

(1) Definition & Location of the Reydarfjörður Acid Volcanic Centre
 As will be seen, the area within the Reydarfjörður and called "The Reydarfjörður Acid Volcanic Centre" is the outcrop of a zone of acid, basalt and intermediate lavas which is later bedded with flow basalt. The stratigraphic position of this acid lava is shown in the table overleaf which gives the association for the strip of country along the north side of Reydarfjörður (Walker 1959)

CHAPTER II

The Reydarfjörður Acid Volcanic Centre.

INTRODUCTION

The base of the Reydarfjörður Acid Volcanic Succession is defined by a widespread well-sorted horizon (shown on the geological map as T₁) produced during the violent explosive activity which also gave rise to the First Phase Agglomerates. These form a local deposit restricted to the Reydarfjörður area and together with the tuff (T₁) are the earliest products of the Reydarfjörður Acid Volcanic Centre. On the north side of Reydarfjörður Walker called the bedded tuff T₁ the "Bjartur tuff" and as can be seen from the stratigraphic table it occurs above the T₁ above the top of the Vinabala porphyritic tuff.

(i) Definition & Preliminary Statement of Stratigraphy

As will be seen, the area studied in this thesis and called "The Reydarfjordur Acid Volcanic Centre" is the outcrop of a lens of acid, basic and intermediate lavas which is inter-bedded with flood basalts. The stratigraphic position of this acid lens is shown in the table overleaf which gives the succession for the strip of country along the north side of Reydarfjordur (Walker 1959)

Walker referred to the acid, intermediate and associated basic flows as the Sellatur Acid Group, and it is these lavas together with some underlying thin tholeiite flows which here comprise the Reydarfjordur Acid Volcanic Succession. The author, in conjunction with Walker, decided on this change in Nomenclature ~~because of~~ (a) to emphasise the importance of this group of acid rocks in the Reydarfjordur area and (b) ^{because} the original limits of the Sellatur Acid Group as defined on the north side of Reydarfjordur excluded closely related acid lavas when this definition was extended to the south side of that fjord.

The base of the Reydarfjordur Acid Volcanic Succession is defined by a widespread acid tuff horizon (shown on the geological maps as T_1) produced during the violent explosive activity which also gave rise to the First Phase Agglomerates. These form a local deposit restricted to the Reydarfjordur area and together with the tuff (T_1) are the earliest products of the Reydarfjordur Acid Volcanic Period. On the north side of Reydarfjordur Walker called the bedded tuff T_1 the "Slettuskard Tuff" and as can be seen from the stratigraphic table it occurs about 300 ft. above the top of the Vindhals Porphyritic Group.

STRATIGRAPHIC COLUMN SHOWING THE POSITION
OF THE REYDARFJORDUR ACID VOLCANIC
SUCCESION WITHIN THE FLOOD BASALT
SEQUENCE OF THE NORTH SIDE OF REYDARFJORDUR

