ABSTRACTS OF SCIENTIFIC REPORTS

British Antarctic Survey Scientific Report No. 87
The Geology of the South Shetland Islands: VI. Stratigraphy, geochemistry and evolution by J. L. Smellie, R. J. Pankhurst, M. R. A. Thomson and R. E. S. Davies 1984. 86 pp. ISBN 0 85665 108 7

The South Shetland Islands are a Jurassic-Quaternary magmatic island arc founded on a sialic basement of schists and deformed sedimentary rocks. The schists, which are restricted to Smith Island and the Elephant and Clarence islands group, are mainly low-grade blueschists and phyllites, but include metacherts and metabasites, part of a regional high P/T metamorphic belt. The Miers Bluff Formation, a flysch sequence folded during the Gondwanian orogeny, is thought to represent part of a pre-Jurassic fore-arc complex, and the undeformed volcaniclastic Williams Point Beds are also related to the pre-arc geology since they contain a Mid to Late Triassic fossil flora. Other supposed basement correlatives, the False Bay schists of Livingston Island, have been re-interpreted as Tertiary basic dykes emplaced within and deformed by an Eocene tonalite intrusion.

Construction of the South Shetland Islands arc proper began during the latest Jurassic or earliest Cretaceous in the south-western part of the archipelago. Marine sediments with Late Jurassic–earliest Cretaceous fossil faunas are succeeded by terrestrial volcanic sandstones and conglomerates, then by basalt to dacite lavas interbedded with andesite and rhyolite ignimbrites. K–Ar dating of the extrusive sequence on Byers Peninsula has yielded mainly Early Cretaceous ages for the lavas, and ages extending into the Late Cretaceous for some intrusions.

The next identifiable arc-building phase is represented by basalt lavas and multiple intrusions between eastern Livingston Island and Robert Island (Coppermine Formation), which have yielded K–Ar ages close to 80 Ma (Late Cretaceous). By contrast, volcanic rocks on King George Island are believed to be entirely Tertiary in age: there is no clear evidence for the Jurassic or Cretaceous volcanic rocks frequently reported from the island and it seems likely that the rocks thought to be of these ages are Tertiary rocks metasomatically altered by the emplacement of later plutonic intrusions. The Fildes Formation, which consists mainly of basalt and basaltic andesite lavas, occupies much of western King George Island and is latest Palaeocene to Early Eocene in age whereas the Hennequin Formation, dominated by glassy andesite lavas, is of Eocene–Oligocene age. Possible Upper Tertiary outcrops are restricted to the south-east coast of King George Island, but they are poorly dated so far. Thus, the radiometric chronology together with the palaeontological evidence suggests a progressive north-easterly migration of intense volcanism that continued in most areas for periods of 10–20 Ma, although products from different eruptive centres overlapped in space and time.

The volcanic sequences are intruded by a varied suite of mainly small plutons, ranging in composition from gabbro to adamellite. The largest intrusions are tonalite and granodiorite of Eocene age.

The entire arc-building period, between Late Jurassic and Late Tertiary times, was characterized by emplacement and eruption of magmas intermediate between island-arc theoleiites and calc-alkaline types. During mid Tertiary times, however, there was a temporary development of intermediate calc-alkaline magmas. There is also a trend of northeasterly decreasing initial $^{87}Sr/^{86}Sr$ ratios from > 0.7040, as in many calc-alkaline island arcs (and here associated with lavas of possible secondary magmatic origin), towards values of 0.7030–0.7035.

Quaternary hyaloclastites, plugs and lavas occur in patchy, isolated outcrops between eastern Livingston Island and King George Island. They include Penguin Island, a well-formed vent. Chemically, the rocks are mainly fresh olivine-basalts, but with strong alkaline affinities unique in the South Shetland Islands. This change in chemistry and the break in geographical migration occurred following the cessation of active subduction at the South Shetland trench, and probably corresponds to a switch of intra-plate tensional tectonics.

British Antarctic Survey Scientific Report No. 100
Antarctic Rotifers by H. J. G. Dartnall and E. D. Hollowday
1985. 46 pp. ISBN 0 85665 107 9

This report describes 42 species of freshwater rotifer and reviews all previous studies on Antarctic rotifers. Thirty-eight of the species were found during a two-year study at Signy Island, South Orkney Islands. Twenty-nine of them were Monogononta including one new species, four new subspecies and twenty new records for the Antarctic. The other nine were Bdelloidea, all of which have been reported from the Antarctic before. In addition, fifteen species (thirteen Monogononta and two Bdelloidea) were obtained from South Gerogia and all are new records for the sub-Antarctic. The results clearly show that, contrary to previous studies, Monogononta, not Bdelloidea, are the predominant group. An attempt is made to integrate the present and previous observations into a coherent ecological picture, as a result of which, areas for future study are indicated.

British Antarctic Survey Scientific Report No. 103
The geology of part of northern Palmer Land by T. G. Davies
1984. 48 pp. ISBN 0 85665 084 6

The previous exploration and geological investigations in northern Palmer Land are described and the physiography and the glacial geomorphology of this area are summarized.

