penecontemporaneous structures, as to suggest a bedding plane control rather than shear zone filling or replacement.

4) Simple mineralogy of the ores.

5) Absence of igneous rocks in the vicinity to which the ore solutions could be genetically related.

It is probable that the coarse grained quartz and carbonate material associated with the lead-zinc ores was eroded from the older rocks and deposited in the carbonate sediment. The cross cutting veins within the mineralised zone were formed during a subsequent remobilisation of the ores either during diagenesis or later movements that affected the basin.

The disseminated pyrite chalcopyrite mineralisation in the lower dolomite might have resulted by precipitation as gels with organic matter or sulphur bacteria coming into play in a reducing environment.

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LOW Ca LOW Al ORTHOPYROXE [illegible] BEARING AREA OF SUKINDA AND THEIR SIGNIFICANCE

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Five samples of orthopyroxenes, collected (hand-picked under binocular microscope) from chromite-bearing area of Sukinda Lat. 21°0′ – 21°5′; Long. 85°45′ – 85° 57′33″, and from enstatitite (bronzitite) and websterite were analysed by using a Phillips 1212 automatic X-Ray fluorescence spectrometer. Major and trace elements were analysed from prepared briquettes. The counts were connected for absorption and matrix by using the technique and computer programme of Holland and Brindle (1966). The data are presented in Table I.

The cations present in unit cell on the basis of 6 (0) is presented in Table II.

In the Sukinda enstatites the number of Ca atom per unit cell varies from 0.16 to .029 suggesting a temperature range of formation of about 700°C and below (Atlas, 1952). No evidence of contact effect due to the intrusion of ultramafites could be seen in the area.

Orthopyroxenes from nodules and intrusive peridotites are low in Ca content and are derived from Ca-deficient magma (Hess, 1960, p. 32, Table 19). Hess gave a range of 1.35 – 1.93% CaO for pyroxene derived from basaltic magma and 0.23 – 1.95% CaO for those from ultramafic magma. Sukinda magma, on this basis, shows affinity to the latter source. Ca-deficiency in orthopyroxene indicates that these pyroxenes were formed in a slow cooling condition.

Those orthopyroxenes have very low range of Al_2O_3 content. In these pyroxenes lime increases generally with alumina as also observed in Lizard (Green, 1963).

TABLE I

Sl. No.	1	2	3	4	5
Sample No.	Ex	B_{124}	B_{123}	B_{68}	M_{434}
SiO_2	57.00	56.38	57.23	57.08	56.55
Al_2O_3	0.78	0.78	0.80	0.66	1.03
FeO	5.81	5.78	5.75	5.96	6.60
MgO	35.73	36.57	35.54	35.75	34.96
CaO	0.65	0.43	0.64	0.49	0.77
Na_2O	0.001	tr	0.01	0.04	0.02
K_2O	0.03	0.03	0.03	0.03	0.07
TiO_2	tr	tr	tr	tr	0.001
Total	100.001	99.97	100.00	100.01	100.001
En ratio :	82.83	83.20	82.74	82.31	80.38

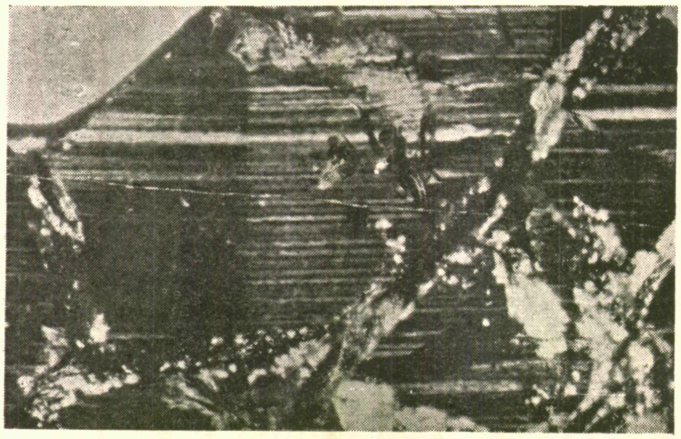

Figure 1. A twinned orthopyroxene containing fine exsolution lamellae of clinopyroxene (crossed ×250).

This suggests that temperature may partly control the entry of alumina into pyroxene structure. The coefficient of correlation (r) between Al_2O_3 and CaO in Sukinda orthopyroxene is .7509 and the regression equation for this is:

$$Al_2O_3 = .1458 + .011721\ CaO.$$

The orthopyroxenes of Sukinda rarely contain fine exsolution lamellae of clinopyroxene (Fig. 1.), which suggests a peridotitic rather than basaltic parentage. The poorly developed lamellae in orthopyroxenes in Sukinda suggest that these were formed by faster cooling of the peridotite magma.

TABLE II

Serial No.	1		2		3		4		5	
Sample No.	Ex		B_{124}		B_{123}		B_{68}		M_{434}	
Si^{+4}	1.9992	2	1.9231		1.9905	2	1.9865	2	1.9803	2
Al^{+3}	.0008		.0218	2	.0095		.0135		.0197	
Fe^{+3}			.0551							
Al^{+3}	.0149				.0069		.0002		.0052	
Fe^{+2}	.0853		.1085		.0804		.0807		.0968	
Mg	1.8681		1.8587		1.8427		1.8537		1.8242	
Ti	—	1.9933	—	1.9842	—	1.9568	—	1.9675	—	1.9627
Ca	.0346		.0158		.0240		.0183		.0289	
Na	—		—		.0016		.0058		.0016	
K	.0004		.0012		.0012		.0026		.0060	

The occurrence of dunite, harzburgite, websterite and enstatitite in the present area and absence of any felsic mineral association suggests that crystallisation of these took place from differential layers in an Al_2O_3-depleted ultramafic magma.

The lime content in the enstatites of Sukinda indicates that the parent magma was derived from the primary calcic type magma occurring in the folded mountains of the Eastern Ghat region of east India.

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