Field studies of the Wilson and Rennick Groups, Rennick Glacier area, northern Victoria Land

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The Wilson and Rennick Groups are metamorphosed sedimentary and volcanic rocks generally believed to be the oldest metamorphic units exposed in northern Victoria Land (Dow and Neall 1974; Gair 1967; Laird, Bradshaw, and Wodzicki 1982; Wodzicki, Bradshaw, and Laird 1982). The main purpose of our project is to determine whether these groups represent more highly metamorphosed equivalents of either the Robertson Bay Group or the Bowers Supergroup (e.g., Tessensohn et al. 1981), or whether they represent a crystalline basement complex.

We selected the following four areas for field studies: (1) three spurs of Mount Bernstein (71°37'S 163°07'E) in the Lanterman Range—northeast, east toward Reilly Ridge (71°32'S 163°18'E), and west toward the junction of the Orr and Rennick Glaciers; (2) Salamander Range near Mount Pedersen (72°05'S 161°02'E); (3) Sequence Hills (73°03'S 161°15'E); and (4) Helliwell Hills near Mount Remington (71°46'S 161°17'E). Our fieldwork was done largely on foot from six helicopter-supported satellite field camps during the period 6 November to 28 December 1981. In addition, we made day trips by helicopter to the east spur of Mount Bernstein, to the northern Salamander Range, and to Mount Weihaupt (72°37'S 161°03'E) and a snowmobile trip to the southern Salamander Range.

The Wilson Group of the Lanterman and Salamander Ranges appears to belong to a single structural-metamorphic unit. In the Lanterman Range we recognized the following stratigraphic units (from east to west)—(1) conglomerate, in part polymict, with clasts of quartzite, marble (rare) felsic rocks, plutonic rocks, and chloritic and amphibolitic schists, (2) mica and biotite-amphibole schists containing layers and pods of amphibolite and ultramafic rocks; (3) biotite-quartz schist commonly with centimeter-sized pods of amphibolitic granulite; and (4) mica schist, amphibolite, quartzofeldspathic gneiss, and subordinate calc-silicate granulite. The conglomerate, which is folded into a syncline plunging shallowly to the north-northwest, has an outcrop width of 2 kilometers on the east spur of Mount Bernstein and is exposed on the northeast spur (compare Wodzicki, Bradshaw, and Laird 1982, figure 6B.1). The rocks we examined in the Salamander Range resemble our units 3 and 4 in the Lanterman Range except that the calc-silicate granulites (some containing grossular) are more spectacular. Contacts between the four units are conformable and to some extent gradational.

Pegmatite veins are abundant around Mount Bernstein in the Lanterman Range and in the Salamander Range, while veins of more mafic rocks were found only in the Salamander Range. The Granite Harbor Intrusive near the Orr Glacier (see Tessensohn et al. 1981, plate 1) is a heterogeneous plutonic complex of hornblendic and biotitic rocks.

In the Lanterman Range, metamorphic grade increases gradually from east to west, reaching sillimanite grade east of Mount Bernstein; rocks in the Salamander Range are all sillimanite grade. The structure is dominated by a subvertical schistosity trending north-northwest and forming the axial planes of the earliest recognizable folds. It has subsequently been folded twice. The youngest generation of folds may be related to the faults bounding the Lanterman Range, while the earliest structural episode overlapped pegmatite emplacement.

The Rennick Group in the Sequence Hills consists of quartzites, mica schists, calc-silicate granulite, and marble. Distinctive spotted mica schists contain cordierite porphyroblasts and, in places, fine garnet euhedra. Andalusite prisms several centimeters long are associated with quartz pods similar to those from the Daniels Range (Kleinschmidt 1981, figure 10). Tourmaline-bearing pegmatites are abundant; a few contain andalusite and fibrolite. Two generations of folds are recognized in the metasediments. The pegmatites apparently were emplaced late in the development of the younger folds. The youngest structures are reverse faults dipping 30° to 40° to the east.

