Revised Archaean stratigraphy of the NORTH SHAW 1:100 000 sheet, Pilbara Craton

by M. J. Van Kranendonk[1] and P. Morant[2]

Abstract

A revised stratigraphy is presented for the NORTH SHAW 1:100 000 map sheet, whereby the greenstones are subdivided into five groups: the c. 3515 Ma Coonterunah Group, the c. 3460 Ma Warrawoona Group, the c. 3240 Ma Sulphur Springs Group, the overlying, undated rocks of the Gorge Creek Group, and the c. 2940 Ma De Grey Group. The Coonterunah Group is further subdivided into three formations and is unconformably overlain by rocks of the upper part of the Warrawoona Group.

The Sulphur Springs Group, which locally unconformably overlies the Warrawoona Group, is subdivided from base to top into the Six Mile Creek, Leilira, Kunagunarrina and Kangaroo Caves Formations. The uppermost formation is comagmatic with the synvolcanic Strelley Granite laccolith. Disconformably overlying the Sulphur Springs Group is the Gorge Creek Group, which has been modified to include two new formations.

Infolded with the Yule Granitoid Complex, but separated from the Sulphur Springs Group by a broad deformation zone, is a sequence of amphibolite-facies metapelite, quartzite, banded iron-formation and rhyolite of the Golden Cockatoo Formation. These rocks are interpreted to be younger than the Warrawoona Group, but older than the Sulphur Springs Group. However, they have yet to be included in a group.

Isolated outliers and synclinoria of cobble conglomerate and sandstone, previously interpreted as basal parts of the Fortescue Group, are reinterpreted as remnants of the Lalla Rookh Sandstone of the De Grey Group. A synclinal outlier of the Fortescue Group in central NORTH SHAW is interpreted to contain parts of the lower four formations of the group.

KEYWORDS: Archaean, stratigraphy, NORTH SHAW, Pilbara Craton.

Before 1995, the stratigraphy of the Archaean Pilbara Craton in the NORTH SHAW* 1:100 000 sheet area was based on reconnaissance 1:250 000-scale mapping in 1972 by the Geological Survey of Western Australia (GSWA) (Lipple, 1975; Hickman, 1983, 1990). These authors recognized three distinct groups in the contorted greenstones underlying the Late Archaean Fortescue Group: the c. 3460 Ma, dominantly volcanic Warrawoona Group at the base; the c. 3100 Ma Gorge Creek Group of banded iron-formation, shale, sandstone, conglomerate and basalt; and the younger, coarse clastic De Grey Group of uncertain age.

More recent mapping by GSWA, company and university geologists has shown that the greenstones are more complex than previously thought. In particular, Buick et al. (1995) described an older succession of volcanic rocks lying unconformably beneath the Warrawoona Group that they informally named the Coonterunah succession and dated at c. 3515 Ma. At the same time, geochronology of volcanic rocks and of the Strelley Granite in the Soanesville Belt, which were previously interpreted as part of the Warrawoona Group, indicated a much younger age of formation at c. 3260 Ma (Pb–Pb age dates; Vearncombe et al., 1995), prompting the informal use of Strelley succession for those volcanic rocks surrounding the Strelley Granite (Morant, 1995).

