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The Trekellend Thrust

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Stewart, I.J. 1981. The Trekellend Thrust. *Proc. Ussher Soc., 5,* 163-167.
Detailed mapping of the north-eastern margin of Bodmin Moor has revealed two distinct tectonic styles: an earlier regime dominated by northerly directed thrusts; and a later series of north-dipping faults associated with uprise of the subjacent granite pluton. The Trekellend Thrust has introduced basinal Tredorn Slates northwards over fossiliferous Launceston successions, the tectonic packet being contained in a north-dipping fault slice. These relations imply the allochthonous stratigraphical units south of the Rusey Fault have a southern source.
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Introduction

There has been much discussion in recent years concerning the structure and tectonic evolution of North Cornwall based on excellent coastal exposure. Structures immediately south of the outcrop of the Crackington Formation have figured prominently, and the projection of structures eastwards from the coast towards Dartmoor has been controversial (Hobson and Sanderson 1975; Freshney and others 1976).

A large measure of agreement has been reached on the structure exposed on the coast between the Rusey Fault and Tintagel. At its simplest, this may be interpreted as a sequence of tectonic slices controlled by low angle, north-dipping faults. The tectonic slices consist of (from north to south) Namurian Crackington Formation, Middle to Uppermost Famennian Tredorn Slates (including comformable *Gattendorfia-Zone* California Quarry Slate (Selwood 1961)), Dinantian Tintagel Volcanic Formation (Freshney and others 1972) and Famennian Woolgarden Slates.

The inland outcrops are now being re-surveyed under contract to the Institute of Geological Sciences, by the Department of Geology at the University of Exeter. Work is sufficiently advanced to allow comment on the problem. Here a totally different picture has emerged. Isaac (1981) and Turner (1981) have reported the occurrence of a series of large-scale thrust sheets that have transported exotic successions northwards onto a parautochthon in the Chillaton and Lydford areas. It appears that the northern limit of this style of deformation coincides with the eastward extension of the Rusey Fault.

Detailed mapping of the north-east margin of Bodmin Moor reveals that both tectonic styles are represented and allows an accommodation to be reached between the apparently contradictory interpretations.

Geology inland from Tintagel

The structural and stratigraphical units recognised in the well known coastal sections north of Tintagel can readily be traced inland. South of St Clether (SX 2060 8440) the sequence is complicated by the tectonic introduction of a Tournasian to low Namurian micaceous and feldspathic sandstone unit (compare Whiteley 1981) between the Tintagel Volcanic Formation and the Woolgarden Slates. This unit persists south-east towards Callington. The Tintagel Volcanic Formation is represented at St Clether by pillow lava and agglomerate and passes eastwards through highly weathered tuffaceous slates not recognised by the Geological Survey (Reid and others 191I), into lava and agglomerate to the south of Lewannick. The Tredorn Slates can also be traced eastwards from the north-west margin of Sheet 337 passing south of Lewannick to Trekellend (SX 2997 7950).

Geology of the Lewannick area

The map (Fig. 1), illustrates the dominant structural features recognised. Details of the Upper Devonian and Lower Carboniferous stratigraphy are given by Stewart (1981b).

The Tredorn Slates on the west of the map (Fig. 1) rest tectonically on the Tintagel Volcanic Formation which in turn rests on feldspathic sandstones. Boundaries between these units consist of low-angle northerly-dipping faults. Towards the east of the map the southern margin of the Tredorn Slates is complicated by the appearance of a Lower Carboniferous quartzite succession that overlies the Slate group along a gently south-dipping thrust, the structural packet being defined to the south by the northern margin of the Tintagel Volcanic Formation. The basic and ultrabasic Polyphant complex is intruded into the Tredorn Slates, although for the most part it is

