SOME ASPECTS OF THE EARLY PRECAMBRIAN
GEOLOGY OF THE PENTEVRIAN BASEMENT
OF THE CHANNEL ISLES AND THE COTENTIN,
ARMORICAN MASSIF

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ABSTRACT

Gneisses form the southern part of the island of Guernsey and parts of the La Hague
peninsula, west of Cherbourg, France. Adams (1967) obtained a Rb/Sr whole rock isochron
date of around 2,600 m.yr. for the granitic gneisses of Guernsey and Leutwein et al. (1973)
have found a similar date for certain of the gneisses of La Hague. Thus these rocks provide
an opportunity to study some of the oldest geological events so far recorded from Western
Europe.

The gneisses of La Hague were formed in large part from a series of sediments. The
earliest structure preserved in the gneisses and in semi-pelitic enclaves is a fine scale lithological
lamination (S0). This was folded during an early deformation (D1) and a gneissose banding
(S1) produced. A second deformation (D2) transposed the S1 gneissose banding parallel to the
main foliation (S2) in the gneisses. Evidence for these two separate deformations includes the
presence of small scale fold hinges defined by S1 banding within the S2 foliation, a lineation
formed by intersection of S1 by S2 and rare small scale interference structures produced by
D2 folding of D1 folds. No large scale structures may be traced because of limited inland
exposure.

Relict andalusite and garnet preserved within less deformed portions of the S1 gneissose
banding suggest an early low pressure amphibolite facies metamorphism accompanying D1.
Andalusite pseudomorphs have been overgrown by the S2 foliation and mineral assemblages
including sillimanite, almandine and muscovite indicate upper amphibolite facies metamorphism
during D2.

Quartz dioritic and granodioritic bodies cut the S2 foliation at Nez de Voidries and Nez
de Jobourg. However, D2 stresses were still sufficient to produce a foliation in these bodies.
A third deformation (D3) gave rise to small asymmetric folds. This may have been preceded
and was certainly followed by the intrusion of basic dykes. All these events pre-date the
intrusion of a suite of foliated granitic rocks, the Thiebot complex, which may be of early
Cadmian age as suggested by an imprecise Rb/Sr whole rock isochron (Leutwein et al., 1973).

On Guernsey the oldest rocks are metasediments which occur as screens both within and
at the margins of the granitic Icart gneiss. The metasediments contain a mineral assemblage
including cordierite and andalusite. This was formed during the first deformation D1 which
produced a gneissose banding (S1) in the Icart gneiss. The S1 banding was deformed during
a second deformation (D2) giving rise to the main foliation in the gneisses under amphibolite

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facies conditions. The Perelle and Doyle quartz dioritic gneisses were emplaced and foliated close to this time. A third deformation \( D_3 \) produced large scale refolding of \( S_2 \) and a very local development of a new foliation under upper greenschist facies conditions.

The close similarity in the geological history of the two areas of gneisses suggests that they formed part of the same Precambrian gneiss series.

References