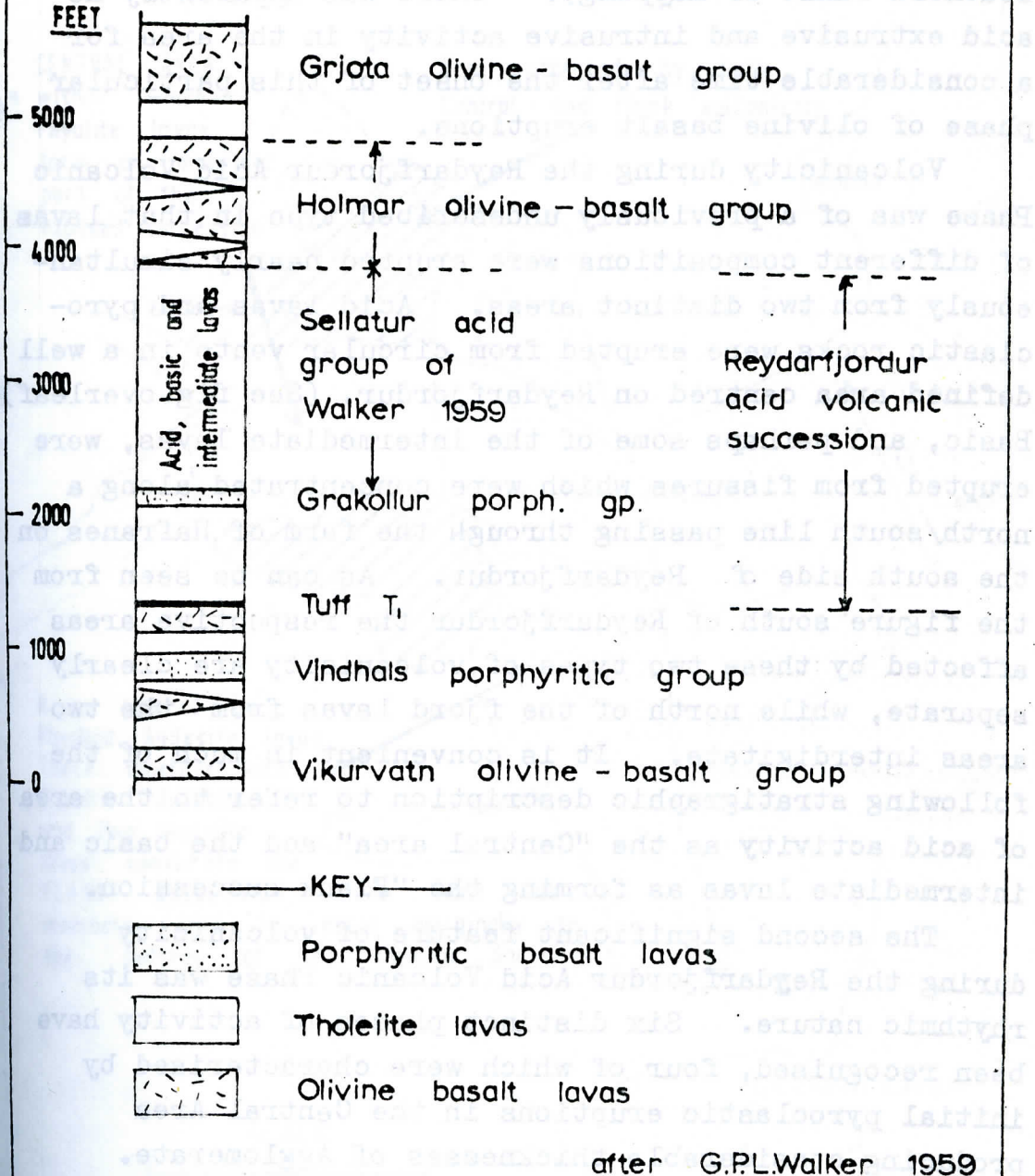


Fig. 4

The author has followed Walker in using the base of the Holmar Olivine Basalt group as the top of the acid succession. This well defined stratigraphic horizon has been followed from Nordfjordur, southwards, as far as the Stodvarfjordur-Breiddalsvik watershed (the present southern limit of mapping). There was apparently no acid extrusive and intrusive activity in the area for a considerable time after the onset of this particular phase of olivine basalt eruptions.

Volcanicity during the Reydarfjordur Acid Volcanic Phase was of a previously undescribed type in that lavas of different compositions were erupted nearly simultaneously from two distinct areas. Acid lavas and pyroclastic rocks were erupted from circular vents in a well defined area centred on Reydarfjordur. (See fig. overleaf) Basic, and perhaps some of the intermediate lavas, were erupted from fissures which were concentrated along a north/south line passing through the farm of Hafranes on the south side of Reydarfjordur. As can be seen from the figure south of Reydarfjordur the respective areas affected by these two types of volcanicity are clearly separate, while north of the fjord lavas from the two areas interdigitate. It is convenient in much of the following stratigraphic description to refer to the area of acid activity as the "Central area" and the basic and intermediate lavas as forming the "Flank succession."

The second significant feature of volcanicity during the Reydarfjordur Acid Volcanic Phase was its rhythmic nature. Six distinct phases of activity have been recognised, four of which were characterised by initial pyroclastic eruptions in the Central Area producing considerable thicknesses of Agglomerate.