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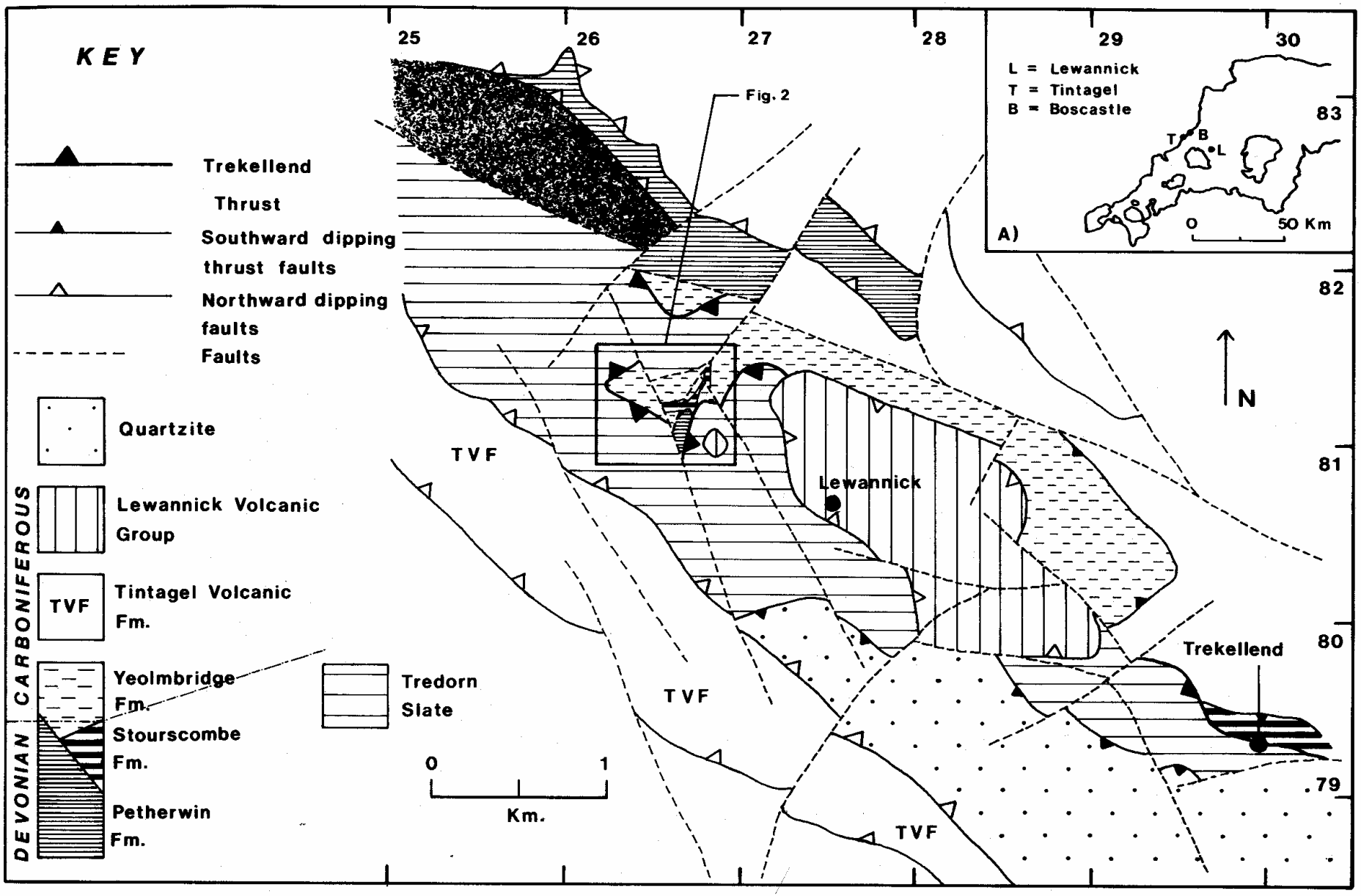

Figure 1. Outline map (A) and Geological map of the Lewannick area of North Cornwall. Heavy stipple represents the Polyphant picrite. Blank areas Upper Devonian and Lower Carboniferous undivided. Numerous minor intrusives omitted.