The Helliwell Hills Wilson Group is largely phyllite or quartzose biotite and mica schists. Plutonic rocks include mafic and leucocratic varieties, as well as tourmaline pegmatites; several episodes of intrusion are indicated. Metamorphic grade rises dramatically (over a cross-strike distance of about 4.5 kilometers) from very-fine-grained phyllite in the east to fibrolite-bearing migmatite in the west. Andalusite-bearing quartz segregations occur locally with spotted (cordierite) schists. The structure is dominated by a subvertical foliation which parallels transposed compositional layering. This foliation is locally folded. However, all structures appear to be related to a single episode of progressive inhomogeneous deformation spanning emplacement of the plutonic rocks.

Our fieldwork confirms the distinction noted by others between the Wilson Group east of the Rennick Glacier and the Wilson and Rennick Groups west of it. Amphibolites and conglomerate apparently are not found west of the Rennick Glacier, whereas tourmaline pegmatites, spotted schists, and andalusite-bearing quartz pods are characteristic of the western areas.

In our traverse east of Mount Bernstein, we did not find a structural or metamorphic break between Wodzicki, Bradshaw, and Laird's (1982) Husky Conglomerate and Wilson Group conglomerate. The two conglomerates appear to form part of the same stratigraphic sequence and show the same deformation history. Our field data suggest that the Wilson Group conglomerate is part of the unit mapped as Husky Conglomerate. If the Husky Conglomerate can be correlated with a part of the Sledgers Group (Laird, Bradshaw, and Wodzicki 1982, suggest correlation with either the Sledgers Group or the Robertson Bay Group), then the Wilson Group in the Lanterman and Salamander Ranges is most likely a more highly metamorphosed equivalent of portions of the Bowers Supergroup, as suggested by Tessensohn and others (1981). In any case, we found no evidence for the Wilson and Rennick Groups being rejuvenated crystalline complexes of the east antarctic Precambrian shield.

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Paleomagnetic investigations of the Sledgers Group, Bowers Mountains, northern Victoria Land

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Structural mapping and sampling of the Sledgers Group for paleomagnetic analysis was conducted during the 1981–82 field season in the Lanterman and Explorers Ranges of the Bowers Mountains, northern Victoria Land. Approximately 400 paleomagnetic drill cores were taken at 44 volcanic and sedimentary drill sites in the vicinity of the Alt and Carryer Glaciers, tributaries of the lower Rennick Glacier, and 113 oriented hand samples were taken at 12 volcanic sites. Of these 56 sites, 42 are from subaerial and submarine flows of the Vendian to Lower Cambrian (Adams et al. 1982) Glasgow Volcanics, which attain their greatest thickness between the Alt and Carryer Glaciers. These predominantly basaltic to andesitic volcanics contain minor younger rhyolitic subaerial flows and breccias and epizonal ons. The remaining 14 sites are from breccias and conglomerates of the Glasgow Volcanics and consanguineous sediments of the Molar Formation, and from mudstones, dikes, and sills of overlying Carryer Conglomerate (Laird, Bradshaw, and Wodzicki 1976). Figure 1 gives locations of these 56 sites.

Drill sites were located to either side of the northwest-trending fold axes of major folds in the Sledgers Group (figure 1), allowing application of the fold test (Graham 1949; McElhinny 1964) to assist in the isolation and identification of primary magnetization and later components. Breccia and conglomerate clasts of the Glasgow and Molar Formations were sampled for application of the conglomerate test (Graham 1949; Starkey and Palmer 1970) to evaluate magnetic stability.

In addition to constraining various pre-Cretaceous reconstructions of Australia and Antarctica, determination of the

Figure 1. Map of primary field area.

precise apparent polar wandering path from northern Victoria Land will provide information bearing on other salient tectonic issues, including the relative motion between East and West Antarctica during the Tertiary proposed by Cox and Gordon (1978). Paleomagnetic analysis of all samples is under way.

Paleomagnetic samples also were obtained from plutonic rocks of the Admiralty and Granite Harbor Intrusives; a total of 103 drill cores were taken at six sites in the Salamander and