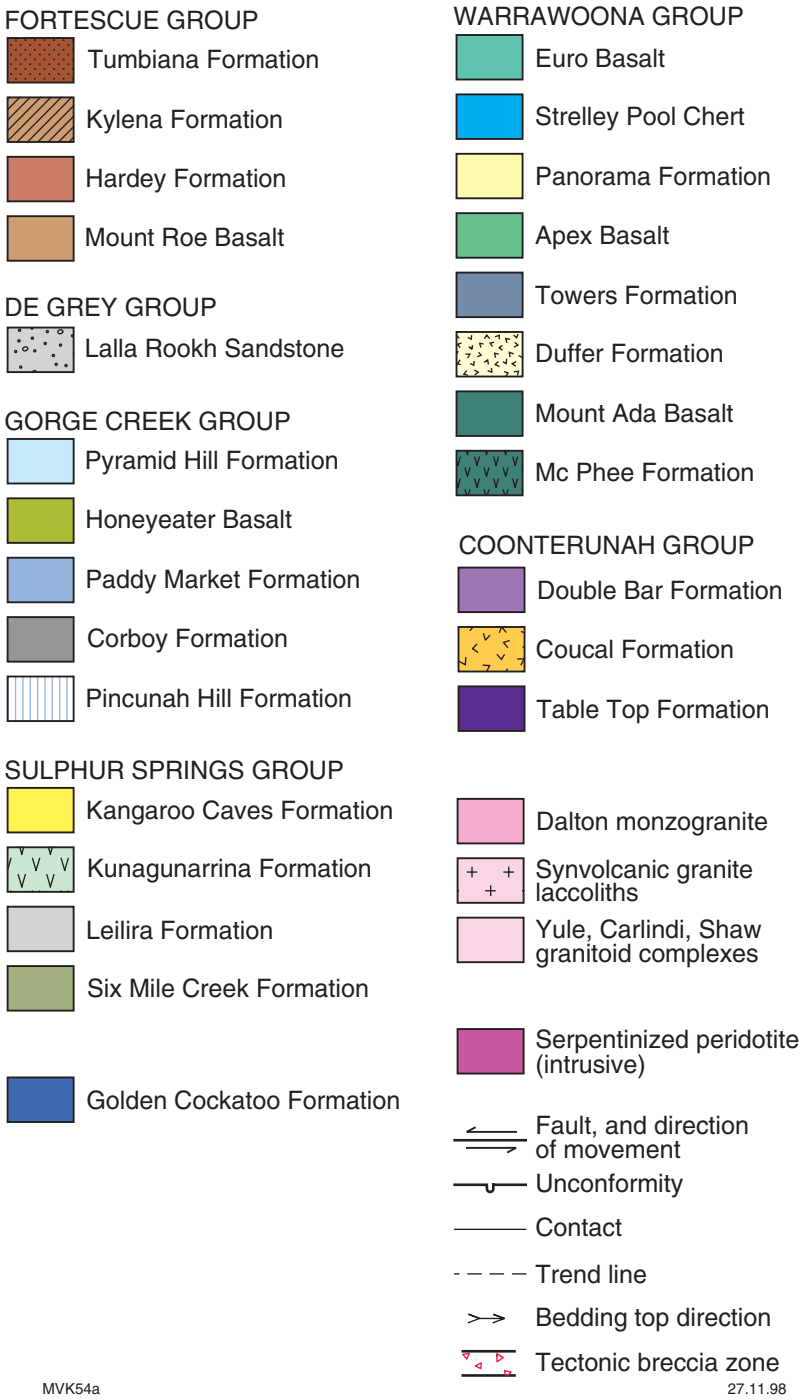
This has resulted in a revised stratigraphy for NORTH SHAW whereby greenstones are divided into five groups (Table 1). In particular, it is proposed that rocks previously referred to as the Coonterunah succession be formally upgraded to the status of Coonterunah Group, and recognized as comprising three formations. Rocks previously informally referred to as the Strelley succession are herein formally named the Sulphur Springs Group and subdivided into four formations. The name Strelley is restricted for use as the Strelley Granite (Hickman, 1983). The Sulphur Springs Group conformably to disconformably underlies the Gorge Creek Group, which was found to contain additional formations at its base (Pincunah Hill

[1] m.vankranendonk@dme.wa.gov.au
[2] Sipa Resources International NL, 87 Colin St, West Perth, Western Australia 6005.
* Capitalized names refer to standard map sheets.

Formation) and top (Pyramid Hill Formation). The structural features of North Shaw (e.g. domes, belts, complexes, and synclinoria) are described in detail by Van Kranendonk (1998).

