



# The (Complex) Geology of the Somerset Coalfield

Andy Gordon (Somerset Geology Group)

# Agenda



Andy talking for 45 minutes (at the most)

- **Overview of the Geology of Somerset / the Geology of the Somerset Coalfield.**
- The Fossils of the Somerset Coalfield
- The father; the birthplace and the home of English Geology?
- The Coalfield Geology and the Faulting – Variscan Orogeny



If I do not know the answer today, I will find it for you....



# Overview of the Geology of Somerset



WALES

Channel



Wiltshire

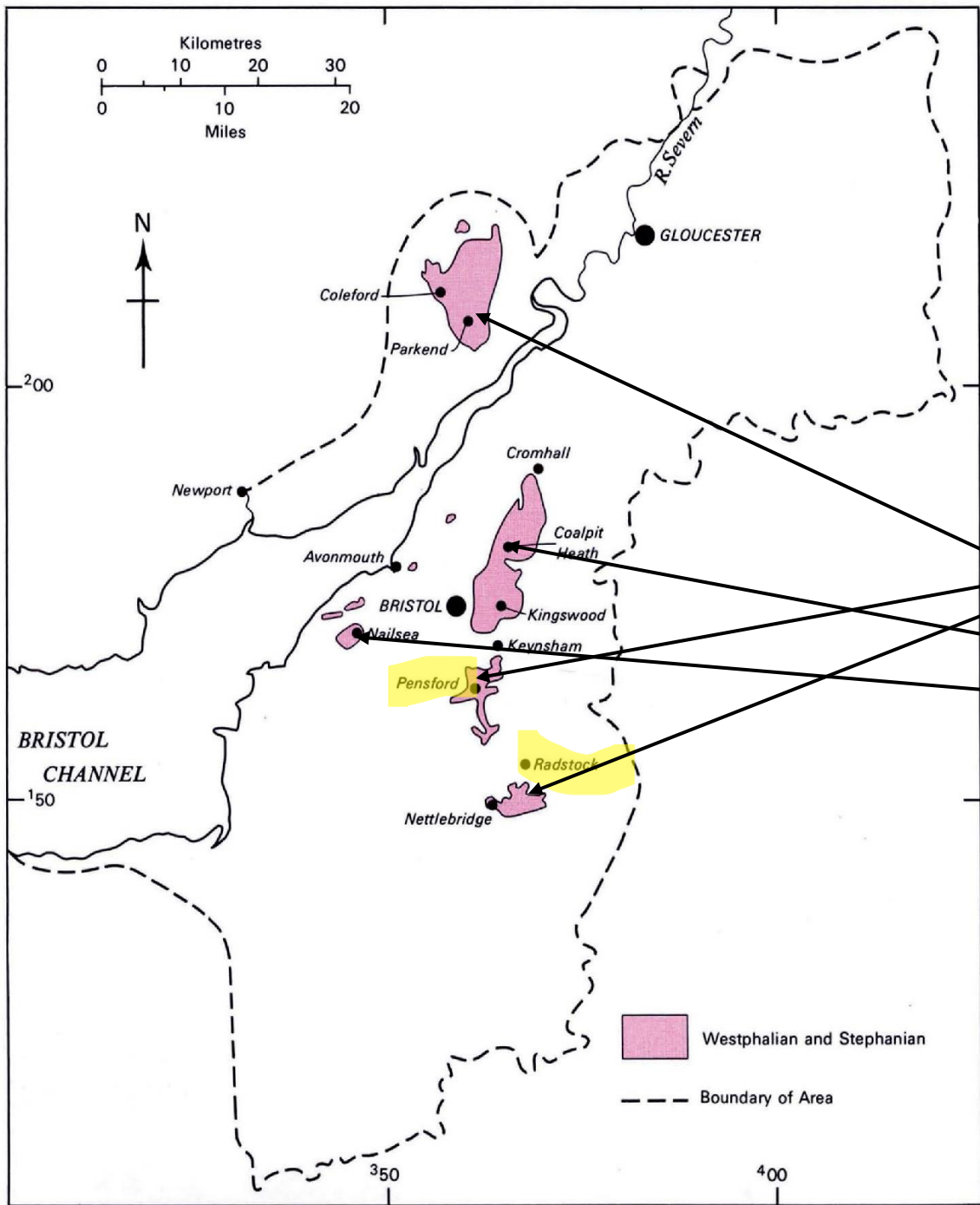


Somerset, South West England, UK





# Overview of the Geology of the Somerset Coalfield



## The Geology of the Somerset Coalfield

Outcrops of the Westphalian and Lowermost Stephanian