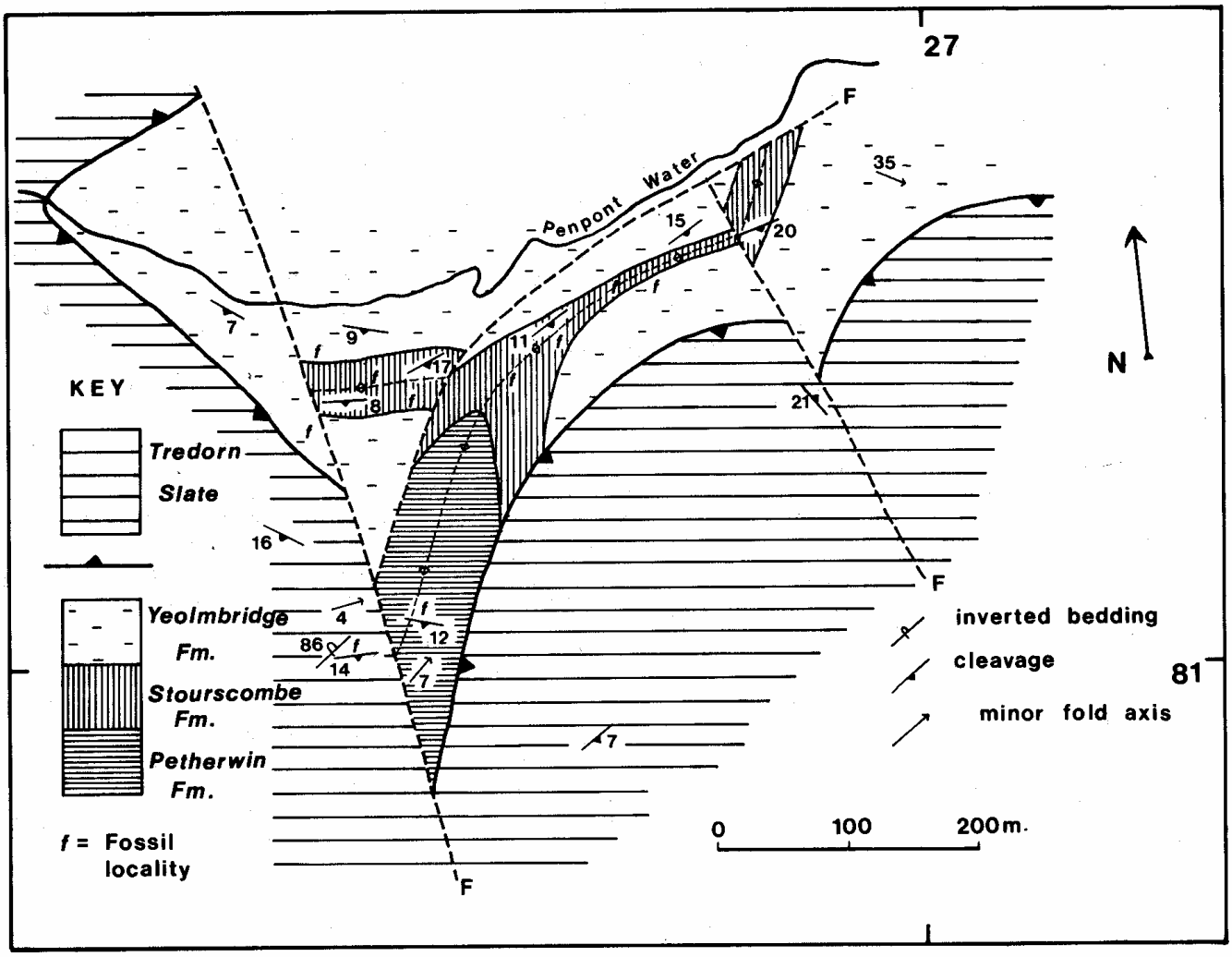

Figure 2. Detailed geological map of the area west of Lewannick.
(See Fig.1).

separated from the Slate unit by a major WNW-ESE fault. To the north of this fault, the calcareous Petherwin Limestone Formation (Stewart 1981b) tectonically overlies the Polyphant complex. The Tredorn Slates are therefore contained within a north-dipping fault slice west of Lewannick.

