traces of dissolution.
40 x 25 cm. Puiva.
Fersman Mineralogical Museum, RAS, no. 40915, 1939.





Fig. 70. Quartz: crystal with phantoms. 15 x 6 cm. Upper Patok. Chernov Geological Museum, Institute of Geology, Komi Scientific Center, Ural Branch, RAS, Syktyvkar, no. 553/102.

↑ Fig. 71. Prismatic crystal of quartz. 26 cm. Subpolar Urals. Specimen: V.A. Pelepenko.

Photo: M.B. Leybov.

Fig. 72. Quartz with inclusions of rutile. 6 x 4.4 cm. Upper Parnuk. Museum "Gems", no. 4113/MP2498.

→ Fig. 73. Smoky quartz, cluster of crystals. 28 x 27 cm. Dodo. Specimen: V.M. Sladkov.



Fig. 122. Parallel intergrowth of rhombohedra of **calcite** (2–11 cm) powdered with crystals of **hydroxyapophyllite**. 18 x 15 x 10 cm. Vein 83, Puiva. Fersman Mineralogical Museum, RAS, no. 85563, 1988.



Fig. 123. Calcite.
22 x 13 cm. Dodo.
Specimen:
V.M. Sladkov.

Photo:
M.B. Leybov.



Fig. 124.
Rhombohedral **cal-**
cite crystal.
11 x 6 cm. Dodo.
Fersman
Mineralogical
Museum, RAS, no.
89221, collected in
1988.



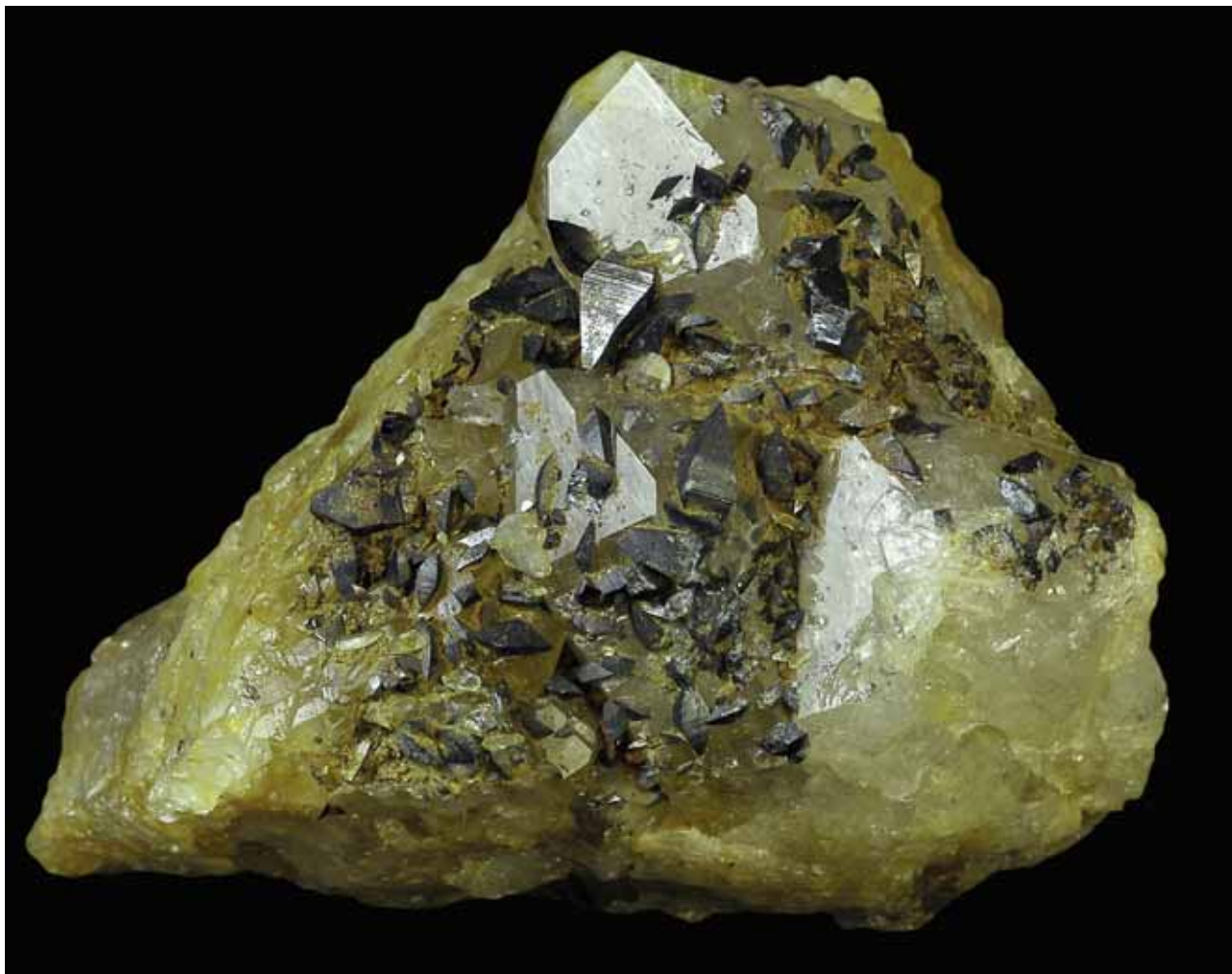


Fig. 129. Anatase crystals (up to 1 cm) on quartz crystals. Sura-Iz. Fersman Mineralogical Museum, RAS, no. 41017, registered in 1939.



Photo: M.B. Leybov.

Fig. 130. Anatase. Width of image 4.5 x 3 cm. Mountain Malaya Lapcha. Vernadsky State Geological Museum, RAS, no. MN-28060, 1938.

Fig. 131. Anatase on the faces of quartz crystal. 5 cm. Dodo. Specimen and photo: E.V. Burlakov.



Fig. 132. Anatase on quartz. 13 x 9 cm. Khobe-Yu. Fersman Mineralogical Museum, RAS, no. 40947, registered in 1939. Photo: M.B. Leybov.



Fig. 154.
Manganaxinite.
6 x 3.5 cm.
Khus'-Oika.
Specimen:
I.V. Pekov.

Fig. 155.
Ferroaxinite.
6.5 x 5 cm. Puiva.
Museum "Gems",
no. 4939/ MP2815.

Photo:
M.B. Leybov.

Fig. 156.
Ferroaxinite.
6 x 3.5 cm. Puiva.
Specimen:
I.V. Pekov.

Fig. 157. Ferroaxinite.
10 x 7 x 3 cm. Puiva.
Vernadsky State Geological Museum,
RAS, no. M-0621,
donated by S.M. Mironov.

Photo: M.B. Leybov.



Fig. 158. Ferroaxinite.
25 x 33 cm. Puiva.
Museum "Gems", no. 5030/ MP2824.

