

# Cambir Dolerite - St. Kilda: an illustrated account of the geology

From Earthwise

[Jump to navigation](#) [Jump to search](#)

From: Harding, R.R. and Nancarrow, P.H.A. 1984. [St. Kilda: an illustrated account of the geology](#). BGS Report Vol. 16, No. 7. Keyworth: British Geological Survey.].



Map 2 Cambir Dolerite



Figure 6A Sheet of fine-grained Cambir Dolerite dipping gently to the left cuts across Western Gabbro with white feldspar-

rich bands dipping steeply to the right.  
Locality: Gob Chathail at a height of 80 ft  
(25 m).



Figure 6B Western cliffs of the Cambir.  
Cambir Dolerite occurs beneath and south of  
the summit at heights of 300-500 ft (90-150  
m).

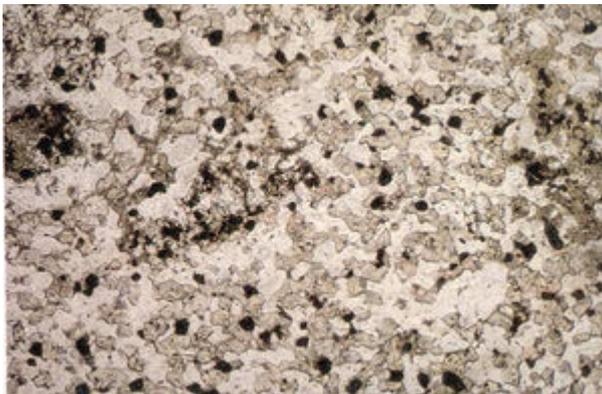


Figure 7A Clinopyroxene (brown),  
plagioclase (grey) and magnetite (black)  
grains averaging 0.2 mm across form a  
granoblastic texture. Orthopyroxene with  
magnetite inclusions occurs near the centre  
of the picture. S 67640; western cliffs of  
Cambir; plane polarised light.



Figure 7B Detailed view of poikilitic  
orthopyroxene and granoblastic feldspar  
and clinopyroxene. S 67640; field 1 mm  
wide, cross polarised light.

## Chapter 4 Cambir Dolerite D

**Keywords:** mineral analyses, annealed textures, cooling history

At the north west end of the Cambir the Western Gabbro is intruded by sheets and veins of the fine-grained Cambir Dolerite. It is exposed on the Cambir cliffs facing the island of Soay, and also near sea level below Mullach Bi where south-westerly-dipping sheets of similar rock cut the Western Gabbro. On weathered surfaces small variations in grain size give the Dolerite a streaky appearance and altered poikilitic olivine crystals form vague bands of elongate black blotches. Contacts with the Western Gabbro are sharp and transgressive to the banding and lamination but variable in attitude and orientation; overall the Dolerite probably dips steeply south-east. Outcrops of Dolerite near the grass-mantled gully below and west of the Cambir summit are variable in grain size and in places distinction from the Western Gabbro is difficult. Near the top of the gully at about 500 ft (160 m) there is an isolated intrusion of medium-grained gabbro similar to some on Soay. Like the Western Gabbro, the Cambir Dolerite is intruded by coarse gabbroic and pegmatitic veins and affected by the same kinds of faulting and shearing which gave rise to the network of veins.

