Hangaspuro

Alternative Names: Juomasuo II
Occurence type: occurrence

Commodity	Rank	Total measure	Total production	Total resource	Importance
gold	1	NA	NA	NA	NA
copper	2	NA	NA	NA	NA
cobalt	2	NA	NA	NA	NA
molybdenum	4	NA	NA	NA	NA

Easting EUREF: 598194
Northing EUREF: 7353989
Easting YKJ: 3598406
Northing YKJ: 7357065

Discovery year: 1989
Discovered by: Geological Survey of Finland
Province: Kuusamo-Kuolajärvi (Co, Au)
District: Kuusamo (Co, Au)
Comments: Discovery by GTK; as a follow-up of exploration at Juomasuo: exploration in an area of a combined ground magnetic and electric anomaly

References: 6, 9, 11

Mineral deposit type

Group: Metallogenic deposit
Main type: Orogenic (metamorphic hydrothermal)
Sub type 1: Au-Co-Cu
Comments: The auriferous fluids were transported along deep, rift-tectonic faults up to the greenschist-metamorphic environment, concentrated on the antiform; the metals precipitated in structurally controlled sites close to impermeable dolerites and metavolcanic units or, rather, in the more competent sericite quartzite units between the more plastic mafic units or, rather, in the more competent sericite quartzite units between the more plastic mafic units.
References: 2, 5, 6, 7, 8, 10, 11, 13

Dimension

Expression: exposed
Form: discordant
Shape: NA
Length (m): 150
Width (m): 10
Thickness (m): NA
Depth (m): NA
Area (ha): NA
Dip azim: 70
Dip: NA
Plunge azim: NA
Plunge dip: NA
Orientation method: NA
Dimension comments: More than 150 m long, about 10 m wide, NNW-trending zone, open at both ends along strike

Holder history

Current holder: Latitude 66 Cobalt Oy
Years: 2020-2027
Holding type: Exploration permit

Previous holders:

Company	Years	Holding type	Comments
Latitude 66 Cobalt Oy	2019	Application for exploration permit	NA
Kuusamo Gold Oy	2015-2018	Exploration permit	Application for a mining permit
Dragon Mining Oy	2014	NA	Appl. for exploration in 2014 and appl. for mining permit in 09.03.2015
Polar Mining Oy	2003-2011	Claim (old law)	NA
Geological Survey of Finland	1989-1991	Claim (old law)	NA

EXPLORATION ACTIVITY

Geological Survey of Finland

Years	Activity type	Geologist	Exploration result	Ref
1989-1991	excavation	Erkki Vanhanen.	NA	1, 2, 4, 5, 7, 8, 11, 12, 13
	7 trenches, in total 650 m			

1989-1989	core drilling	Erkki Vanhanen	NA	1, 2, 4, 5, 7, 8, 11, 12, 13
	Core drilling (reconnaissance drilling): 6 diamond-drill holes, total 906 m. Ag, Au, Co, Cu, Fe, Ni, Pb, Te and Zn analysed.			
	Intersections			
	HoleID	R354		
	From-To	NA		
	Length	1m		
	molybdenum	9500ppm		
	HoleID	R357		
	From-To	NA		
	Length	1m		
	copper	1,9%		
	HoleID	R357		
	From-To	NA		
	Length	14m		
	cobalt	0,14%		
	HoleID	R357		
	From-To	NA		
	Length	3m		
	gold	4ppm		

1989-1991	detailed geochemistry	Erkki Vanhanen.	NA	1, 2, 4, 5, 7, 8, 11, 12, 13
	Part of the Käylä-Konttiaho area geochemical till survey (120 km2, 250 m grid sampling) + local grid and line till sampling			

1989-1989	regional geochemistry	NA	geochemical anomaly	
	Regional geochemical till survey			