Coonterunah Group

The Coonterunah Group is a ~6000 m-thick, lower greenschist to lower amphibolite facies succession of mafic volcanic rocks, interbedded iron formation and chert, and felsic volcanic rocks that wrap around, and are intruded by, the southern margin of the Carlindi Granitoid Complex. Dated felsic volcanic rocks are c. 3515 Ma (Buick et al., 1995), which makes this the oldest known succession of supracrustal rocks in the Pilbara Craton. Buick et al. (1995) informally referred to these rocks as the Coonterunah succession, but they are here given formal group status and subdivided into three formations. From base to top these are the Table Top, Coucal, and Double Bar Formations (Table 1). The Table Top Formation comprises some 2500 m of dominantly tholeiitic basalt, with thin, cherty interbeds, and minor high-Mg and komatiitic basalt. The Coucal Formation consists of around 1000 m of basalt, andesitic to felsic volcanic rocks, and interbedded black and white-layered cherty iron formations. The Double Bar Formation comprises up to 2000 m of massive to pillowed tholeiitic basalts, local mafic tuffaceous rocks (crystal-lithic tuff), and rare chert. The group was extensively intruded by dolerite–gabbro before being tilted, locally folded, and overlain by the Strelley Pool Chert across a paraconformity to an angular unconformity (Fig. 1) (G. Blackburn *in* Kennecott, 1971; Buick et al., 1995).



Warrawoona Group

The Warrawoona Group was subdivided into nine formations by Hickman (1983). Current mapping on North Shaw indicates no fundamental changes to the existing stratigraphy, but has identified three members within the uppermost formation, the Euro Basalt. In North Shaw, the Towers Formation refers to the chert–barite unit of the North Pole Dome, whereas the Strelley Pool Chert is stratigraphically higher and refers to the chert formation at the type area (Strelley Pool) in the East Strelley Belt, and to the chert which overlies the Panorama Formation in the North Pole and Shaw Domes (Fig. 1). Given that the well-known Strelley Pool Chert represents an important marker horizon in the stratigraphy of the east Pilbara and is composed of five distinct members (Lowe, 1983; Hickman, 1990), it is proposed that it be given formation status. The occurrence of conical stromatolites within the chert (Lowe, 1980), although of controversial biogenicity (Lowe, 1994), is nevertheless a diagnostic feature of the chert.

The Euro Basalt lies conformably above the Strelley Pool Chert in the East Strelley, Panorama, and North Shaw greenstone belts and is characterized by three compositionally distinctive units,