To the south-east of the map, however, a different structural picture emerges. Tredorn Slates are bounded on the north by a gently south-dipping fault structure, here termed the Trekellend Thrust. This fault, which dips between 5-15° to the south, serves to introduce basinal Tredorn Sales northwards over *schwelle* deposits of Upper Devonian and Lowest Carboniferous age. Tredorn Slates at Trekellend (SX 2997 7950) rest on silicified cephalopod limestones at the Stourscombe Formation, and to the west of Lewannick (SX 2760 8167) they overlie condensed, highly fossiliferous lithologies of the Petherwin, Stourscombe and Yeolmbridge Formations. Structure arid stratigraphy beneath the Trekellend Thrust is best exhibited immediately west of Lewannick (Fig.2).

The stratigraphical succession beneath the Trekellend Thrust (Fig. 2) consists of the Petherwin Formation (represented by *styriacus* - Zone and older Landerslake Slate Member), through lower and middle *costatus*- Zone Stourscombe Formation (Strayerpark Slate Member) and upper *costatus* - Zone to Lower Carboniferous *latior* - Zone silts of the Yeolmbridge Formation (Stewart 1981b). Tredorn Slates immediately above the thrust yield faunas indicative of the upper *marginifera* - Zone. The faunal control and excellent exposure allow the recognition of a major north-facing recumbent anticline

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beneath the Trekellend Thrust (Fig.2). This anticline and the bedding-cleavage relations in the overlying tectonic unit (cleavage dips gently south, bedding vertical to overturned to the north), can only imply introduction of the Tredorn Slates from the south.

Comparable structures exist east of Dartmoor where Waters (1970) has shown that the southern equivalent of the Tredorn Slates, the Kate Brook Slates, have also been introduced from the south along the Holne Thrust.

The Lower Carboniferous *(texanus-Zone)* Lewannick Volcanic Group (cf. Selwood 1974) progressively overlies (from south to north) the Tredorn Slates, the Trekellend Thrust and the Yeolmbridge Formation along a low angle north-dipping tectonic contact (Fig. 1). The Trekelland Thrust and related structures therefore clearly pre-date the development of the north-dipping faults.

The Petherwin Limestone Formation at Trenault (SX 2625 8292) is contained within a gently north-dipping fault slice which is here overlain by upper *Pericyclus* - Zone black slates. Open to isoclinal folds within Petherwin lithologies close south and are separated by low angle faults. Conodont succession however, youngs towards the fold cores and indicates north facing, which, together with consideration of the facies represented by the Petherwin Limestone Foundation (Stewart 1981b) can only imply a source south of their present outcrop.

Discussion

In the Lewannick area there is no evidence for either south facing or the oblique folding described by Sanderson (1972). The evidence here and farther east is at variance with the concept of Zone 5 of Sanderson and Dearman (1973) and also the view of Hobson and Sanderson (1975) that large scale south-facing F1 folds control lithological outcrop in the region between Bodmin Moor and Dartmoor.

The outcrop pattern described in this paper is, as on the coast, controlled primarily by low angle faults. There is also much evidence to support the view of Freshney (1965) and Freshney and others (1972) that these structures are late and related to uprise associated with the emplacement of the Bodmin Moor Granite. The recognition that these fault slices disrupt and include earlier formed, north-facing folds represented in south-dipping thrust slices, allows the integration of the apparently disparate structures of the coastal region with those recognised further east at Lydford (Isaac 1981) and east of Dartmoor (Waters 1970).

