EXPLANATION OF PLATES

PLATE-I

fig. 1 A thinly laminated banded ferruginous quartzite usually associated with iron ore deposits of Bicholim, Goa. 1/2 Nat.size.

fig. 2 A rare variety of thickly banded ferruginous quartzite consisting of alternate bands of silica (white) and iron oxides (dark grey). 1/2 Nat.size.

fig. 3 A handspecimen of medium grained and unmetamorphosed basic dyke. 1/2 Nat.size.

fig. 4 Pisolites in aluminous laterite derived from phyllites. 2/3 Nat.size.

PLATE-II

fig. 1 Schistosity in chlorite phyllite developed due to preferred orientation of quartz and felsper grains (white) and flaky micas. X32 Plane polarized light.

fig. 2 Fractured and rounded to subrounded porphyroblasts of quartz, micas and chlorite being bendaround them. X90 crossed Nicol.

fig. 3 Local occurrence of interlocking aggregates of quartz in chlorite phyllite. Also note the twinning in the porphyroblast of albite in the centre of the photomicrograph. X90 crossed Nicol.

fig. 4 Untwinned sieved felspar containing innumerable minute inclusions of flaky minerals. X90 crossed Nicol.

PLATE III

fig. 1 Segregated band formed by flaky minerals (white). X32 crossed Nicol.

fig. 2 Coarse-grained calcite in calcareous phyllite having some felspar and quartz porphyroblasts. X90 crossed Nicol.

fig. 3 Porphyroblasts of twinned albite in calcareous phyllite riddled with minute inclusions of apatite, chlorite, sericite, etc. X90 crossed Nicol.

fig. 4 Well-developed schistosity in calcareous phyllite, biotite flakes (dark) stretched along schistosity direction. X140 Plane polarized light.

PLATE IV

fig. 1 Alternate dark ferruginous and light siliceous bands in banded ferruginous quartzite. X32 Plane polarized light.

fig. 2 Siliceous bands in ferruginous quartzite having little iron oxides, the proportion of which gradually increases as the ferruginous band approaches. X90 Plane polarized light.

fig. 3 Cherty quartz in siliceous band of ferruginous quartz. X32 crossed Nicol.

fig. 4 Quartz showing mosaic texture. X90 Plane polarized light.

PLATE V

fig. 1 Partial replacement of quartz crystals by iron oxide (black) mostly along their grain boundaries. X60 Plane polarized light.

fig. 2 Subhedral to enhedral crystals of magnetite (black) in the ferruginous band with subordinate amount of quartz (white). Note also the fairly uniform size of the magnetite crystals. X32 Plane polarized light.

fig. 3 Crude schistosity marked by the orientation of specular hematite (black). X90 Plane polarised light.

fig. 4 Granoblastic texture in metadolerite. X32 crossed Nicol.

PLATE VI

fig. 1 Blastophitic texture in metadolerite, plagioclase laths are enclosed in altered pyroxene. X90 crossed Nicol.

fig. 2 Altered plagioclase having inclusions of epidote and zoisite. X90 crossed Nicol.

fig. 3 Actinolite, uralite and chlorite along the crystal boundary of hornblende (left hand corner). Note clusters of epidote grains in the upper part of the photomicrograph. X90 crossed Nicol.

fig. 4 Characteristic ophitic texture in dolerite. X32 crossed Nicol.

PLATE VII

fig. 1 Clouding of plagioclase due to its partial alteration. X32 crossed Nicol.

fig. 2 Olivine altering into sepentine along grain boundaries and fracture planes heaving relicts of former. X32 Plane polarized light.

fig. 3 A portion of the 35 meter level face of hard ore (right hand side) workings at Sirigao mines. Left hand side of the photograph is a ferruginous laterite capping over hard ores.

PLATE VIII

fig. 1 A close-up view of the steeply dipping, and thinly laminated friable ore at Sanquelim mines.

fig. 2 Highly dipping transitional zone of friable ore (left hand side) and powdery ore (right hand side) in the Sanquelim mines. Note the thin laminations and minor folds in the undisturbed face of powdery ore.

PLATE IX

fig. 1 A general view of a part of the Coplegaichem concessions at Sirigao showing mining of powdery ore in progress at 15 meter level.

fig. 2 A handspecimen of hard ore showing fine laminations. 3/2 Nat.size.

fig. 3 A handspecimen of folded hard ore. Individual laminae are more distinctly shown by voids left after leaching of silica. 1/2 Nat.size.

PLATE X

fig. 1 Ground surface of a handspecimen of ferro-manganese ore with fine laminations parallel to the given scale. 1/2 Nat.size.

fig. 2 A handspecimen of iron ore laterite showing pisolites in the upper part and crude lamination in the lower part. 4/3 Nat.size.

fig. 3 Subhedral to enhedral crystals of martite without any relict of magnetite. X160 Oil immersion.

fig. 4 Specular hematite with intervening goethite or gangue. X730 Oil immersion.