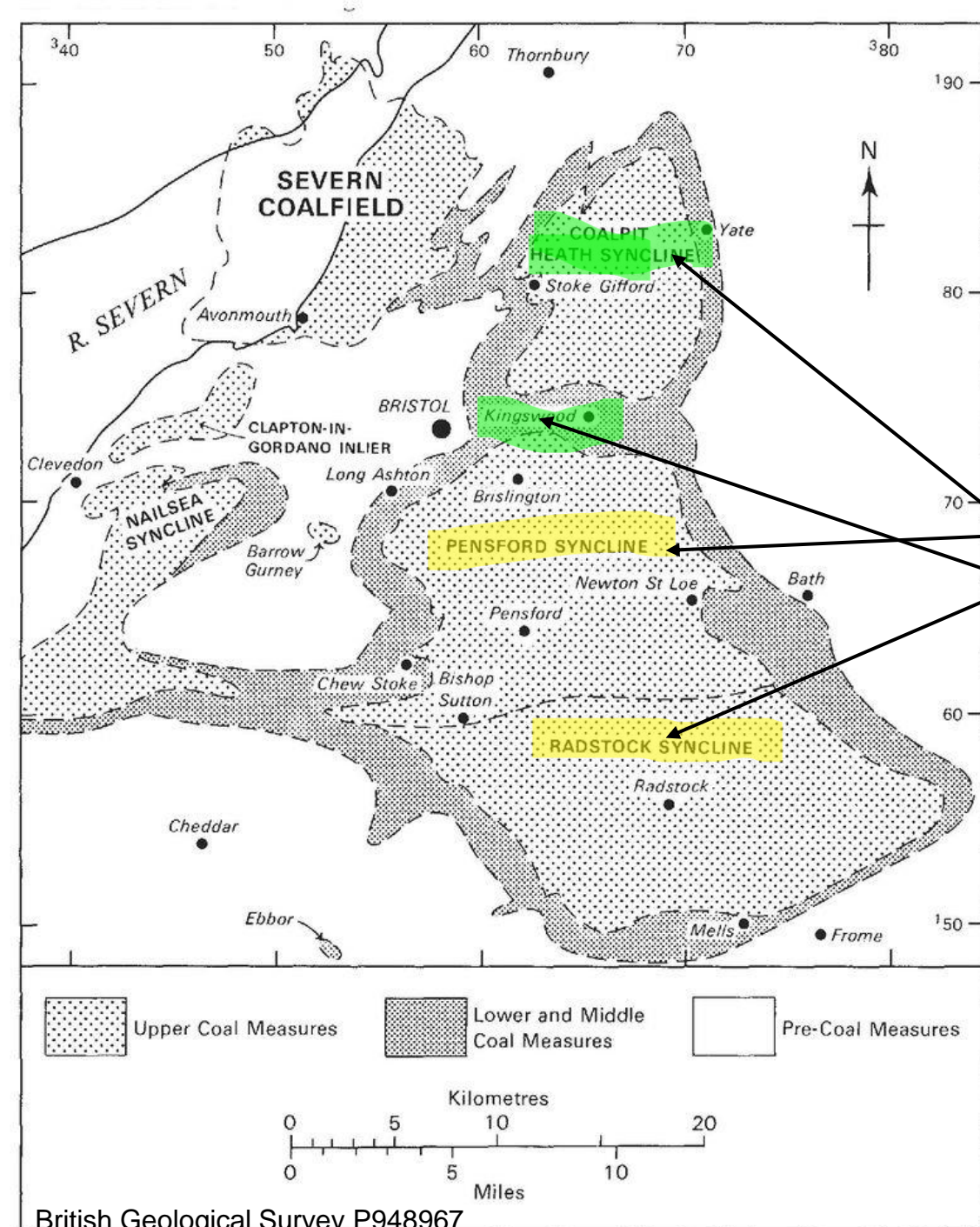
Somerset coalfield

Forest of Dean coalfield

Bristol coalfield

Nailsea coalfield





## Distribution of Coal Measures (outcrop and subsurface) showing coal 'basins'

- Somerset Coalfield: Radstock and Pensford Synclines
- Bristol Coalfield: Kingswood Anticline and Coalpit Heath Syncline
- 73% of the Bristol and Somerset coalfields are covered by Mesozoic rocks – only 10% is outcrop

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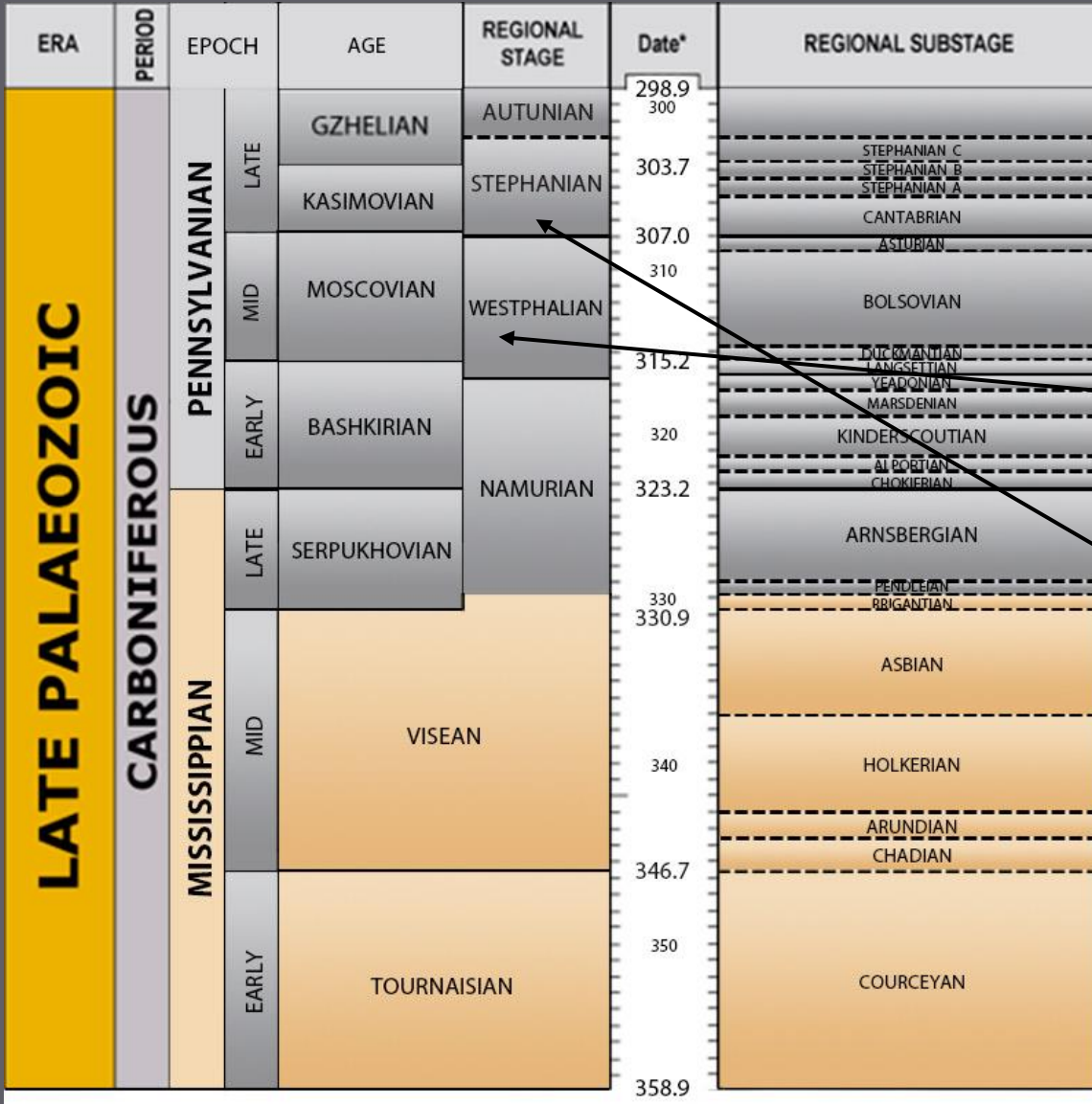


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# The Fossils of the Somerset Coalfield



Carboniferous European subdivisions

Most coal in the UK is Upper Carboniferous and in particular - Westphalian.

The Somerset Coalfield also has Lower Stephanian coal.