The position of the Trekellend Thrust in the schematic structural section of North Cornwall, proposed by Freshney and Taylor (1971) is shown in Fig. 3. The new evidence implies that the Upper Devonian and Lower Carboniferous fault slices on the southern margin of the present surface outcrop of the Crackington Formation in

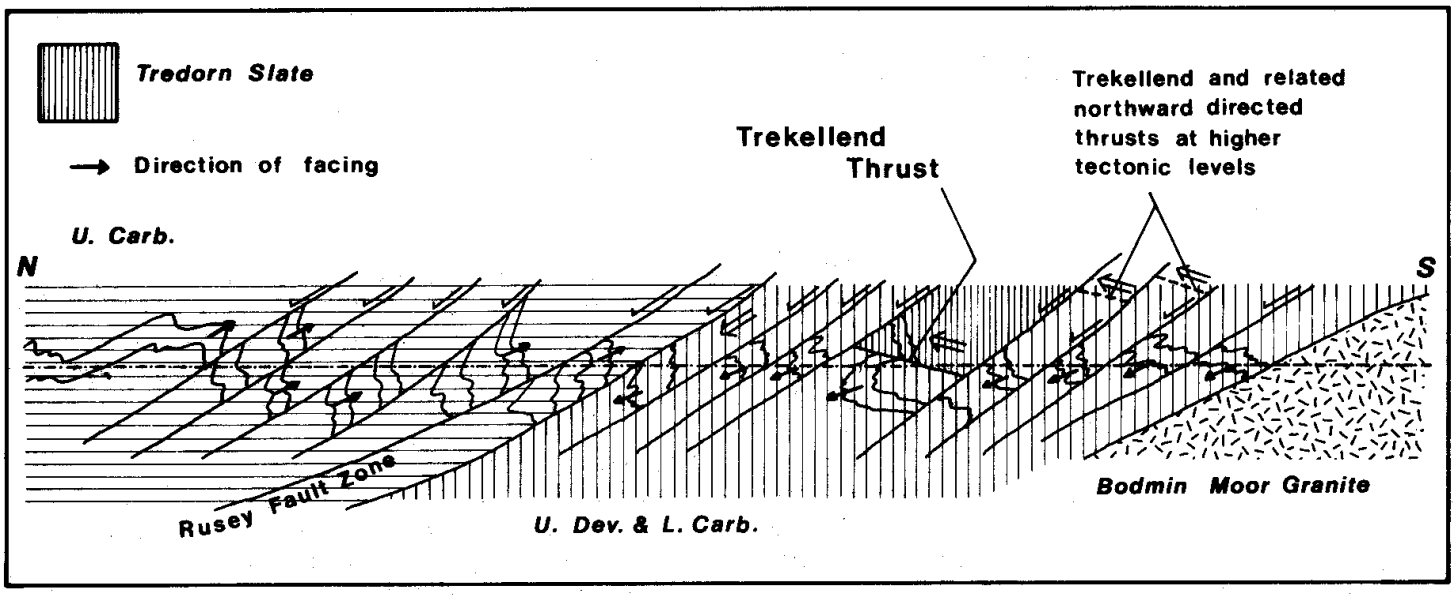

Figure 3. Highly diagrammatic structural section of North Cornwall based on Freshney and Taylor (1971) showing position of the Trekellend Thrust. Double-tick arrows indicate direction of tectonic transport prior to the development of north-dipping faults.

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North Cornwall had a southern source prior to uplift associated with granite intrusion. Field evidence also shows that the influence of structures related to the uplift of the Bodmin Moor granite decreases .rapidly eastwards, whilst structures comparable to the Trekellend Thrust, representing deeper tectonic levels, increase in importance to become the dominant structural element in west and south Devon.

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