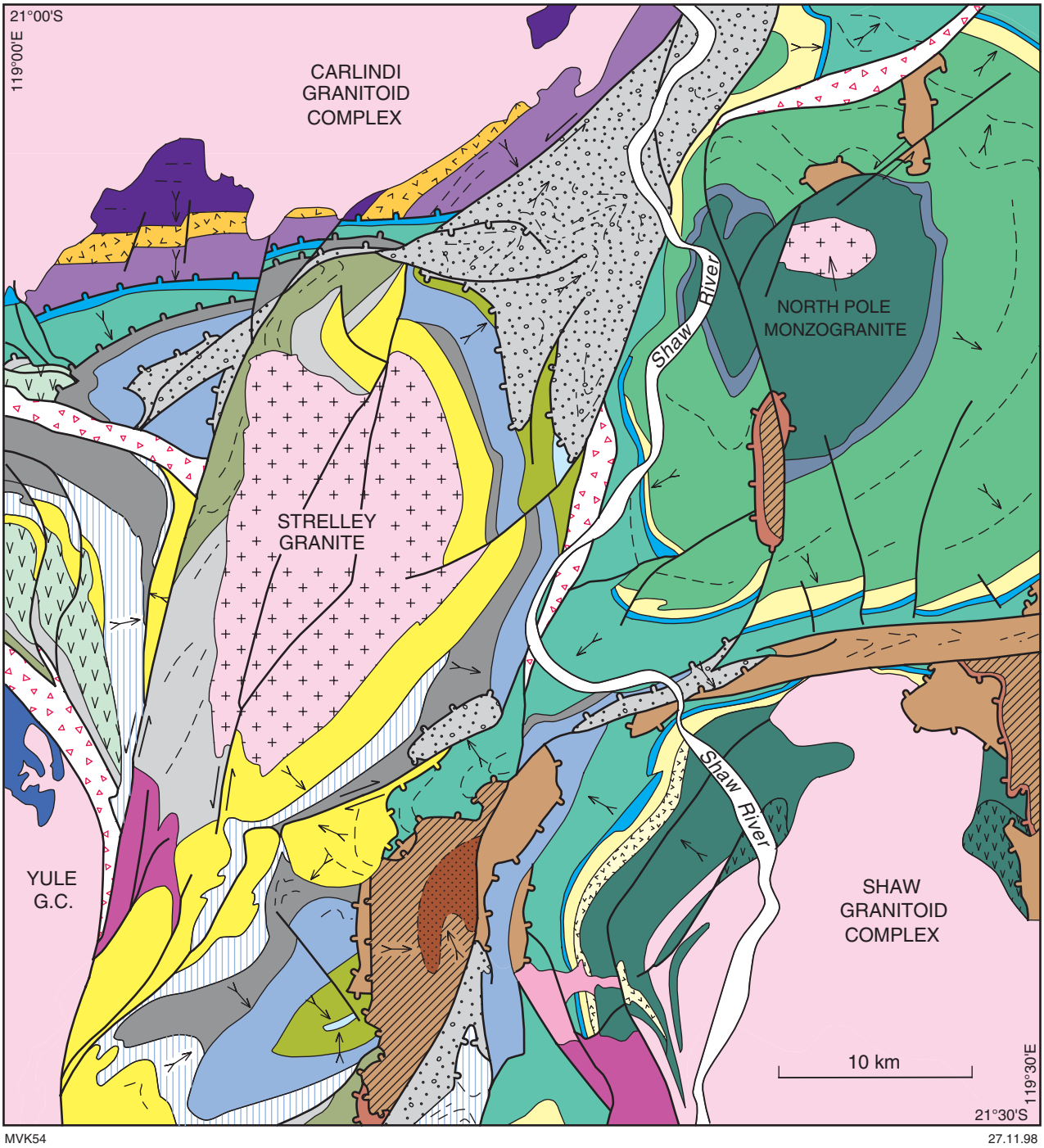


Figure 1. Distribution of groups and formations in North Shaw 1:100 000 sheet. Locations of type areas and of Cu-Zn VMS-type prospects indicated. See Table 1 for unit codes

which are here given member status. At the base of the formation are spinifex-textured, massive and pillowed ultramafic lavas, and up to 2250 m of overlying pillowed, high-Mg basalt, referred to as the Cloisters Member. In the Panorama and East Strelley Belts, these rocks are conformably to unconformably overlain by pillowed tholeiitic basalts and interbedded cherts of the Miralga Creek Member (type section at AMG QB500750*, just west of Miralga Creek). In the North Shaw Belt, the Cloisters Member is largely absent, and rocks of the Miralga Creek Member directly overlie the Strelley Pool Chert. Potkoorok Member is the name given to a ~2800 m-thick sequence of interlayered pillow basalts (<5%

* Standard AMG six-figure reference system

Table 1. Revised Archaean stratigraphy of the NORTH SHAW 1:100 000 sheet

Deformation event	*Group*	*Age (Ma)*	*Formation*	*Lithology*
			Maddina Formation	Massive to vesicular basalt and agglomerate
			Tumbiana Formation	Mingah tuff member; pisolitic and felsic tuff
		≥2715[a]	Kylena Formation	Thick flows of basalt
D_4~	**Fortescue Group**	≥2756[a]	Hardey Formation	Conglomerate, shale and sandstone, local tuff and agglomerate
		2765[a]	Mount Roe Basalt	Basalt, locally glomeroporphyritic; agglomerate
D_3	**De Grey Group**	ca. 2950[b]	Lalla Rookh Sandstone	Conglomerate, sandstone, minor shale
			‡ Pyramid Hill Formation	Banded iron-formation (BIF)
			Honeyeater Basalt	Basalt
	Gorge Creek Group	<3235	‡ Dalton Suite	Layered ultramafic–mafic sills in Soanesville Subgroup
			† Paddy Market Formation (*Soanesville Subgroup*)	Fe-shale; locally silicified to grey and white chert
			Corboy Formation	Sandstone, mudstone, minor conglomerate
			‡ Pincunah Hill Formation	Fe-shale, BIF, interbedded sandstone, felsic volcanic rocks
		3238–3235[c]	‡ Kangaroo Caves Formation	Differentiated volcanic–volcaniclastic pile of mainly tholeiitic magmatic affinity varying from basalt to rhyolite, with comagmatic granite; includes chert, local polymictic mega-breccia and iron formation, and calc-alkaline rhyodacite
D_2	‡ **Sulphur Springs Group**		‡ Kunagunarrina Formation	Pillow basalt, komatiite, high-Mg basalt, chert
			‡ Leilira Formation	Wacke and intercalated rhyolite, sandstone, mudstone, chert
			‡ Six Mile Creek Formation	Mafic volcanic rocks, minor volcaniclastic rocks
?		>3238	‡ Golden Cockatoo Formation	Cherty silicate-facies iron formation, rhyolite, quartzite and interbedded metapelite
			Euro Basalt	Pillow basalt and chert (‡Potkoorok Member)
				Pillow tholeiitic basalt and chert (*Miralga Creek Member)
				Komatiite and high-Mg basalt (‡Cloisters Member)
		≤3458	* Strelley Pool Chert (*Salgash Subgroup*)	Quartzite and chert, stromatolites
	Warrawoona Group	3458[d]	Panorama Formation	Felsic lavas, tuffs and tuffaceous sandstone
			Apex Basalt	Carbonate-altered basalts, chert
D_1		<3463	Towers Formation	Blue-black and white layered chert, barite
		3471–3463[d] [e]	Duffer Formation	Dacitic tuff, agglomerate and lava
		>3471	Mount Ada Basalt (*Talga Talga Subgroup*)	Basalts and cherts
			McPhee Formation	Talc–chlorite schist, chert, BIF, pelite
			Double Bar Formation	Basalts and volcanogenic sedimentary rocks
	‡ **Coonterunah Group**	3515[f]	‡ Coucal Formation	Mafic and felsic volcanic rocks, chert, carbonate, BIF
			‡ Table Top Formation	Basalt, local komatiitic basalt