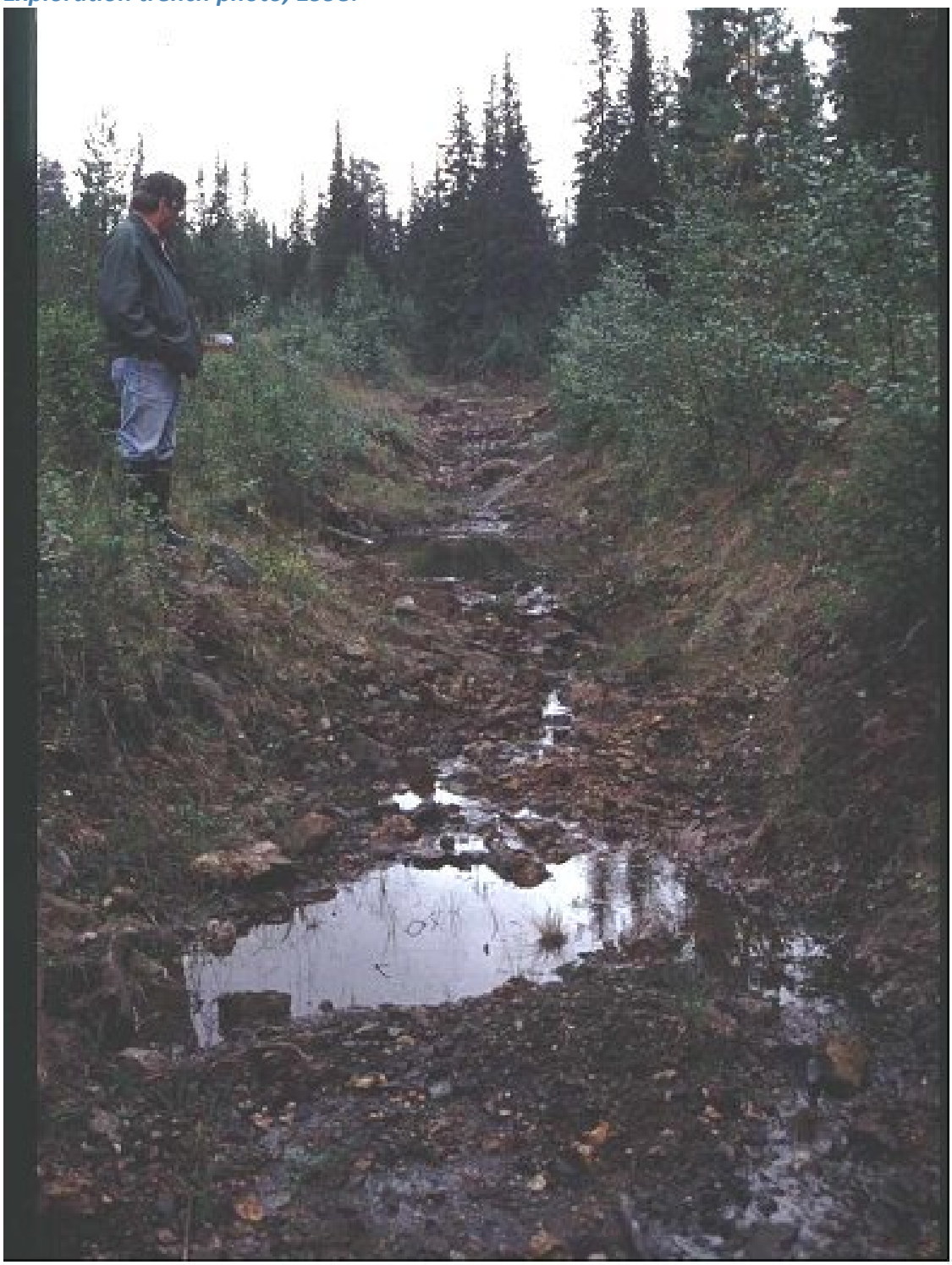
1987-1990	detailed geophysics	Erkki Vanhanen.	NA	2
	Gground IP, VLF-R, slingram, radiometric and magnetic survey done, A combined ground magnetic and electric anomaly.			