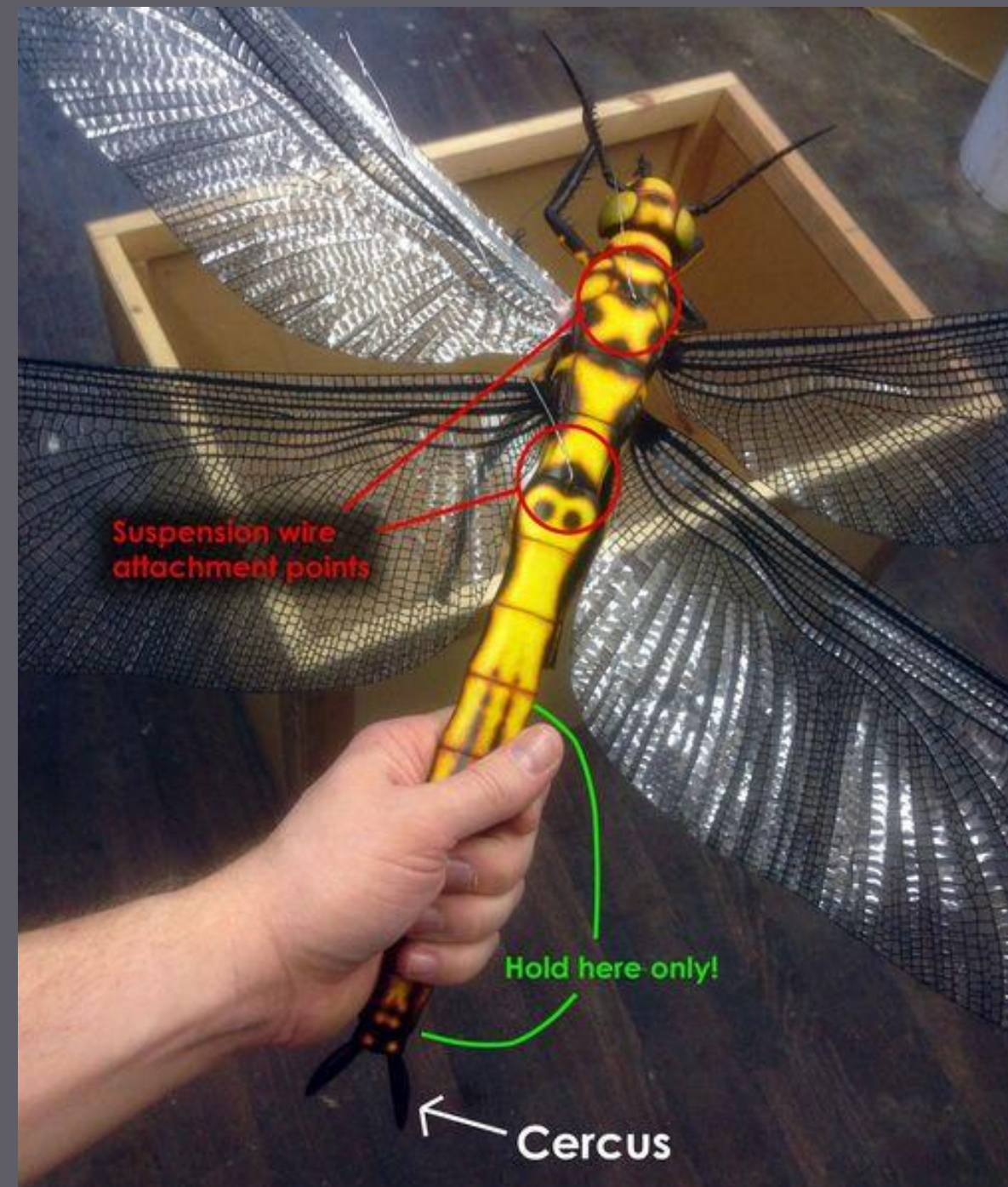
Stages	Marine bands	Nonmarine bivalves		Spores	Divisions on Geological Survey maps
		Zones	Faunal belts		
Stephanian					
Cantabrian					
Westphalian D		<i>A. tenuis</i>		<i>Thymnospora obscura</i> (xi)	Upper Coal Measures
Westphalian C (Upper) [Bolsovian]	Cambriense*	<i>A. philipsii</i>		<i>Torrispora securis</i> (x)	
Westphalian C (Lower) [Bolsovian]	Aegiranum*	Upper <i>similis-pulchra</i>	<i>adams-hindi* atra*</i>	<i>Vestispora magna</i> (ix)	Middle Coal Measures
Westphalian B [Duckmantian]	Vanderbeckei*	Lower <i>similis-pulchra</i>	<i>caledonica* phrygiana ovum* regularis</i>	<i>Dictyotriletes bireticulatus</i> (viii)	
Westphalian A [Langsettian]	Listeri*? Subcrenatum*	<i>A. modiolaris</i> <i>C. communis</i> <i>C. lenisulcata</i>	<i>crisagalli pseudorobusta* bipennis torus proxima extenuata* fallax-protea</i>	<i>Schulzospora rara</i> (vii) <i>Radiizonates aligerens</i> (vi) <i>Densosporites anulatus</i> (v)	Lower Coal Measures

\*Marine bands and nonmarine bivalve faunal belts recognised in the Bristol and Somerset coalfields

## Standard British Chronostratigraphical Classification of the Coal Measures

This is the Chronostratigraphical Classification of the Coal Measures after Ramsbottom et al(1973). The spore zones are after Smith and Butterworth (1967).

Somerset Coalfields span the Westphalian through to the Lower Stephanian.



## Writhlington SSSI

3,000 tons of spoil  
1,400 insect fossils found – the largest collection of Carboniferous insects in Britain.

**Meganeura (Boltonites radstockensis):**  
Radstock's major fossil contribution to geological science - the giant dragonfly. Wing fragments found at Writhlington indicate a wingspan of 40cm, making this the largest insect ever to fly.



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- The Coalfield Geology and the Faulting – Variscan Orogeny



Q&A

If I do not know the answer today, I will find it for you....

# John Strachey & William Smith – The Father of English Geology; the Birthplace and the Home of English Geology?



William Smith - Father



The Birthplace – High Littleton?



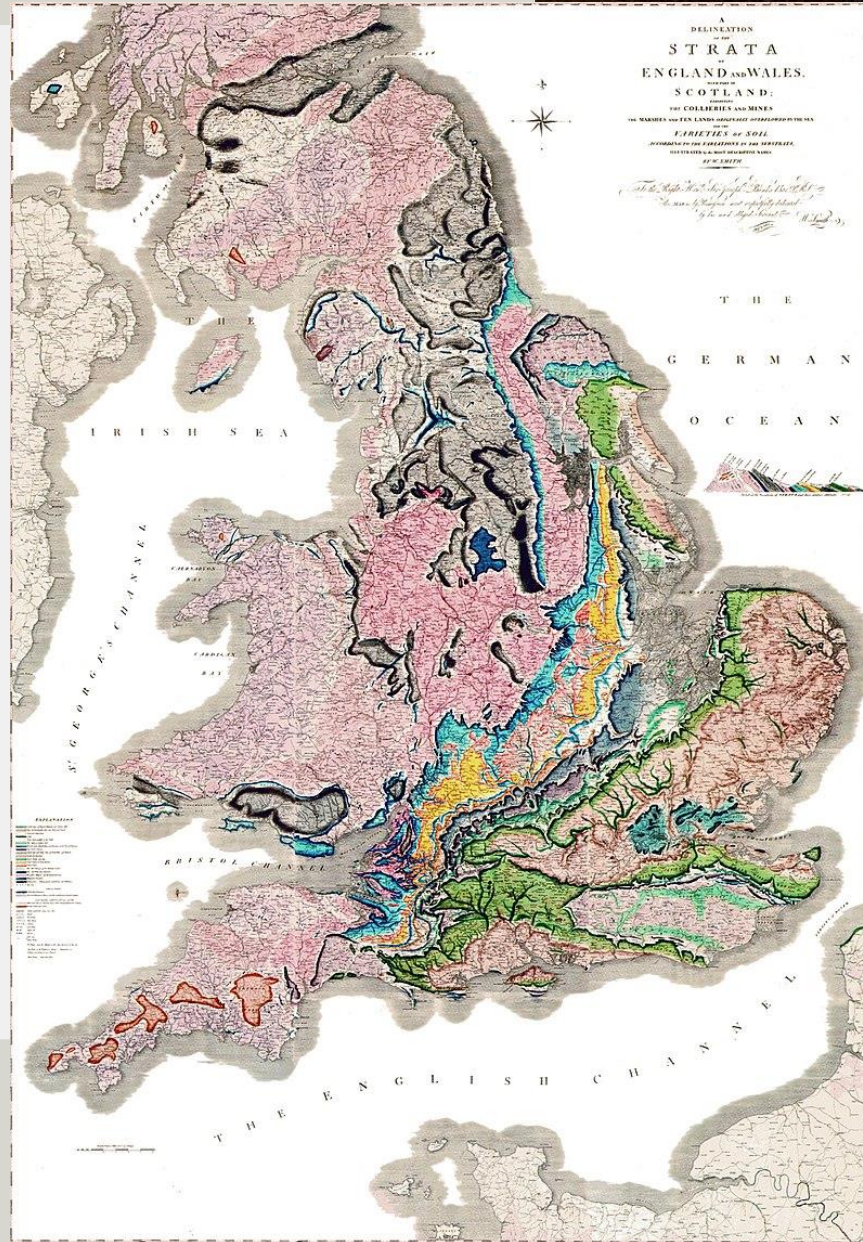
The Home – Chew Magna?