NOTE: * Redesignation of existing name; ‡ New group/formation/member name and associated type area; † New type area designated; (a) Arndt et al. (1991); (b) Van Kranendonk and Collins (1998); (c) Unpublished SHRIMP U–Pb zircon data (R. Buick, University of Sydney, 1997, pers. comm.); (d) McNaughton et al. (1993); (e) Thorpe et al. (1992); (f) Buick et al. (1995)

MgO) and various cherts located in the southwestern extension of the Panorama Belt. This member, which paraconformably to unconformably underlies the Sulphur Springs Group (Van Kranendonk, 1997), is preliminarily interpreted to represent the topmost part of the known Warrawoona Group in the east Pilbara Craton.

Golden Cockatoo Formation

Golden Cockatoo Formation is a new name proposed for a sequence of predominantly metasedimentary supracrustal rocks preserved within a small-scale dome-and-basin fold pattern within the northeastern corner of the Yule Granitoid Complex (Fig. 1) (Van Kranendonk, in press). The rocks, metamorphosed to the lower amphibolite facies, include up to 2000 m of metapelites (muscovite schists and local garnet–biotite schist), quartzite, a unit of rhyolitic ash-flow tuff and agglomerate, a centimetre-layered unit of brown, cherty iron formation, and mafic to ultramafic sills. A unit of mafic schist is discontinuously preserved along the base of the formation, but the high grade of metamorphism and degree of deformation have obscured whether this was originally an intrusive or extrusive rock. The base of the formation is either in tectonic contact with c. 3470 Ma orthogneisses, or intruded by c. 3240 Ma granitoid plutons (Van Kranendonk, 1997). The top of the formation is in contact with ultramafic schist and tectonic breccia of the Numerous Scrapes deformation zone, which separates it from the basal, mafic volcanic part of the Sulphur Springs Group.

Sulphur Springs Group

Recent detailed mapping by GSWA, company, and university geologists has shown that a succession of interbedded volcanic and sedimentary rocks in the Pincunah, Soanesville, Panorama and East Strelley Belts are distinct from the Warrawoona Group (in which they were previously included) on the basis of lithology, state of preservation, stratigraphy, geochemistry, geochronology, and relation to overlying and underlying rocks. In particular, it was found that these rocks locally rest unconformparaconformably on the Warrawoona Group (Van Kranendonk, 1997), and lie disconformably beneath clastic rocks of the Gorge Creek Group. Dating of the upper, felsic parts of the succession containing associated VMS-type base-metal deposits, and the synvolcanic Strelley Granite laccolith, has indicated an age of c. 3240 Ma, some 220 m.y. younger than the Warrawoona Group (Buick, R., 1997, pers. comm.*). As such, it is herein proposed that these rocks be given formal group status and be referred to as the Sulphur Springs Group. The group is divided into four formations that include, from base to top, the Six Mile Creek, Leilira, Kunagunarrina, and Kangaroo Caves Formations.

