GREENSTONE AXE FRAGMENTS AND ROUGHOUTS. CLODGY MOOR - PAUL, PENWITH, CORNWALL

Section 1 Core 1. CORN-30D0E 1 (SW45406 26380) Field 490 Page 567B Gabbroic 'greenstone' worked to an asymmetrical adze-form with the butt broken off.

Plagioclase feldspar Tabular crystals up to 3 mm long, variably sericitised, with many of the feldspar grains crushed broken and distorted (Cataclasis).
Amphibole– Dark green as single interstitial crystals after pyroxene and secondary interstitial fibrous aggregates. Bluish green pleochroic to buff
Leucoxene –Dark pinkish brown weakly translucent angular grains, some showing relict skeletal structure after Ilmenite
Apatite – Colourless hexagonal crystal sections and prisms, mainly enclosed in feldspar

Comment. A cataclastic metagabbro with some relict gabbroic fabric some similarity with Group 1.

Section 2 core 2. CORN-B607442 (SW 4535626484) Field 513 Gabbroic 'greenstone' worked to axe form with the butt broken off. The edge appears to have been ground but is difficult to say whether the tool was finished.

Plagioclase feldspar – Moderately sericitised tabular crystals with a current composition of andesine up to 2.5 mm, rarely 4.6 mm. Some grains are broken and distorted.
Pyroxene –Titanaugite as pale purplish brown weakly pleochroic grains interstitial to and sometimes enclosing plagioclase crystals.
Amphibole –Bluish green to pale green pleochroic green to buff as fibrous and finely prismatic 'uralitic' actinolite fringes and internal replacements of pyroxene
Opaque ore – Ilmenite as irregular grains tending to show skeletal structure.

Comment. A gabbro with some alteration and replacement of the pyroxene by green amphibole and a similar igneous texture and catclasis to that of Section 1. Probably from a similar source to that of section 1.

Section 3, core 3. (SW45423 26383) Field 490. Metamafic 'greenstone' showing foliation parallel to the flattened surfaces of the fragment and an amphibole vein at one edge. A broken tip of a fragment that is water worn on one side and roughly worked on the other to give the form of the edge of an axe. A possible example of an axe roughout developed from worn beach material, possibly broken in manufacture.

Amphibole – A pleochroic from light green to neutral pale buff as fine granular and fibrous aggregates of grains less than 0.1 mm forming irregular foliae.
Feldspar – Plagioclase as twinned sometimes distorted laths up to 0.5mm and untwinned recrystallised grains and aggregates tending to be aligned between amphibole foliae.
Opaque ore – Irregular patches of opaque grains probably of Ilmenite, partially altered to light brownish translucent leucoxene.

Comment. A rock from a smaller, more intensely deformed, Metamafic outcrop or the deformed margin of a larger intrusion.

Section 4, core 4. Field 490 No.567.1 Metamafic ‘greenstone’, Part of a ‘greenstone boulder judged by curvature. One side is evidently a water-smoothed surface and the opposite side roughly worked by chipping to form an axe shape. If this is indeed an axe roughout it is an excellent example of the employment of water worn beach material as a source of raw material.

Amphibole– Colourless to neutral and very pale green irregular and randomly orientated grains with fibrous growths on the margins, with fibrous and acicular aggregates up to 0.8 mm, rarely 1.2 mm. distributed throughout.
Feldspar – Plagioclase, rarely showing twinning as Irregular sometimes elongated grains
Biotite – As light brown weakly pleochroic irregular patches replacing amphibole, unevenly distributed through the rock.
Opaque ore – Minute disseminated grains and aggregates distributed throughout the rock, possibly Ilmenite.

Comment. A mafic hornfels comparable with description of occurrences at Penlee.

Section 5, core 5. Field 523 page 529 Metadolerite ‘greenstone’ bladed cobble with some original smoothing and suggestions of trimming by chipping and splitting along a joint surface parallel to one present in the body of the specimen. A possible worked axe roughout.

Amphibole – Pleochroic bluish green to neutral actinolite as single crystals and fine aggregates interstitial to and enclosing feldspar.
Plagioclase feldspar – Lath shaped crystals up to 0.1-0.8 mm long, rarely 1.5 mm, with a current composition of andesine.
Opaque ore – Ilmenite, unaltered and showing skeletal crystal form.

Comment. A metadolerite showing relict ophitic texture with amphibole replacing pyroxene.

Section 6, core 6. CORN-47E2F1D (SW45498 26483) Field 490 A weathered rough surfaced bladed ‘greenstone’ cobble with eroded amphibole veins, possibly selected as an axe roughout, but showing no evidence of working.

Feldspar – Probably plagioclase with variably sericitised and some grains tending to be elongated up to 0.7 mm, rarely 1mm long, but mainly with a fragmented and granular texture resulting from cataclasis.
Amphibole– Probably actinolite, as colourless to very pale green weakly pleochroic as randomly orientated grains and aggregates with fibrous and acicular margins. Some grains enclose feldspar laths suggesting relict ophitic igneous texture.
Opaque ore – Ilmenite as small grains mainly altered to slightly pinkish brown translucent leucoxene

Comment. A Metadolerite, possibly with weak thermal metamorphic recrystallization of the amphibole.

Comment on rock sources

The variations of ‘greenstone’ represented by the specimens represented by sections 1-6 are of interest in that they are potentially all available from intrusions in the Upper Devonian Mylor Formation currently exposed around the shores of Mounts Bay. These gabbroic and doleritic intrusions can be quite massive with more intense deformation and alteration on the margins compared with the interior.

Two that have been studied are of interest. That of the intrusion around Penlee Point immediately adjacent to the site which lies within the thermal aureole of the Land’s End Granite and the intrusion at Cudden Point to the east. These intrusions have sufficient variation within them to accommodate all the lithological varieties encountered in the Clodgy artefacts.

The Cudden point intrusion includes gabbroic, doleritic and sheered schistose metamafic variants. The doleritic sill cropping out on the cast at Gwavas and Penlee Points lies within the thermal aureole of the land’s End Granite and could provide the source for metagabbro, metadolerite and hornfels specimens examined.

It is not suggested that these rock outcrops are the direct source of the Clodgy material but they do extend off-shore and might have been available as water worn cobbles and boulders at lower sea levels. However, these intrusions indicate the potential range of ‘greenstone’ compositions available around the coast of west Cornwall and that the potential for locating particular sources of axe material is likely to be very limited.

The axe lithologies included in Cornish groups 1-4 and probably group 5 might well be gathered together simply as the West Cornwall Group.

References.

Floyd, P. A. 1966. Greenstone sills and metamorphic zoning in the land’s End aureole at Newlyn, Cornwall. *Proceedings of the Ussher Society*. Vol.1, pp.252-6.
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Floyd, P.A., Exley, C.S. and Styles, M.T. Igneous Rocks of South-West England. *Geological Conservation review series*. Chapman & Hall 1993.