1986-1991	detailed geology	Erkki Vanhanen	NA	1, 2, 4, 5, 7, 8, 11, 12, 13

1984-1984	regional geophysics	NA	key geological features	1, 2, 4, 5, 7, 8, 11, 12, 13
	Low-altitude magnetic, aeromagnetic and radiometric survey			

Figures

Exploration trench photo, 1998:



Exploration trech across mineralisation at Hangaspuro.

Scale: Dr Heikki Pankka.
Photo Pasi Eilu 25/8/1998.

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GEOLOGY

Host rock: Mica schist, Dolerite, Mafic volcanic rock

Mica schist (Host rock)

Rock type: Host rock
Proportion: major
Grain size: NA
Color: NA
References: 2, 4, 5, 7, 8, 10, 11, 12, 13
Comments: Quartz-carbonate ± sulphides in veins in mineralised parts. No native gold detected. Gold is chiefly in the altered host rocks, less in the veins

Ore minerals:

Mineral	Proportion	Mineral texture
Brannerite	minor	
Chalcopyrite	minor	
Molybdenite	minor	
Pyrite	major	
Pyrrhotite	major	
Uraninite	minor	

Other minerals:

Mineral	Proportion	Mineral texture
Actinolite	present	Alteration product
Albite	present	Alteration product
Biotite	present	Alteration product
Calcite	present	Alteration product
Chlorite	present	Alteration product
Chloritoid	present	Alteration product
Dolomite	present	Alteration product
K-Feldspar	present	Alteration product
Magnetite	present	Alteration product
Quartz	present	Alteration product
Rutile	present	Alteration product
Sericite	present	Alteration product
Talc	present	Alteration product
Tremolite	present	Alteration product

Structures
Faulted
Comments: Controlling structure; WNW-trending faults which cut across the antiform; contact between rock types of contrasting competence, especially, areas close to the contact between Sericite Quartzite and Greenstone II Formations are critical for mineralisation

Alteration:	Distribution:	Degree:	Relation to mineralization:
silicification	NA	NA	Post
albitic alteration	Pervasive	Strong	Pre
Comments: Locally intense Albitisation of clastic sediments and spilitisation of volcanic units when the 2.206 Ga mafic sills and dykes heated the evaporite-bearing sequence and put hot brines into circulation.			
biotite alteration	Disseminated	NA	Syn
sulphidation	NA	NA	Syn
carbonate alteration	Disseminated	Strong	Syn
sericitic alteration	Disseminated	Weak	Syn
chloritic alteration	Disseminated	Strong	Syn
skarnification			
Comments: amphibole skarns			

Metamorphic description:

Type:	Facies:	Degree:	Relation to mineralization:	Min P- Max P (kbar)	MIn T- Max T (°C)
Regional	amphibolite metamorphic facies	medium metamorphic grade	Syn		
Comments: Peak regional metamorphism at lower-amphibolite facies: staurolite porphyroblasts in Al-rich rocks, during D1?. This was followed by retrograde greenschist-facies metamorphism: sericitisation of staurolite, during D2?, related to NW-trending shear zones and gold mineralisation?; Metamorphic mineral assemblage; Quartz-albite-sericite-biotite ± chlorite.					

Geological age:

Geological era:	Max age - Minage (Ma):	Inferred age (Ma):	Age of mineralization:
Paleoproterozoic (2500-1600 Ma)	1800-2050		Y
Comments: Mineralisation between 2.05-1.8 Ga.			

Dolerite (Host rock)

Rock type: Host rock
Proportion: minor
Grain size: NA
Color: NA
References: 2, 4, 5, 7, 8, 10, 11, 13
Comments: Differentiated, 2050 Ma dolerite(s) which predate all alteration and gold mineralisation

Textures
Granoblastic

Metamorphic description:

Type:	Facies:	Degree:	Relation to mineralization:	Min P- Max P (kbar)	MIn T- Max T (°C)
Regional	amphibolite metamorphic facies	medium metamorphic grade	Syn		
Comments: Peak regional metamorphism at lower-amphibolite facies: staurolite porphyroblasts in Al-rich rocks, during D1?. This was followed by retrograde greenschist-facies metamorphism: sericitisation of staurolite, during D2?, related to NW-trending shear zones and gold mineralisation?; Metamorphic mineral assemblage; Albite-actinolitic hornblende-epidote-opaques ± titanite, quartz.					

