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RECONNAISSANCE GEOLOGY OF THE FRENCHMANS CAP NATIONAL PARK

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ABSTRACT

Reconnaissance geological mapping of the Frenchmans Cap National Park confirms the presence of Precambrian metasedimentary assemblages representative of the Franklin, Mary and Scotchfire Groups and has documented part of their distribution. The structural succession of rock groups is shown to be, in descending order - Franklin, Mary and Scotchfire. It is suggested that the Scotchfire Group is a stratigraphic equivalent of the Joyce Group but of slightly lower metamorphic grade.

INTRODUCTION

The rocks of Frenchmans Cap National Park, Western Tasmania are part of a Precambrian crystalline basement termed the Tyennan Geanticline (Carey, 1953). They are predominantly metasedimentary assemblages of the Franklin, Mary and Scotchfire Groups which have been defined by Spry (1957) and Wells (1957) in neighbouring regions and have been extrapolated by Spry (1962, 1963) through the Frenchmans Cap area.

Reconnaissance geological mapping carried out by the writer during several weeks in 1964 has documented part of the distribution of these various rock groups. In conformity with Spry (1957), the term "group" is not used in the strict stratigraphical sense but covers an assemblage of metamorphic rocks, varied in composition, but exhibiting mineral associations of the same metamorphic facies.

STRATIGRAPHY

Franklin Group

Representatives of this rock group occupy low-lying hills in the west of the area (fig. 1) where exposures are concentrated in creek beds. The main rock types encountered in the Franklin Group adjacent to the Mary Group are mica and garnetiferous mica schist having one predominant schistosity dipping approximately 40^{o} westerly. From the garnet-bearing schist, the transition to the first occurrence of thick, often massive quartzite typical of the Mary Group (Spry, 1963) takes place to the east through about 700 m of mica schist, phyllite and quartz schist in that order. Hence the contact between the Franklin and Mary Groups in this area is not well-defined and appears to be of a gradational nature. As the general attitude of the main foliation present in the lithologies of the transition zone is parallel to those in the adjacent Mary and Franklin Groups, the two groups appear grossly conformable.

Mary Group

Being more resistant than those of the Franklin Group, the rocks of this group are expressed as most of the high ridges and peaks of the area such as Philps Peak, Sharland Peak, Clytemnaestra and Frenchmans Cap itself (fig. 1) and provide spectacular cliffs with almost complete exposure. The Mary Group in this area is approximately 1700 m thick and consists of thickly banded, massive white quartzite with darker quartz schist. Despite the good exposure, the lithology does not vary enough to provide any distinctive reference horizon which might be traced throughout the area. Only broad variations can be mentioned. Frenchmans Cap is composed of thickly-banded quartzite although towards the contact with the structurally underlying Scotchfire Group, the quartzite becomes variegated in thinner bands of differing composition. To the south,

the whole mass of Clytemnaestra is composed of quartz schist. The massive quartzite splits along poorly-developed surfaces on which specks of mica are visible. Microscopic examination (specimens nos. 4918, 4919 and 4920)reveals an essentially monomineral lic fabric with upwards of 95% quartz, the remaining constituents being white mica, zircon and opaque minerals. The quartz grains have a crude dimensional orientation imparting a linear fabric to the rocks.