Immediately west of the Strelley Granite in the Soanesville Belt, and in the Pincunah Belt immediately west of the map area (Van Kranendonk, 1998), the base of the group is represented by the Six Mile Creek Formation. This formation includes mafic volcanic rocks and thin interflow units of volcaniclastic rocks and mudstone which are intruded by sills of peridotite, pyroxenite, dolerite, and gabbro. The total thickness of the formation west of the Strelley Granite, including the sills, is around 2200 m, but the base of the formation is cut out by a fault. In the Pincunah Belt, the formation includes tholeiitic dacites that are host to VMS-style mineralization.

Above these rocks, or forming the base of the group at the Jamesons prospect southeast of the Strelley Granite (at AMG 295395) and in the East Strelley Belt (at AMG 085586), is the Leilira Formation of wacke and interbedded rhyolite, calk-alkaline dacite, conglomerate, sandstone, mudstone, and chert. This unit reaches a maximum thickness of some 3900 m west of the Strelley Granite, where it is composed almost exclusively of wacke, but is tightly folded and intruded by dolerite sills. At the Jamesons prospect locality, the Leilira Formation comprises about 260 m of intermediate to felsic volcanic rocks and volcanic wacke, and is directly overlain by andesite–basalt and felsic volcanic rocks of the Kangaroo Caves Formation. In the East Strelley Belt, the Leilira Formation consists of around 200 m of conglomerate, sandstone and shale, and is conformably overlain by komatiite and pillow basalt of the Kunagunarrina Formation. In two places, the Leilira Formation rests unconformably on older rocks of the Warrawoona Group; on the Potkoorok Member of the Euro Basalt in the southwestern extension of the Panorama Belt (at AMG 295395; Van Kranendonk, 1997, figs 4 and 5a), and on the Miralga Creek Member of the Euro Basalt in the East Strelley Belt (at AMG 085586). In the Soanesville and Pincunah Belts, the Leilira Formation conformably overlies the Six Mile Creek Formation.

The type area for the Kunagunarrina Formation is in the Pincunah Belt, but it also occurs in the East Strelley and Soanseville Belts. In the type area, the Kunagunarrina Formation comprises some 3000 m of high-Mg basalt (14–16% MgO), a central unit of komatiitic basalt and spinifex-textured komatiite (12–19% MgO), and pillowed basalt (6–8.3% MgO) with thin interbeds of chert. Spinifex-textured komatiites of the formation also occur above conglomerates of the Leilira Formation in the East Strelley Belt, and a small outcrop of ocellar-textured, high-Mg basalt to basaltic komatiite occurs just north of the Strelley Granite.

At the top of the group is the Kangaroo Caves Formation, a ~1700 m-thick, predominantly tholeiitic volcanic pile of, from base to top, rhyolite, andesite, andesite–basalt, dacite, rhyolite, and local banded iron-formation. Capping the volcanic rocks of the formation is a persistent unit of centimetre-bedded grey and white chert, representing silicified mudstone and felsic volcaniclastic tuff. Southeast of the Strelley Granite, the chert grades into a coarse-grained sandstone and locally contains banded iron-formation. At the Kangaroo Caves base-metal prospect (AMG 327533) is a younger calk-alkaline dacite dome which overlies, but is itself capped by, grey and white layered chert (Morant, 1995).

A unit of coarse olistostrome breccia overlies the marker chert at the Sulphur Springs base-metal prospect (Fig. 1: AMG 283591), but is included

* University of Sydney, unpublished U–Pb SHRIMP data on zircons

within the formation because it is itself capped by a thin unit of chert. The breccia is composed of blocks, ranging in size from centimetres to tens of metres, of chert, massive felsic volcanic rocks, and iron formation (Vearncombe, 1996). Detached areas of chert and iron formation, up to a kilometre in length, have been locally folded into tight structures whose facing and asymmetry indicate gravitational sliding down a slope to the south-east. The core of the breccia is occupied by syndepositional rhyodacite sills surrounded by peperite, a rock characterized by spherules of felsic glass scattered throughout a fine muddy matrix, which forms when hot magma interacts with wet sediment.