PLATE XI

fig. 1 Subhedral crystals of magnetite. The intergranular dark spaces are occupied by gangues. X160 Oil immersion.

fig. 2 Lepidocrocite (white, around the dark vug) surrounded by gangue (dark grey). The light grey goethite is around the gangue. X160 Oil immersion.

fig. 3 Atoll structure formed due to complete enclosure of goethite (grey) by lepidocrocite (greyish white). X160 Oil immersion.

fig. 4 Subhedral grains of pyrolusite in the upper part of the figure exhibit mosaic texture and below are the accicular crystals of pyrolusite. X35.

PLATE XII

fig. 1 Banded structure shown by magnetite-martite (white) and gangue (dark) occurring in alternate bands. X35.

fig. 2 Thin trains of goethite (grey) and gangue (dark) along the bedding planes exhibit banded structure. X35.

fig. 3 Granular texture in a hard iron ore, goethite (dark grey) occupying the intergranular spaces of martite (grey white). X160 Oil immersion.

fig. 4 Granular texture in manganiferrous iron ore. Grains of martite and magnetite are surrounded by pyrolusite (grey white). X160 Oil immersion.

PLATE XIII

fig. 1 Granular texture shown by martite in a protore in which silica (dark) occupies the intergranular spaces. X160.

fig. 2 Preferred orientation shown by specular hematite in a schistose ore. X90.

fig. 3 Crude schistosity is developed due to imperfect preferred orientation of magnetite or martite crystals. X50.

fig. 4 Colloform texture with alternate concentric bands of pyrolusite (grey) and gangue (dark). X50.

PLATE XIV

fig. 1 Concentric rings of psilomelane (white) and pyrolusite (dark grey). Ore or gangue is present at the centre of the colloform rings. X35.

fig. 2 Subhedral and radiating pyrolusite crystals occur in a vuge of manganese ore. Note also shrinkage cracks perpendicular to the surface of colloform ore in the upper left and lower right side of the figure. X35.

fig. 3 Incomplete pseudomorphic replacement of magnetite by martite is indicated by the presence of some relicts of magnetite (slaty grey). X730 Oil immersion.

fig. 4 Pseudomorphic replacement of magnetite by goethite (dark grey) leaving some relicts of the former(light grey). There is also an indication of later replacement of goethite by hematite (white) along the margin of the pseudomorphs. X160.

PLATE XV

fig. 1 Initial replacement of magnetite(pale grey) by martite (white) along grain boundaries of the former. X160 Oil immersion.

fig. 2 Wedmanstetten like texture due to pseudomorphic replacement of magnetite by martite following octahedral cleavage partings of the former. X730 Oil immersion.

fig. 3 Partial replacement of a cubic magnetite crystal(white) by martite along its grain boundaries. The other crystals show complete alteration into martite. X160 Oil immersion.

fig. 4 Straight boundary relation between a euhedral crystal of magnetite (dark grey) and several specular crystals of hematite (white) surrounding the former. X730 Oil immersion.

PLATE XVI

fig. 1 Parts of the grain boundary of a martite crystal (white) is being irregularly replaced by goethite (grey). X730 Oil immersion.

fig. 2 Goethite pseudomorphs after magnetite. It was subsequently replaced by hematite (white) leaving some relicts of the former (light grey). Intergranular space material (darker grey) is also goethite. X160 Oil immersion.

fig. 3 Wedmanstetten like replacement texture shown by having innumerable hematite plates (white) along the octahedral cleavage of the original magnetite. X730 Oil immersion.

fig. 4 Irregular rim replacement of goethite (dark grey) by martite (white) showing that the replacement is in progress. X160 Oil immersion.

PLATE XVII

fig. 1 The biggest pseudomorph of martite (white) after goethite is sometimes being marginally replaced by goethite (dark grey) encroaching from the intergranular spaces. Note also some small relicts of goethite (light grey) in the martite. X160 Oil immersion.

fig. 2 Colloform psilomelane (white) and pyrolusite (light grey) in the intergranular spaces of martite (dark grey) in manganiferrous iron ores. X160 Oil immersion.

fig. 3 Irregular marginal replacement of largely martitised magnetite crystal by colloform psilomelane and pyrolusite. Note the advancement of two different

processes of replacement due to which the crystal boundaries of magnetite (light grey) and martite (dark grey) do not match.X730 Oil immersion.

fig.4 Concentric bands of colloform goethite (dark grey), psilomelane (white) and pyrolusite (light grey) in manganiferous iron ore . X160 Oil immersion.