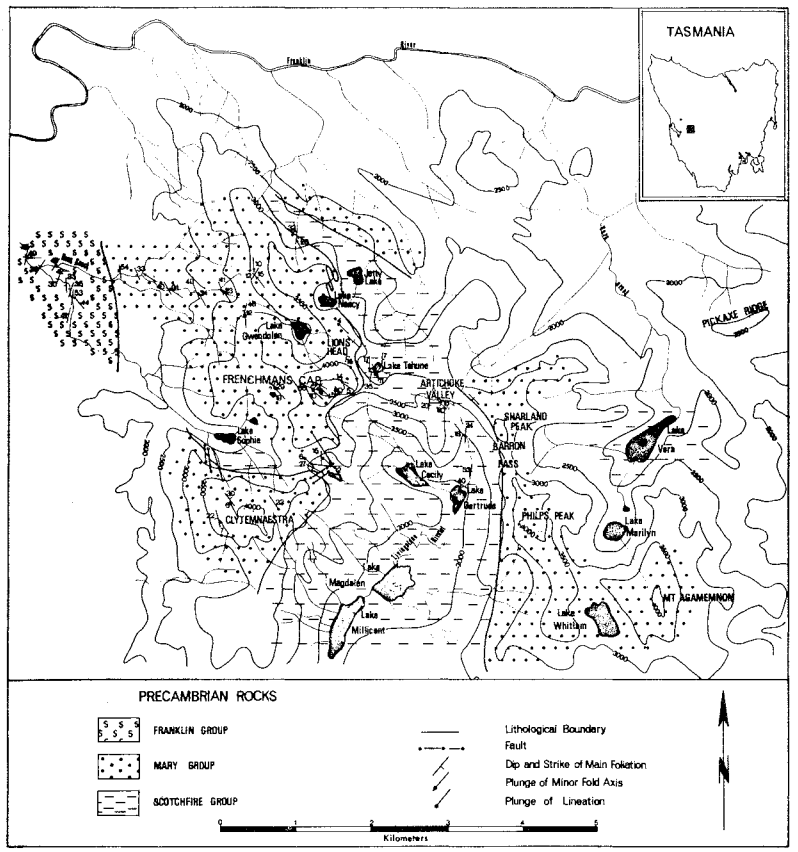

FIG. 1. - Geological sketch map of an area near Frenchmans Cap.

The contact of the Mary with the Scotchfire Group is relatively sharp with the juxtaposition of banded, schistose quartzite of the former group and dark green phyllite of the latter. The foliations in the rocks on both sides of the contact are parallel to the contact which is folded into two tight flexures just to the west of Jetty Lake (fig. 1) and is displaced by faulting particularly near Lake Sophie.

Scotchfire Group

Dark green phyllite and gray to black dolomitic schist are present from the Livingstone Valley, through Artichoke Valley, Lake Tahune, Lake Nancy to beyond Jetty Lake and also on the floors of the Lake Vera and Lake Sophie Valleys (fig. 1). As the rocks of this group occur in mostly low-lying areas, they are obscured by dense vegetation and superficial glacial deposits (Peterson 1966) severely restricting any stratigraphical mapping. At Lake Nancy and the Barron Pass, the Scotchfire Group is represented by dark green phyllite. Dolomitic schist is more abundant at Lake Tahune, Artichoke Valley and the Livingstone Valley somewhat more removed from the Mary Group contact. The two rock types appear to be interleaved in detail.

The phyllites (specimen nos. 4925 and 4926) have a banded appearance with alternating muscovite - and quartz-rich layers. In thin section, the banding is seen to be of tectonic origin having developed as a crenulation cleavage with folded relics of a mica surface occurring in the quartz-rich layers and recrystallized mica laths and aggregates forming micaceous bands in the new schistosity surface.

The dolomitic schists (specimen nos. 4921, 4922 and 4923) have characteristic carbonate weathering surfaces and, microscopically, the dolomite is observed as granular aggregates whose distribution suggests a crude banding. Muscovite occurs as discontinuous tufts and spindles mainly in the schistosity surface.

STRUCTURE

Minor Structures

The rock groups bear the effects of deformation in a generally similar manner to that described by Spry (1957, 1963) and Spry and Zimmerman (1959) and Gee (1963) in areas to the north of the Franklin and Loddon Rivers. On a mesoscopic scale, most structural elements have a north-westerly trend. The minor fold axes and lineations plunge at a shallow angle generally to the north-west in the Franklin and Mary Groups and in places to the south-east particularly in the Scotchfire Group. The dominant foliation dips westerly in the Franklin Group, to the north-east and south-west in the Mary Group and is variable in the Scotchfire Group (fig. 1). Although no clear examples of refolded fold closures were observed, at least two generations of schistosity surfaces are present particularly in the Scotchfire phyllites and testify to the multiphase nature of the Precambrian Frenchman Orogeny (Spry 1963).

No systemmatic regional study of the minor structures was possible within the time available. Recumbent, isoclinal folds are particularly well-developed in the Mary Group quartzites along the western wall of Lake Gwendolin Cirque and in the northern wall of Lake Sophie Cirque.

Major Structure

From the information contained in the geological map (fig. 1), it is apparent that the structural succession in the area is, in descending order -

Franklin Group
Mary Group
Scotchfire Group

This succession is similar to that found by Spry (1957, 1963) in the Mt. Mary area except that until now the structural position of the Scotchfire Group has been uncertain. As no facing directions are known, it does not necessarily follow that the above is also the stratigraphic order.

No major fold closures have been recognized within the area mapped but a structural break appears to be present trending W.N.W. along the Lake Sophie Valley and is interpreted as a reverse fault or thrust. It has raised the southern Clytemnaestra block to bring Scotchfire Group rocks against south-westerly dipping Mary Group rocks in the floor of the Lake Sophie Valley at the same time exposing the Mary-Scotchfire boundary high up on the southern wall of the cirque (fig. 2). Further west the fault appears to have displaced the Mary-Franklin boundary.