# William Smith (1769-1839)

- It was in the coalfield at High Littleton that William 'Strata' Smith, first put together his ideas on stratigraphy.
- He is the father of English Geology (named by Adam Sedgwick)
- He called High Littleton the Birthplace of English Geology (wrongly in my opinion)



British Geological Survey

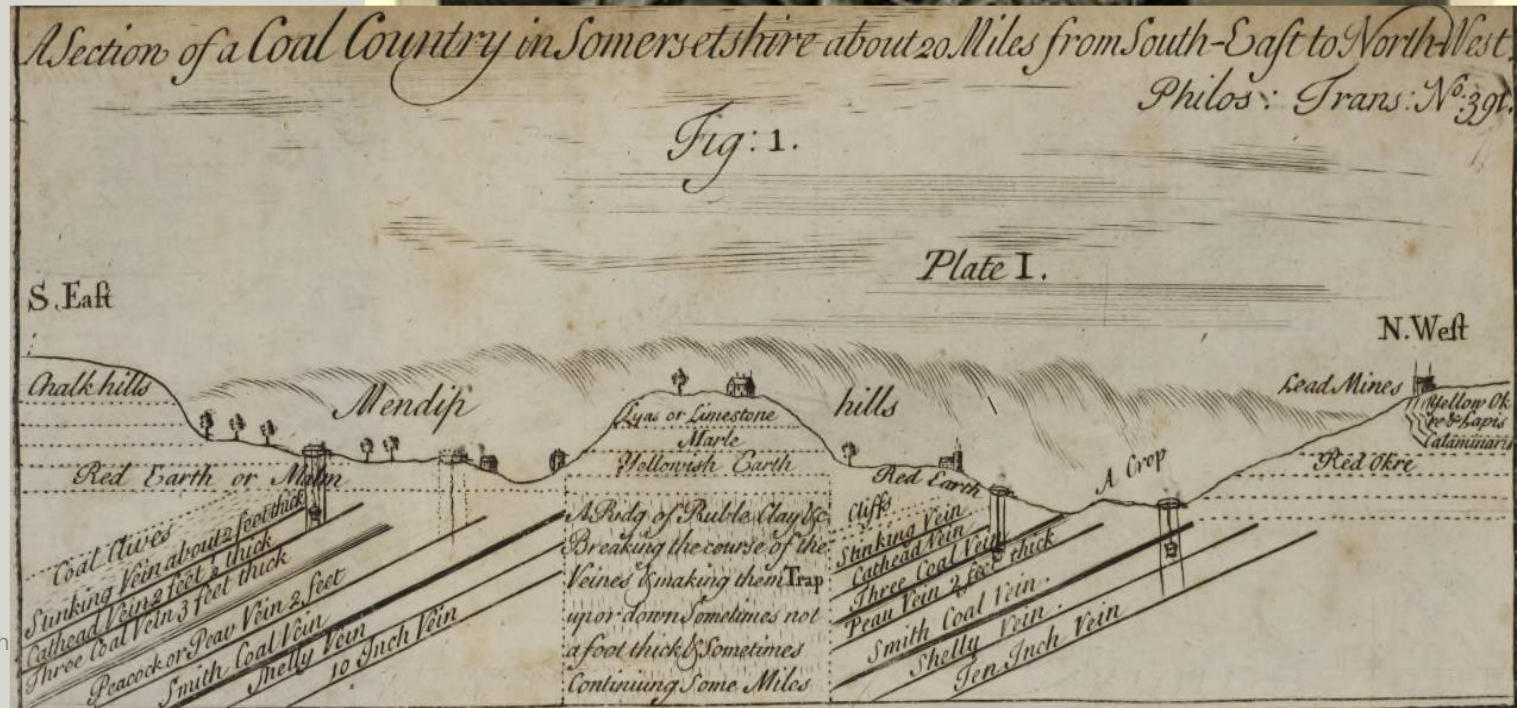






# John Strachey (1671-1743)

- Born almost 100 years before William Smith, this Somerset (Chew Magna) man produced this drawing in 1727. He introduced a theory of “stratum” .
- Strachey’s stratigraphical cross-sections, of which he published several, are the earliest known in scientific literature.
- High Littleton is the birthplace of English Geology according to William Smith ....I would propose that Chew Magna is actually the Birthplace of English Geology





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**Orogeny**



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# The Coalfield Geology and the Faulting – Variscan Orogeny

Farmborough Fault Belt  
(overlap faults)

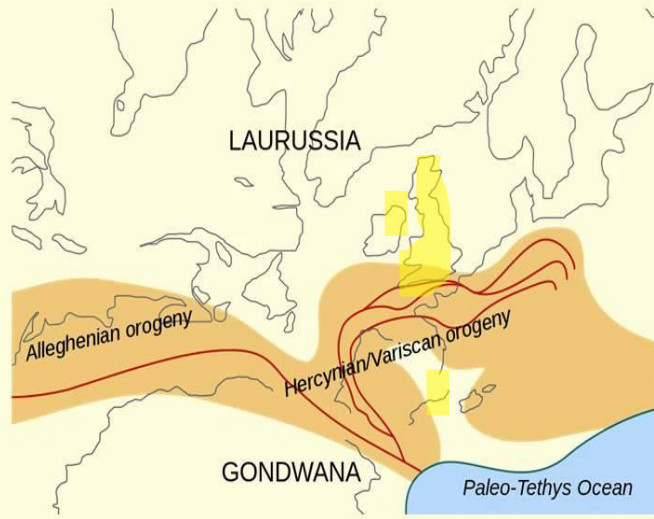
Radstock Slide  
(overthrust fault)

Southern Overthrust  
(reverse thrust fault)

Vobster Klippe  
(thrust created feature)