THE RELATIONSHIP OF THE CENTRAL AREA TO THE FLANK SUCCESSION

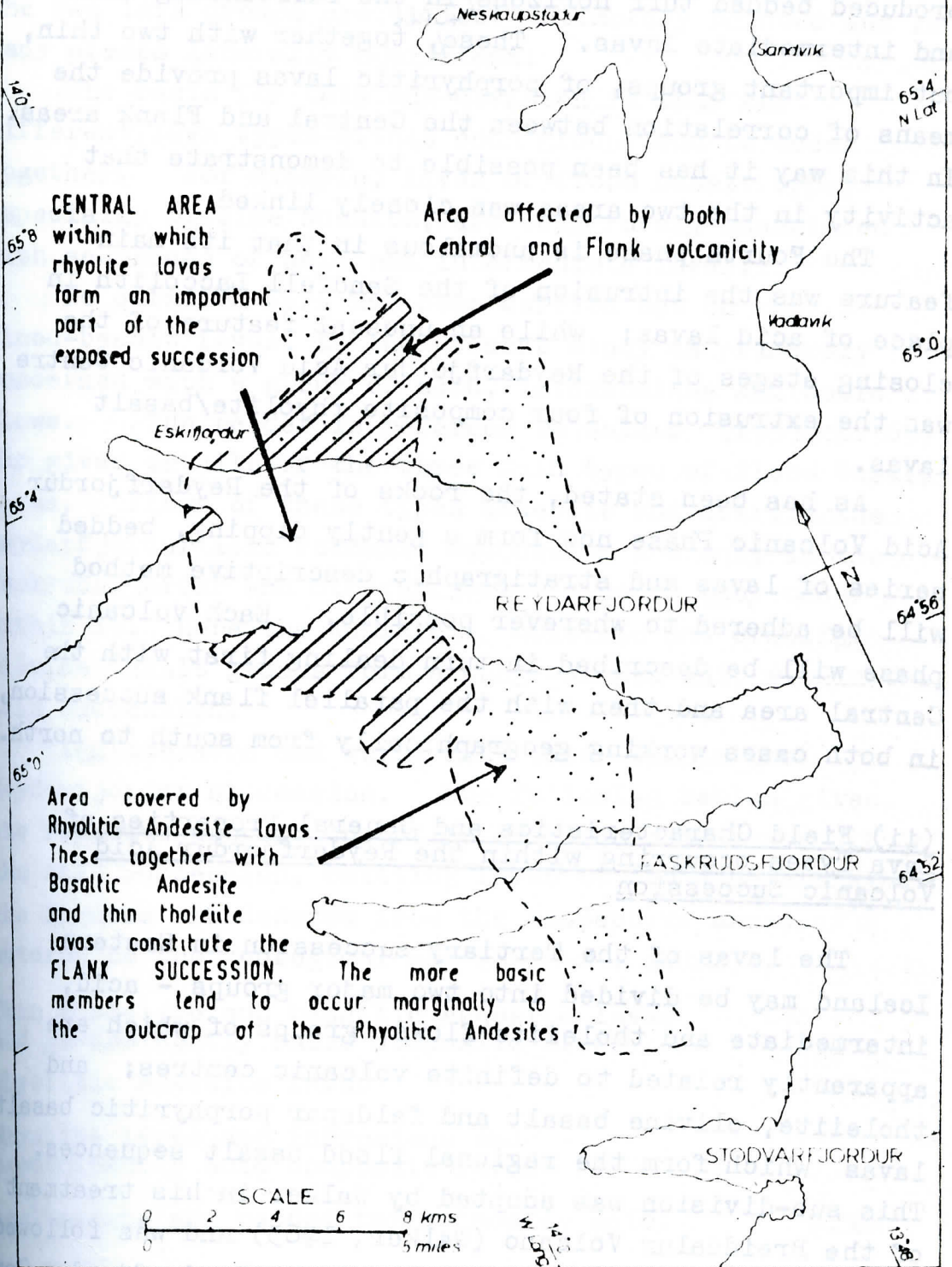


Fig. 5

Away from the Central area these pyroclastic eruptions produced bedded tuff horizons^{interbedded} in the surrounding basic and intermediate lavas. These^{tuffs}, together with two thin, but important groups, of porphyritic lavas provide the means of correlation between the Central and Flank areas. In this way it has been possible to demonstrate that activity in the two areas was closely linked.

The Fourth phase is anomalous in that its main feature was the intrusion of the Sandfell Laccolith in place of acid lavas; while an unusual feature of the closing stages of the Reydarfjordur Acid Volcanic Centre was the extrusion of four composite rhyolite/basalt lavas.