By using aerial photographs, an attempt has been made to arrive at the distribution of rock groups in the general area south of the Franklin River and to correlate with that to the north (Spry 1957). The proposed distribution pattern of groups is depicted in figure 2 and may be interpreted in terms of faulting (fig. 2A) or folding (fig. 2B).

The postulated folds would be of open style with north-westerly trending axes similar to the Mary Antiform just north of the Franklin River (fig. 2) - a structure ascribed by Spry (1957) and Spry and Gee (1964), along with all other large-scale folds.

to the Tabberabberan (Devonian) Orogeny. The postulated strike faults are a feature of the neighbouring areas (Spry 1957) and are also attributed to Tabberabberan deformation. Both folding and faulting may be present.

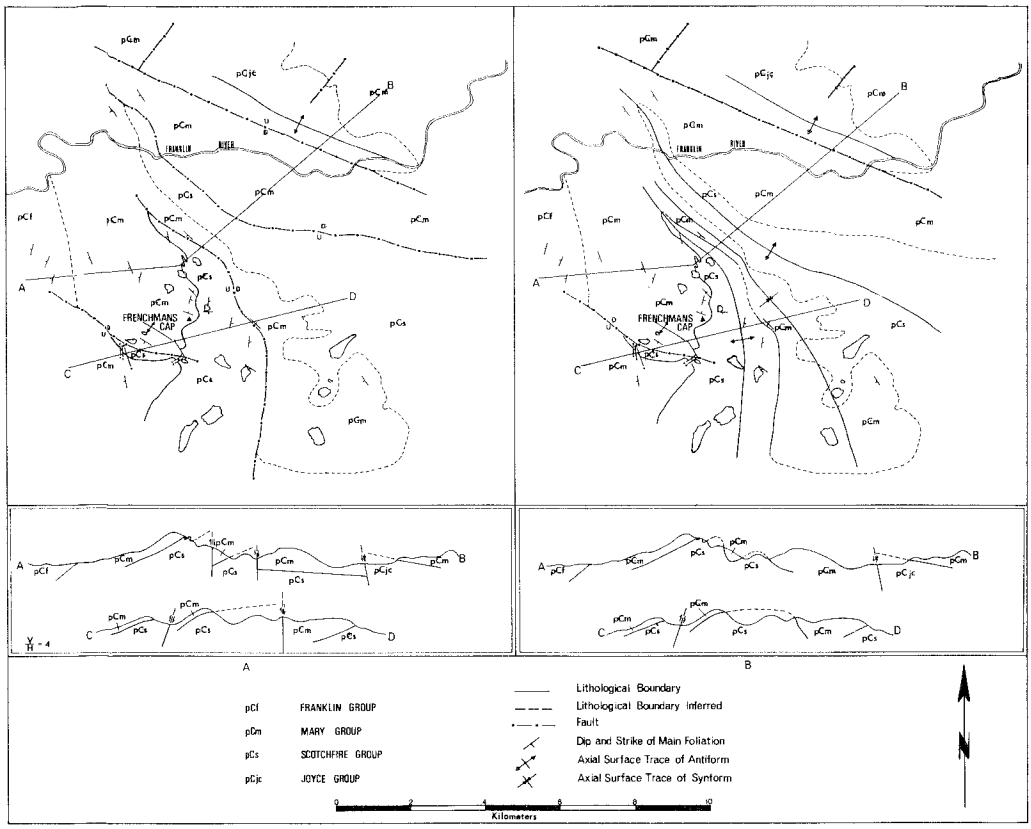

FIG. 2. - Structural interpretation of the Frenchmans Cap area.

IMPLICATIONS

As the Mary Group is underlain by the Scotchfire Group in this area and by the Joyce Group in the Mt. Mary area to the north (Spry 1957), it is probable that the Scotchfire is a stratigraphic equivalent of the Joyce Group having a somewhat lower metamorphic grade. This is in accord with one of the possibilities suggested by Spry (1963). The fact that the Joyce Group has no known dolomitic members could be accommodated by a change in sedimentary facies.

In common with adjacent areas to the north (Spry 1963; Spry and Gee 1964), the structural succession in this area appears to have the relatively high grade (upper greenschist facies) Franklin Group overlying the lower grade (lower greenschist facies) Mary Group. If it is accepted that an increase in metamorphic grade is commonly accompanied by an increase in depth (e.g. Winkler 1967) then this part of the succession must have been disturbed since the imprint of the metamorphic facies although whether due to inversion by recumbent folding or overthrusting is unclear at present.

The results presented here make little contribution towards solving the problems of the major Precambrian structure as postulated and discussed by Spry (1963) in this part of the Tyennan Geanticline.

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