Structural and geochemical studies on the Strelley Granite and overlying felsic volcanic rocks of the Kangaroo Caves Formation have shown that they are a cogenetic suite (Vearncombe, 1996), with the granite representing a synvolcanic, asymmetrical laccolith or sphenolith (Van Kranendonk, 1997). The Strelley Granite drove hydrothermal circulation in the overlying Kangaroo Caves Formation, and this gave rise to a series of Cu–Zn-type volcanogenic massive sulfide deposits beneath the marker chert, which are spaced at roughly 10 km intervals along strike (Fig. 1) (Morant, 1995; Vearncombe et al., 1995; Vearncombe, 1996).

Gorge Creek Group

Soanesville Subgroup

The Soanesville Subgroup of the Gorge Creek Group (Lipple, 1975) outcrops in three main areas within NORTH SHAW; in the northern half of the Pincunah Belt, in the East Strelley Belt, and in the Soanesville Belt east and south of the Strelley Granite (Fig. 1). These rocks also occur in a fault-bounded sliver in the western part of the North Shaw Belt, and in the south-central corner of the Panorama Belt, just south of the Shaw River (Fig. 1). A common component of all areas of outcrop is coarse to pebbly sandstone of the Corboy Formation, at or near the base of the subgroup, overlying mafic volcanic rocks of either the Sulphur Springs Group or the Warrawoona Group.

The newly recognized Pincunah Hill Formation is discontinuously developed at the base of the group and variably composed of red, black and white banded iron-formation, shale, local sandstone, and rare felsic volcanic and volcaniclastic rocks. Locally, where the basal shales have been silicified, they are represented by grey, white and black layered cherts. This formation is best developed in the Pincunah Belt, but also occurs southeast of the Strelley Granite in the Soanesville Belt. The formation is named after Pincunah Hill on the WODGINA 1:100 000 sheet, at AMG 695100E, 7653300N. The type area of this formation is at 7648000N, between 713000E and 713800E on that sheet. The map thickness of the unit varies along strike up to approximately 1200 m, but it is impossible to determine the true thickness of the unit in any one area as it has been affected throughout by small-scale, tight folds.

The Corboy Formation consists of sandstone, greywacke, pebble to cobble conglomerate and, locally, shale. In places, it conformably overlies the Pincunah Hill Formation, whereas elsewhere it lies in direct contact with older volcanic rocks of the Sulphur Springs Group or the Warrawoona Group. East of the Strelley Granite, the Corboy Formation forms a series of metres-thick sandy turbidite beds, with a thin wedge of conglomerate at its base, that downlap onto the marker chert of the Sulphur Springs Group.

Within the Tambina Complex, pebbly sandstones in a tectonic sliver of the Gorge Creek Group overlie silicified mudstones and banded iron-formation across an angular unconformity (Boulter et al., 1987).These authors referred to this unit informally as the Daltons sandstone and interpreted it to be an equivalent of the Lalla Rookh Sandstone of the De Grey Group. However, the Lalla Rookh Sandstone occurs immediately west of this area within the Keep It Dark synclinorium (see below), where it is less deformed and onlaps the sliver in which the Daltons sandstone outcrops. Thus, the Daltons sandstone is herein re-assigned to the Corboy Formation and its basal unconformity is interpreted to represent an intra-group unconformity on rocks of the Pincunah Hill Formation.

Overlying the Corboy Formation is the Paddy Market Formation (Lipple, 1975), which is composed predominantly of shales and mudstones that have been extensively silicified to chert, but also includes minor banded iron-formation, siltstone and minor sandstone, and a local unit of dacite. At present, the type area for this unit is where Paddy Market Creek cuts through a high ridge of tightly folded grey and white layered chert and local BIF. However, at this locality, these rocks lie in faulted contact against the Warrawoona Group in the east, and against the Fortescue Group in the west, so that their stratigraphic relationship with other units in the Gorge Creek Group is unknown. Thus, it is considered that the type area is inappropriate and a new type area for the Paddy Market Formation is proposed. This is located northeast of the Strelley Granite along an unnamed creek from AMG 305584 to 313600 (Fig. 1).