Several rock groups have been distinguished in northern Palmer Land; their field relations, petrography and geochemistry are discussed and correlations have been made with other parts of the Antarctic Peninsula. The metamorphic complex comprises gneisses, amphibolites, schists and greenschists, some of which have been regionally metamorphosed to the almandine–amphibolite facies. Granitic gneisses predominate and these appear to be the products of fusion of pre-existing rock modified by metasomatism.

A sequence of metavolcanic and metasedimentary rocks has been correlated with schists and greenschist dykes from the metamorphic complex and they seem to be of a comparable age to the (?) Carboniferous quartz-keratophyres of the Wilkins and Bowman Coasts, and the Trinity Peninsula Series.

The abundant Upper Jurassic volcanic rocks comprise volcanic breccias and tuffs with subsidiary basalt, rhyolite and dacite lavas and sedimentary rocks, which were deposited, mainly subaerially, on to an eroded surface of plutonic and metamorphic rocks. The succession of sedimentary and volcanic rocks overlying the adamellite on Mount Charity is thought to be the same age as the Upper Jurassic volcanic rocks.

There has been extensive episodic plutonic activity in northern Palmer Land, probably over a long period of time, and tonalites, granodiorites and adamellites are the predominant rock types.

In addition, several phases of basic to acid hypabyssal rocks intrude the various rock units.

British Antarctic Survey Scientific Report No. 104
The geology of parts of the Wilkins and Black coasts, Palmer Land by J. F. Anckorn
1984. 32 pp. ISBN 0 85665 085 4

In this report the previous and current topographical and geological investigations in north-eastern Palmer Land are summarized and a brief description of the physiography and glacial geomorphology of this area is given.

The rocks of this part of the Wilkins and Black Coasts have been subdivided into six groups comprising (from oldest to youngest):

(i) A (?) Palaeozoic metamorphic complex consisting of a group of *ortho-* and *para*gneisses intruded by metamorphosed amphibolitic dykes, all presumably overlain by a sequence of quartz-mica-schists.

(ii) Also believed to be of a Palaeozoic age are the (?) Palaeozoic intrusive rocks, which intrude the metamorphic complex but are similarly metamorphosed by a low-pressure, moderate-temperature Abukuma-type metamorphism.

(iii) An isolated dacitic crystal-lapilli-tuff assigned to the Upper Jurassic Volcanic Group.

(iv) An extensive sequence of altered basic (oldest) to relatively fresh intermediate to acid intrusive rocks which is correlated with the Andean Intrusive Suite of the Antarctandes.

(v) A group of late Tertiary basic, acid and intermediate dyke rocks intruded along a previously established joint system.

(vi) Recent lateral moraines and other superficial glacial debris.

The history, lithology, structure and distribution of each rock type are discussed and, where possible, they are correlated with rocks in other areas of Palmer Land. In conclusion, the existence and trends of major Tertiary block faults are discussed.

British Antarctic Survey Scientific Report No. 105. *The geology of parts of central west Palmer Land* by M. E. Ayling. 1984. 60 pp. ISBN 0 85665 086 2

This report embodies the results of an investigation of the volcanic, plutonic and hypabyssal rocks in two geologically related areas of Palmer Land which are about 40 km apart.

In the first of these, the Taurus Nunataks–Braddock Nunataks area, volcanic rocks of probable Upper Jurassic age form the relic of a composite cone. Its components grade from andesitic tuffs and infrequent breccias, with interbedded basaltic lava-flow horizons, into a restricted horizon of rhyolitic lavas, and into further andesitic tuffs with interbedded augite-andesite lava flows. The upper tuffaceous sequence and agglomerates which occur in a prominent vent contain large rounded granodiorite boulders, apparently derived from earlier intrusive rocks which have not been found *in situ*.

Andean granodiorite, which has subsequently invaded these volcanic rocks, contains elongated basic inclusions and distinct linear flow structures which tend slightly west of north. Intrusion breccias developed at sharp contacts and the hybrid nature of the marginal granodiorites indicate that its advance was controlled by assimilation rather than by granitization of the volcanic rocks, which are hornfelsed or metasomatized over a narrow contact zone. Pegmatite dykes cut the coarser-grained granodiorites but mineralized minor intrusions allied to the granodiorite, which strike sub-parallel to the contacts, cut both the plutonic and volcanic rocks. A basaltic dyke swarm trends slightly west of north throughout this area.

In the second area, the Batterbee Mountains, acid extrusive rocks crop out around

Swine Hill. The lowest sub-aqueous pillow lavas are succeeded by an apparently terrestrial succession of rhyolite flow lavas with interbedded tuffs and volcanic breccias, which are most abundant in the upper horizons. Quartz-porphyry lavas, exposed at the top of this succession, may be equivalent to similar rocks at Horse Bluff. A vent agglomerate of indeterminate age in Norman Glacier also contains rounded boulders of earlier intrusive rocks.

The volcanic rocks in the western Batterbee Mountains are intruded by granite, which is considered to be genetically related to gabbro and granodiorite intrusions further east. These probably represent the Andean Intrusive Suite, and the granodiorite, which is similar to the Braddock Nunataks representatives, intrudes heterogeneous gabbroic rocks north-east of Mount Bagshawe. Several mineralized quartz-porphyry minor intrusions and a north-north-west trending basaltic dyke swarm are the most recent geological features.