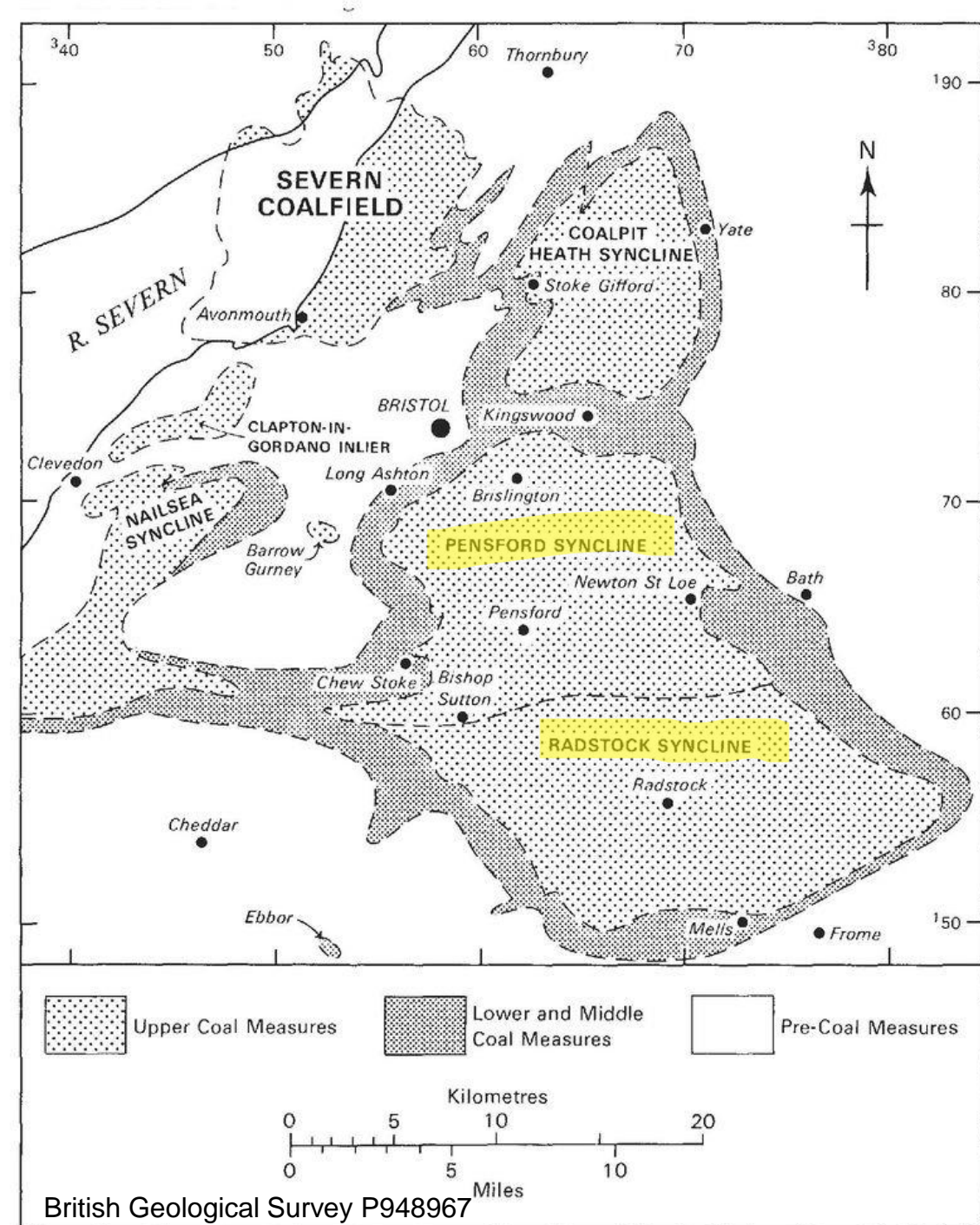
Clandown and Luckington  
Faults  
(normal faults)

# Variscan orogeny



[https://en.wikipedia.org/wiki/File:Hercynides\\_EN.svg](https://en.wikipedia.org/wiki/File:Hercynides_EN.svg)

Post-Westphalian (Variscan) earth movements have led to the separation of the Bristol and Somerset coalfields into several structurally distinct areas (previously referred to as basins).