As has been stated, the rocks of the Reydarfjordur Acid Volcanic Phase now form a gently dipping, bedded series of lavas and stratigraphic descriptive method will be adhered to wherever possible. Each volcanic phase will be described in turn dealing first with the Central area and then with the parallel flank succession, in both cases working geographically from south to north.

(ii) Field Characteristics and General Properties of Lava Types occurring within the Reydarfjordur Acid Volcanic Succession

The lavas of the Tertiary succession in Eastern Iceland may be divided into two major groups - acid, intermediate and tholeiite flows, groups of which are apparently related to definite volcanic centres; and tholeiite, olivine basalt and feldspar porphyritic basalt lavas which form the regional flood basalt sequences. This sub-division was adopted by Walker in his treatment of the Breiddalur Volcano (Walker, 1963) and was followed by the author during the mapping of the Reydarfjordur Centre.

However during this latter work it has become increasingly apparent that this distinction is very arbitrary and that the two lava groups are in fact intimately related and in many places laterally equivalent.

The basis for this sub-division is that the different lava types within each group tend to occur together. For example, lavas of flood basalt type, especially olivine basalts, are only rarely associated with sequences of acid and intermediate lavas.

No detailed work has been carried out on the flood-basalt lavas, as the present study is primarily concerned with a group of acid, intermediate and basic flows. The reader is referred to Walker (1959, p.369) who gives details of the three main types of flood basalt lavas. Flows of these types underlie and overlie the Reydarfjordur Acid Volcanic Succession and only in the Faskrudsfjordur and Stodfarfjordur area do they occur within it. Here the Kumlatell tholeiite and Ornofur Olivine Basalt groups form a wedge-shaped unit within the Acid Succession.

Agglomerates and tuffs also occur within the Reydarfjordur succession. The following tables gives the relative proportions of the various rock types within the Acid Succession, omitting lavas of flood basalt type. The figures are deduced from the respective areas of outcrop on the geological map (Sheets 1 and 2)

Thin tholeiite and basaltic andesite lavas and predominantly basic composite flows	78%
Rhyolitic andesite lavas	6.5%
Rhyolite lavas and intrusions and predominantly acid composite lavas	7%
Agglomerate and bedded tuff; mostly acid.	8.5%

Thin Tholeiite and Basaltic Andesite lavas.

Lavas of these types predominate within the acid succession. In the field it is not possible to distinguish between them and as they are normally associated together they were mapped as a single unit. One of the most characteristic features of the flows is that they are generally thin, averaging perhaps 15 ft., in contrast with a figure of 46 ft. for flood basalt lavas in Eastern Iceland (Walker 1963. p.36) Another feature is that the red beds, so common between the flood basalt lavas, are usually missing.

The thin tholeiite and basaltic andesite lavas are very fine-grained, and are generally non-porphyrific, or only weakly so. When fresh the rock is dark grey to nearly black and weathers grey or pale brown. Amygdales are usually flattened parallel to the very weakly developed flow structure, while pipe amygdales are absent.

Rhyolitic Andesites.

Typically, flows of this type are thicker, averaging perhaps 80 ft. and the rock often splits along the well-marked flow structure to produce slate-like fragments. The lavas weather a characteristic dull red or brown, while the fresh rock is usually black. The lavas are very fine grained, often showing a hackly fracture when hit with a hammer, while the lava tops are almost glassy though a true pitchstone is never developed. Often the top of the flow is marked by a layer of rubbly, black, flinty rock, weathering to a pale yellow colour.

Types intermediate between typical basaltic andesites and rhyolitic andesites do occur, and there is probably

a complete gradation from one to the other.

Rhyolites.

Under this heading are grouped all the acid lavas and near surface intrusives. The lavas are characteristically white, pale grey or pink and may have well developed flow structure. Many of the acid flows have a green or black pitchstone layer at the top or bottom of the flow. In addition, or alternatively, there may be a basal layer of brecciated rhyolite. Spherulitic varieties are not common and abound only in the acid portions of the composite lavas. Non-porphyrific and porphyritic rhyolites appear to be approximately equally developed south of Reydarfjordur, but north of the fjord almost all the lavas are porphyritic.

Pyroclastic rocks.

In the present account all the bedded pyroclastic rocks, whether acid or basic, are referred to as "tuffs", regardless of their grain-size. The non-bedded deposits, which are invariably coarser are termed "agglomerates"

The reader is referred to the appendix on Petrology for further details of the various rock types.