The Paddy Market Formation is intruded by a series of differentiated ultramafic to mafic sills, herein named the Dalton Suite. Mafic and ultramafic rocks of the suite include dunite, harzburgite, lherzolite, pyroxenite, wehrlite, norite and gabbro (McCall, 1971). The suite occurs as sills primarily within the Paddy Market Formation and, locally, within the Corboy Formation, but a large sill also intrudes the Strelley Granite and identical sills occur in the Tambina Complex and in pillow basalts south of the Soanesville syncline. The sills are interpreted to be associated with the eruption of the overlying Honeyeater Basalt.

Pyramid Hill Formation

At the top of the Gorge Creek Group, lying conformably above the Honeyeater Basalt, lies a sparsely preserved unit of banded iron-formation composed of centimetre-wide layers of hematitic iron and pale-grey chert. This unit is herein named the Pyramid Hill Formation after Pyramid Hill (AMG 227286) which is located 3 km northwest of one of the two occurrences of this unit in the core of the Soanesville syncline. The other occurrence of the formation is immediately west of the Bernts deformation zone, at AMG 364532.

De Grey Group

In NORTH SHAW, the De Grey Group is represented by the Lalla Rookh Sandstone and is best known from the Lalla Rookh Synclinorium, a fault-bounded trough northeast of the Strelley Granite (Fig. 1) (Krapez, 1984; Van Kranendonk and Collins, 1998). Mapping has shown that the Lalla Rookh Sandstone also outcrops in several other places across NORTH SHAW, notably within the East Strelley Belt, the Keep It Dark synclinorium (named after the Keep It Dark mine at AMG 308259), and a small doubly plunging synclinorium near Leilira Creek. Previously, the latter two occurrences of cobble conglomerate and sandstone were considered to belong to the lower part of the Fortescue Group (Hardey Sandstone *of* Hickman and Lipple, 1978), but the lithological and structural similarities of rocks in these areas with the Lalla Rookh Sandstone in the Lalla Rookh Synclinorium strongly suggest that they are pre-Fortescue Group in age and show better correlation with the De Grey Group. Lithological similarities include the fact that they predominantly contain well-rounded clasts of chert and white vein quartz, with rare smaller clasts of greenstones; the rocks are markedly deep orange on the weathered surface. Structural observations indicate that these rocks are tightly folded in areas where the Fortescue Group is merely shallow dipping. Mapping has also shown that folded conglomerates and sandstones in the Keep It Dark synclinorium are unconformably overlain by the Mount Roe Basalt and a thin (1–2 m), lowermost unit of white, silicified cobble to boulder conglomerate.

Fortescue Group

Five formations of the Fortescue Group occur in the map area, as shown in Table 1. A significant revision of previous stratigraphy by Blake (1993) is presented for the outlier located between the Shaw and Yule Granitoid Complexes, south of the Strelley Granite (Fig. 1). Small remnants of the Mount Roe Basalt are preserved along the western edge of this faulted syncline, and east of the fault. These remnants are eroded by a discontinuously preserved, thin (<200 m) unit of sandstone, local conglomerate and brown-grey shale, interpreted to be the Hardey Formation. Above this is a thick unit of basalt and then an overlying unit of cross-bedded volcanogenic sandstone and pisolitic tuff. Above this lies a flat-lying succession of massive to vesicular basalts. These three upper units are interpreted as the Kylena Formation, the Mingah Tuff Member of the Tumbiana Formation, and the Maddina Formation.

Discussion

The revised stratigraphy and new observations regarding unconformable relationships between groups (e.g. Sulphur Springs Group on the Warrawoona Group) strengthens the hypothesis promoted by Hickman (1984) and Van Kranendonk and Collins (in press) that eastern Pilbara crust was formed by punctuated granitoid diapirism and coeval volcanism. Successive supracrustal sequences were deposited in local synclinal basins formed by downwarping of the older groups, and all generally face away from adjacent granitoid domes. Apart from the Coonterunah Group (at least based on available geochronology), volcanism and sedimentation was in each case coeval with a pulse of granitoid magmatism which served to amplify the granitoid domes that had initially formed at c. 3460 Ma (Van Kranendonk and Collins, in press). Gravitational reactivation of granitoid domes continued throughout deposition of the 'post-tectonic' Fortescue Group, as evidenced by intra-group unconformities and the preservation of outliers only in areas in between granitoid domes.

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