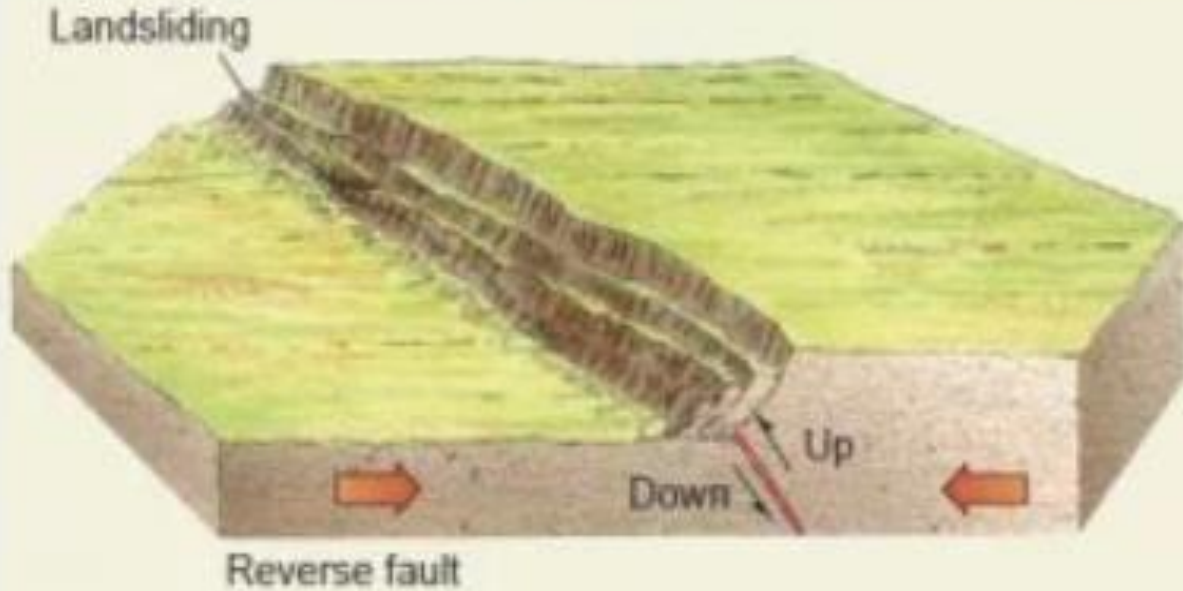
## The Geology and the Faulting - Recap

- Somerset Coalfield: Radstock and Pensford Synclines

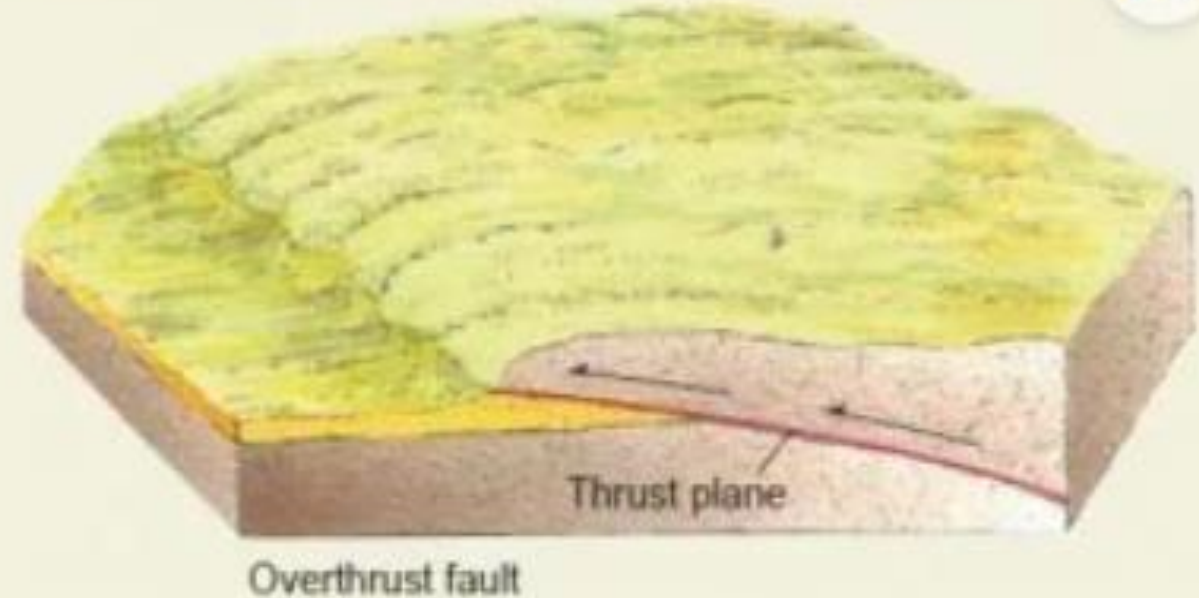


# The Geology and the Faulting - Definitions

## 12.24 Reverse and overthrust faults



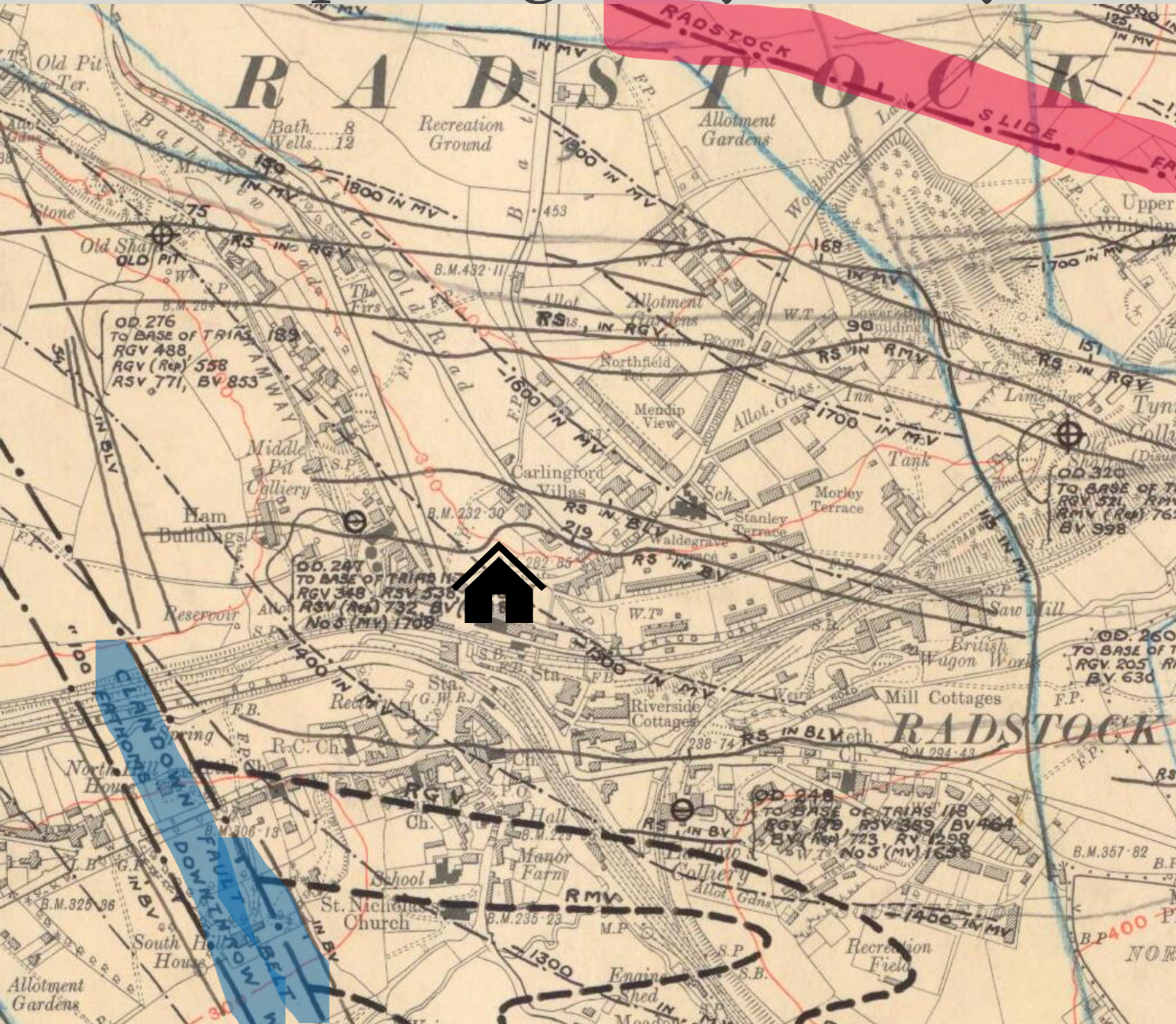
▲ **Reverse fault** The fault plane along a reverse fault is inclined such that one side rides up over the other. Reverse faults produce fault scarps similar to those of normal faults. But because the scarp tends to be overhanging, there's a much greater risk of a landslide.



▲ **Overthrust fault** Overthrust faults involve mostly horizontal movement. One slice of rock rides over the adjacent ground surface. A thrust slice may be up to 50 km (30 mi) wide.