Geological age:

Geological era:	Max age - Minage (Ma):	Inferred age (Ma):	Age of mineralization:
Paleoproterozoic (2500-1600 Ma)	1600-2500		N

Mafic volcanic rock (Host rock)

Rock type: Host rock
Proportion: minor
Grain size: NA
Color: NA
References: 2, 4, 5, 7, 8, 10, 11, 13
Comments: The mineralisation is in the contact zones between metasedimentary and metavolcanic rocks of the Kuusamo Schist Belt.

Textures
Granoblastic

Metamorphic description:

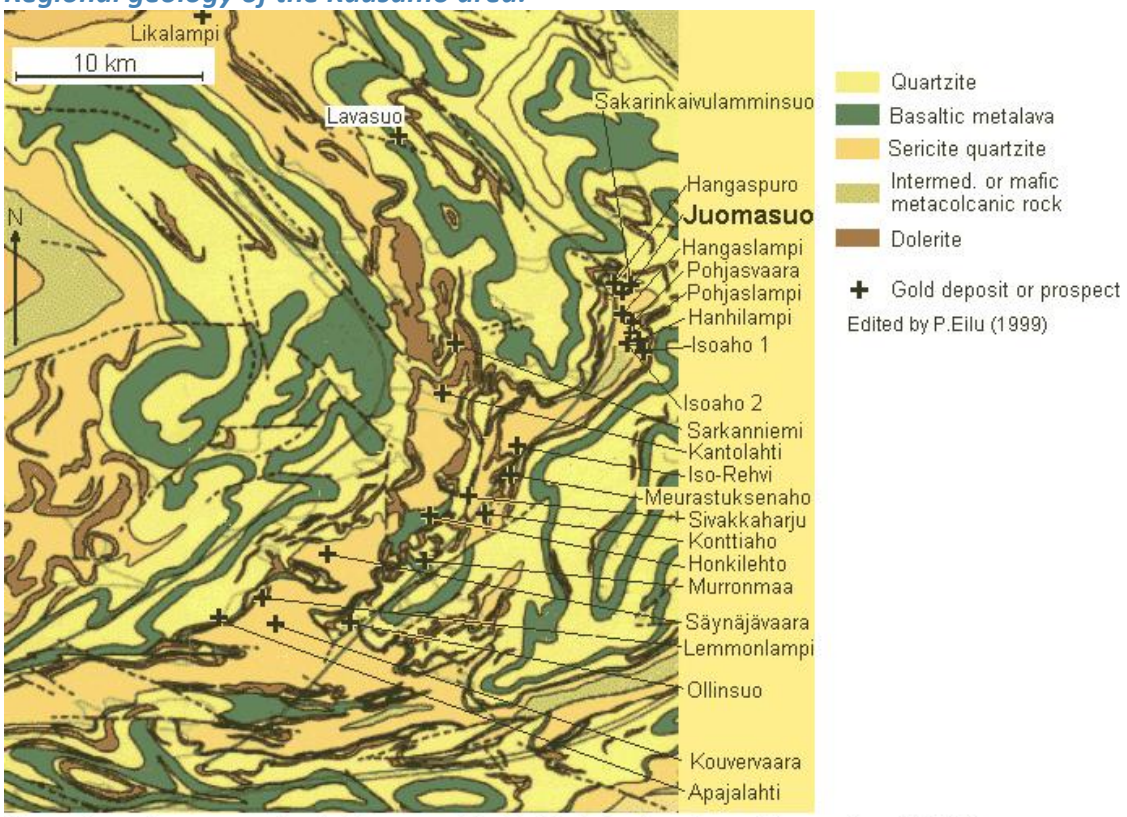
Type:	Facies:	Degree:	Relation to mineralization:	Min P- Max P (kbar)	MIn T- Max T (°C)
Regional	amphibolite metamorphic facies	medium metamorphic grade	Syn		
Comments: Peak regional metamorphism at lower-amphibolite facies: staurolite porphyroblasts in Al-rich rocks, during D1?. This was followed by retrograde greenschist-facies metamorphism: sericitisation of staurolite, during D2?, related to NW-trending shear zones and gold mineralisation?					