More than 90% of the Dolerite is made up of plagioclase, augite and opaque minerals, and the rest consists of olivine, orthopyroxene and a small quantity of alteration products. Most plagioclase grains are small and unzoned, ranging in composition from  $An_{50}$  to  $An_{68}$  in different rocks; some larger crystals are more calcic with complex zoning patterns and may be xenocrysts derived from the Western Gabbro. Clinopyroxene grains, making up about 40% of the rock, have a relatively constant composition of  $En_{38} Wo_{42} Fs_{20}$ , and are generally less magnesian than the augite(s) of the Western Gabbro. The opaque grains are mostly magnetite with variable contents of either ilmenite lamellae or ulvospinel ( $Fe_2TiO_4$ ) and spinel ( $MgFeAl_4O_8$ ) granules, and this is reflected in the  $TiO_2$  content which in some grains reaches 25%. Irregularly shaped ilmenite grains occur in association with magnetite but are not common. Orthopyroxene grains, of smaller size and shape to the granular clinopyroxenes, are found in a few rocks, but this mineral occurs more commonly as poikilitic platy crystals enclosing plagioclase. Olivine also occurs in this form but not generally in the same rock and this mutually exclusive development of olivine in some rocks and orthopyroxene in others may be related to local temperature and oxidation conditions. Commonly, magnetite mantles the poikilitic olivine grains and there is some alteration to chlorite in the interior; fresh grains however range in composition from  $Fo_{63}Fa_{37}$  to  $Fo_{53}Fa_{47}$  (Figure 5). The sheets of dolerite below Mullach Bi have a similar mineralogy but they are coarser, with granular olivines and an overall intergranular texture. Parts of the Dolerite on the Cambir also are intergranular but the main mass is granulitic in texture, resembling a metamorphic rather than an igneous rock. This texture is characteristic of basic rocks that have been heated and maintained at a high enough temperature for sub-solidus recrystallisation (annealing) of the minerals to have occurred. Thus the sharp contacts and the transgressive nature of the veins of Cambir Dolerite in the Western Gabbro indicate that it was a liquid or a crystal mush when intruded, while the textural evidence suggests that much of the Dolerite has suffered a complex cooling history.

Although the chemical analyses of the dolerites on the Cambir (col. 1) and Mullach Bi (col. 2) are similar, the latter is slightly more magnesian and less silicic; there is some variation in the trace elements and it is possible that the example of dolerite from Mullach Bi is related more to the suite of gabbros and dolerites which form parts of Soay, Glacan Mor and Boreray. Certainly the range of sulphides found in this dolerite was greater than in the main Cambir dolerite and these include chalcopyrite, nickeliferous pyrite and a member of the linnaeite-violarite family ( $Ni_{1.8}Co_{0.8}Fe_{0.6}S_4$ ).

### Chemical analysis Cambir Dolerite

Major elements (Oxide, wt %)	1	2	Minor elements (ppm)	1	2
SiO <sub>2</sub>	49.00	47.70	Li	6	2
TiO <sub>2</sub>	1.30	1.00	V	418	314

Al <sub>2</sub> O <sub>3</sub>	14.50	15.30	Cr	240	147
Fe <sub>2</sub> O <sub>3</sub>	4.30	5.40	Co	96	57
FeO	8.20	8.60	Ni	112	108
MnO	0.20	0.20	Cu	261	169
MgO	6.50	8.10	Zn	<50	n.d.
CaO	12.20	12.30	Rb	< 10	< 10
Na <sub>2</sub> O	2.50	2.30	Sr	124	117
K <sub>2</sub> O	0.10	0.00	Y	26	n.d.
H <sub>2</sub> O <sup>+110</sup>	0.90	0	Zr	36	28
H <sub>2</sub> O <sup>-110</sup>	0.10	0.10			
P <sub>2</sub> O <sub>5</sub>	0.04	0.02			
<i>Total</i>	99.84	101.82			

Analyses: 1 by A. N. Morigi, A. E. Davis and K. A. Holmes, 2 by R. R. Harding

## References

At all times follow: [The Scottish Access Code](#) and [Code of conduct for geological field work](#)

Retrieved from

'[http://earthwise.bgs.ac.uk/index.php?title=Cambir\\_Dolerite\\_-\\_St.\\_Kilda:\\_an\\_illustrated\\_account\\_of\\_the\\_geology&oldid=43413](http://earthwise.bgs.ac.uk/index.php?title=Cambir_Dolerite_-_St._Kilda:_an_illustrated_account_of_the_geology&oldid=43413)'

Category:

- [2. Northern Highlands](#)

## Navigation menu

### Personal tools

- Not logged in
- [Talk](#)
- [Contributions](#)
- [Log in](#)
- [Request account](#)

### Namespaces

- [Page](#)
- [Discussion](#)

### Variants

## Views

- [Read](#)
- [Edit](#)
- [View history](#)
- [PDF Export](#)

## More

## Search

## Navigation

- [Main page](#)
- [Recent changes](#)
- [Random page](#)
- [Help about MediaWiki](#)

## Tools

- [What links here](#)
- [Related changes](#)
- [Special pages](#)
- [Permanent link](#)
- [Page information](#)
- [Cite this page](#)
- [Browse properties](#)

• This page was last modified on 5 November 2019, at 19:06.

- [Privacy policy](#)
- [About Earthwise](#)
- [Disclaimers](#)