# 1931 Map (Originally Surveyed in 1883)



Dip underground in seam indicated

Fault at pre-Triassic surface. Crossmark on downthrow side

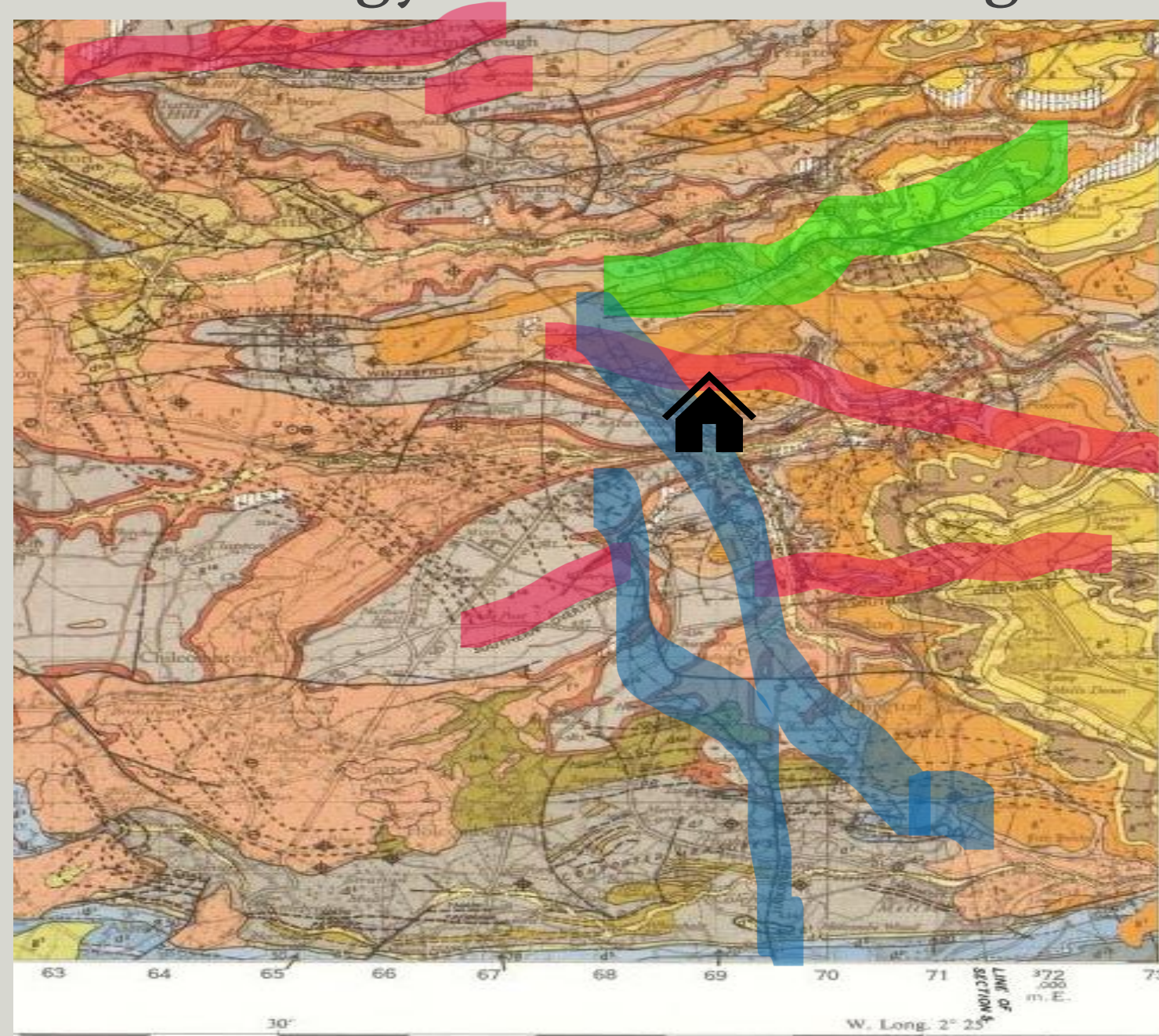
Fault underground. Seam name or symbol on coal side. Throw in feet

Coal crop on pre-Triassic surface. Position approximate and in many cases is hypothetical.

Contour in coal seam indicated. Figures with plus or minus sign indicate feet above or below Ordnance Datum (O.D)



# The Geology and the Faulting – Radstock Syncline



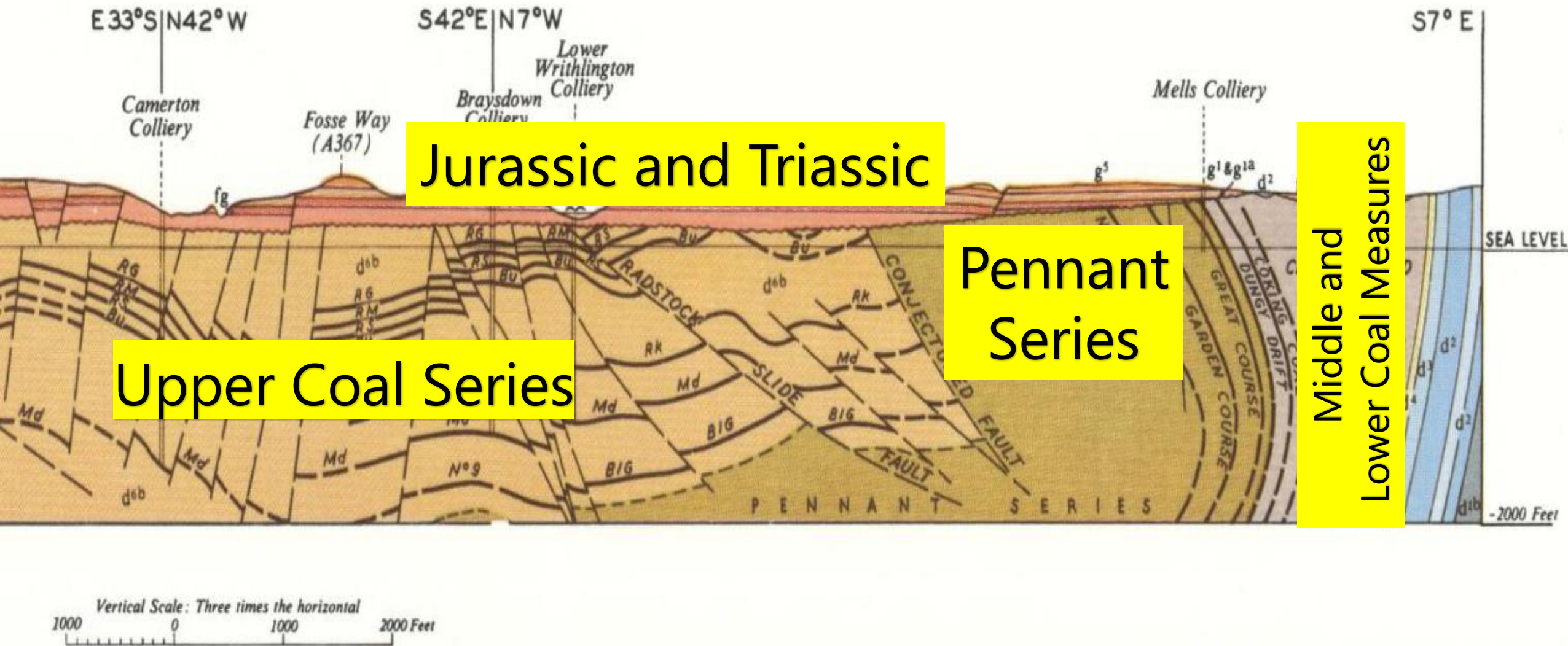
- - - - - Coal-crop  
 - - - - - Coal-crop on sub-Triassic surface (Assumed position)  
 —|— Fault at surface, crossmark indicates downthrow side  
 —|— Fault on sub-Triassic surface (Assumed position) crossmark  
 —Pb— Mineral vein or mineralized fault belt. Pb Lead, Zn Zinc,  
 —M—M— Marine Band  
 Broken lines denote uncertainty  
 ⊙ Borehole  
 ⊙<sup>w</sup> Waterwell or borehole  
 ⊙<sup>u</sup> Borehole from underground workings  
 ⊖ Pit or mine shaft  
 ⊖ Pit or mine shaft, abandoned  
 ↗ Adit or mine mouth, showing direction of entry  
 ↗ Adit or mine mouth, abandoned, showing direction of entry  
 ▭ Area of foundered strata

Where sandstones cover small areas they have been given  
 Some areas with Coal Measures are published on the  
 For detailed description see explanatory Memoir

Abbreviations:—  
 CPH F..... Coal Pit Heath Fault  
 F..... Fault  
 RDG F..... Ridgeway Fault  
 RSF..... Radstock Slide Fault  
 SST..... Sandstone