Geological age:

Geological era:	Max age - Minage (Ma):	Inferred age (Ma):	Age of mineralization:
Paleoproterozoic (2500-1600 Ma)	1600-2500		N

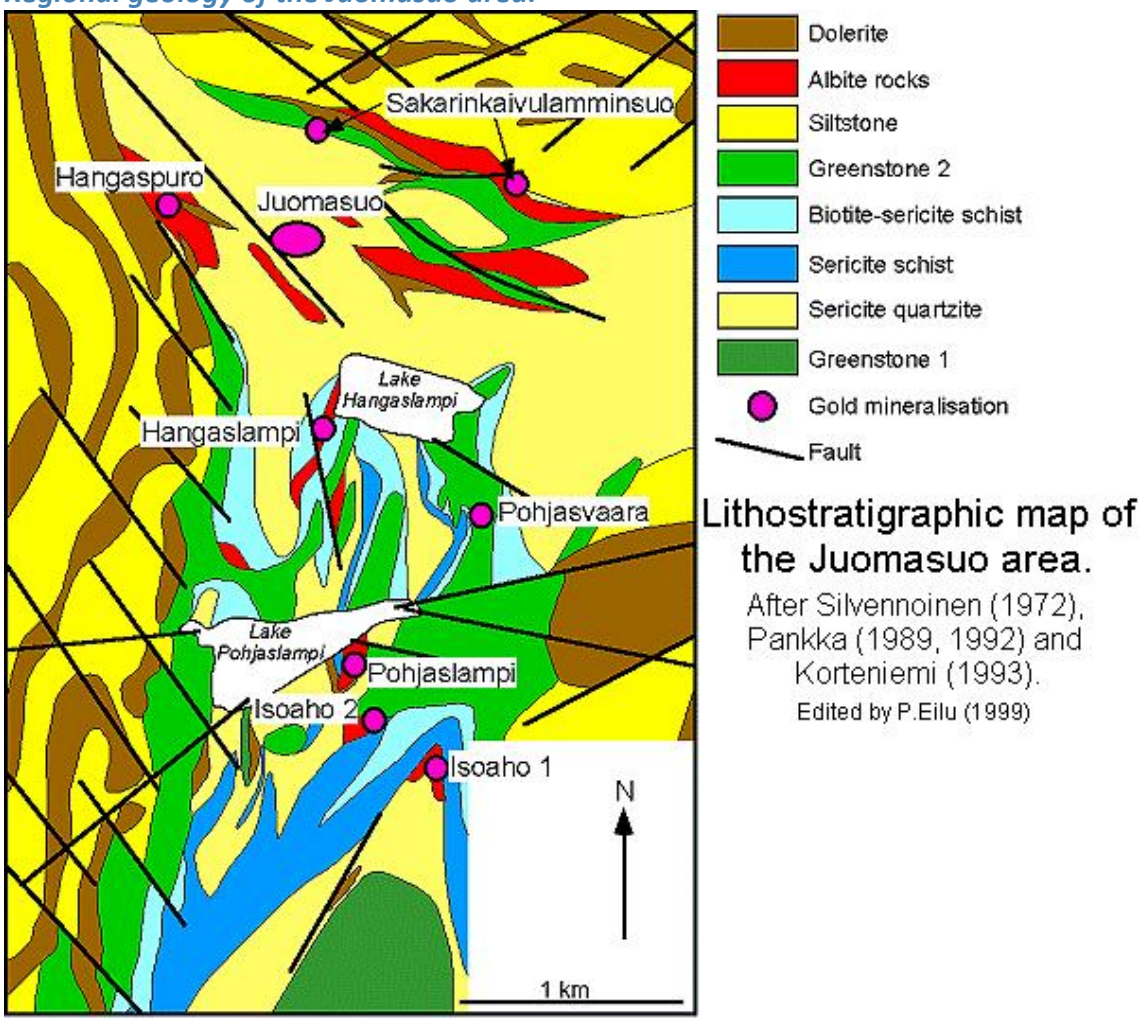
Figures

Regional geology of the Kuusamo area:

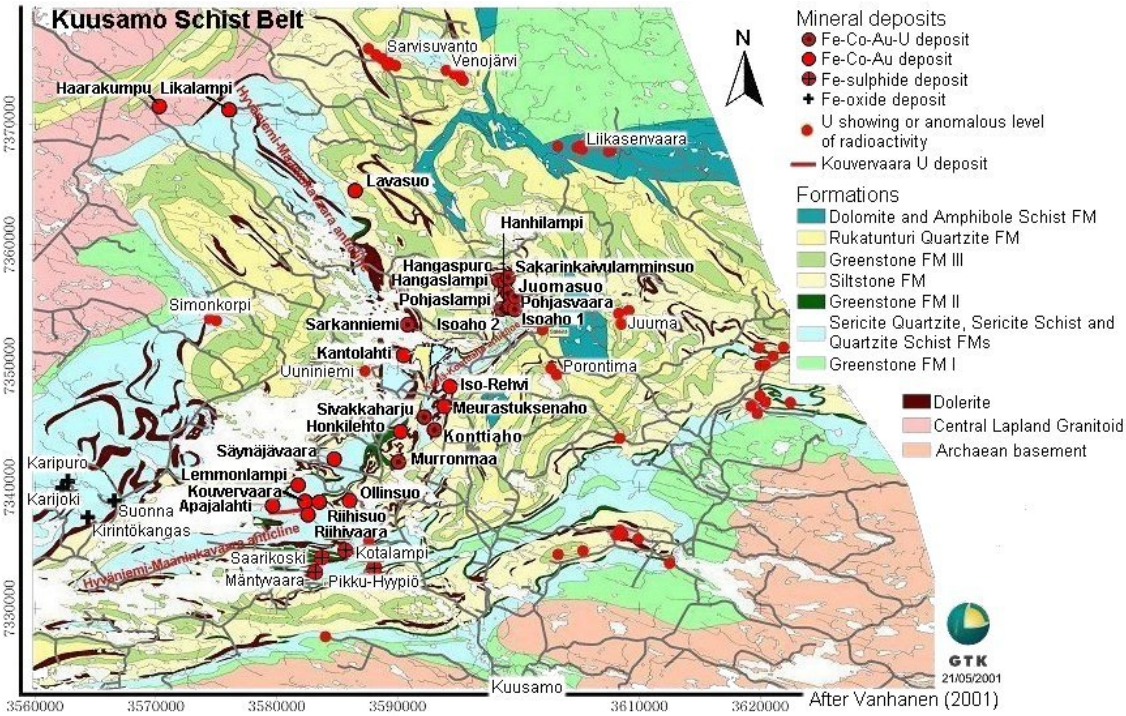


Deposits and prospects in the Kuusamo Schist Belt. Geology from Silvennoinen (1992).
Solid and dashed, curved lines indicate boundaries between lithological units, faults and shear zones

Regional geology of the Juomasuo area:



Regional geology and mineral deposits of the Kuusamo area:



After Vanhanen (2001)

Local geology of the Hangaspuro target:

Geology of the Hangaspuro area (Korteniemi 1993).

- ALBITE DIABASE
- CHLORITE-ALBITE ROCK
- CARBONATE-ALBITE ROCK
- ALBITE / QUARTZ-ALBITE ROCK

Intensely albitised host rock. Photomicrograph:

Hangaspuro. Finegrained albite rock with zoned carbonate porphyroblasts and pyrite. Brecciated by later hydrothermal biotite-chlorite filled veins. Width of the photo ca 4 cm.

(from Korteniemi 1993)

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