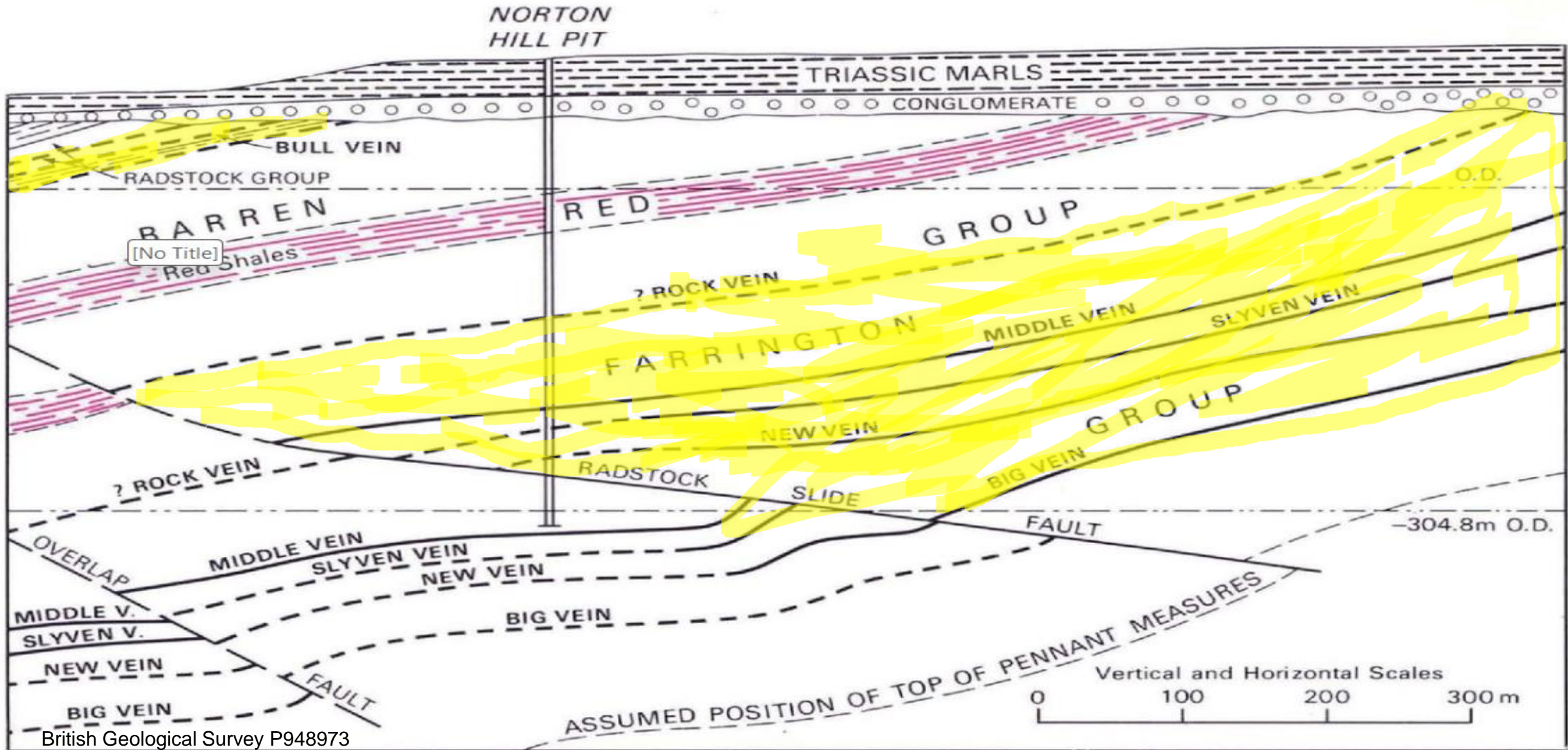
# Impact of the Variscan Orogeny



# Radstock Slide (Overthrust) Fault and the Coal Seams

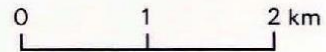
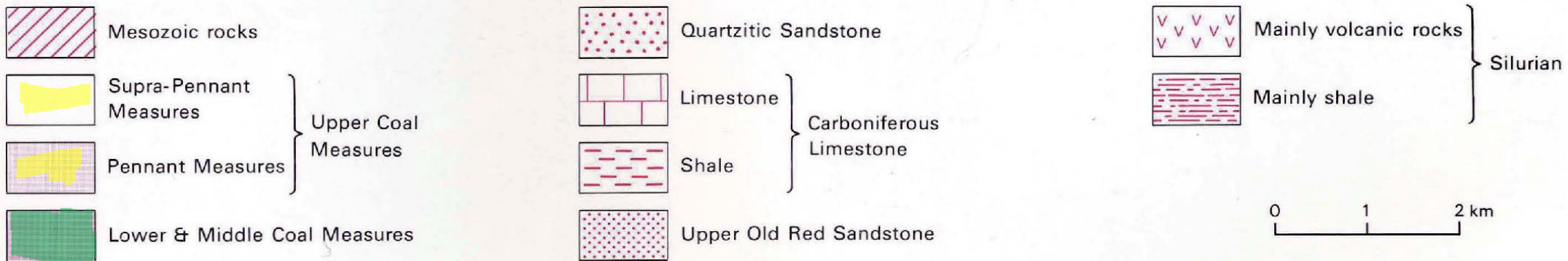
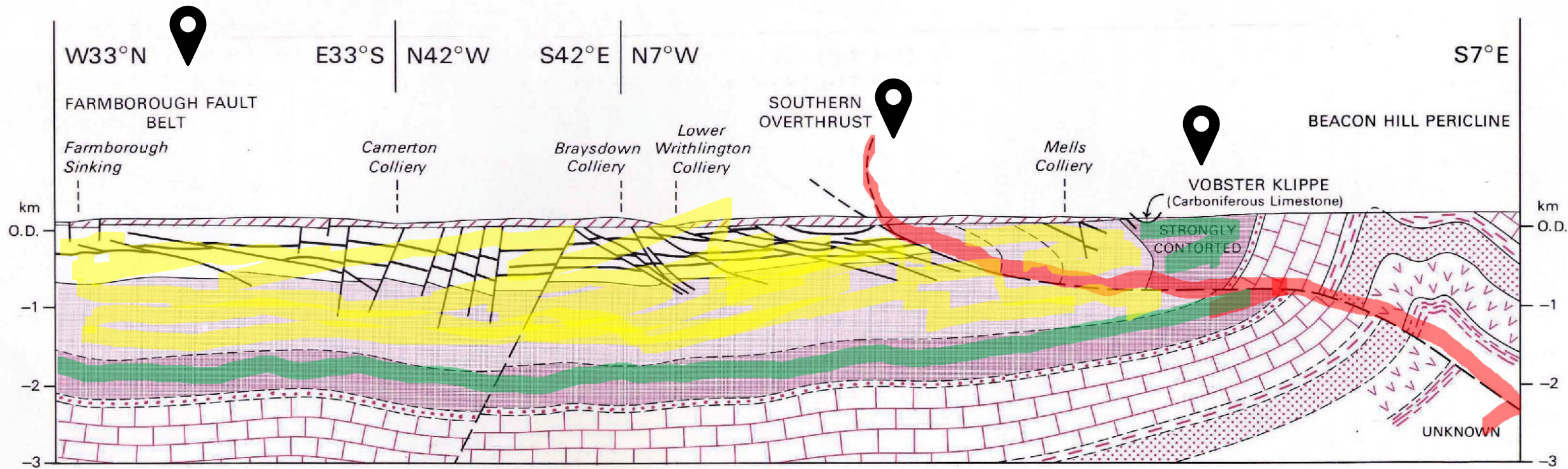
N25°E

S25°W





# Horizontal Section Across the Radstock Syncline-Faulting





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# Thank you

Andy Gordon

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