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# Red Beds of the Moray Firth Basin, North-East Scotland

## Introduction

The age of red beds now assigned to the Permian and Triassic systems of the area around Elgin (Figure 2.2) in the Moray Firth Basin has been debated extensively since the 1830s. At first, these sandstone units were mapped as part of the Devonian Old Red Sandstone. Discovery of the first fossil at Lossiemouth, a cuirass of armour plates, named *Stagonolepis* by Louis Agassiz in 1844, did nothing to change this view: *Stagonolepis* was interpreted as a large, excessively well-armoured ganoid fish. Doubts arose in 1850, with the discovery of footprints at Cummington (Clashach–Covesea GCR site) and the skeleton of *Leptopleuron* at Spynie. Charles Lyell was keen to argue that these were clearly advanced reptiles from definitively Devonian rocks. Others, however, had doubts; to Richard Owen such seemingly advanced fossils appeared incompatible with rocks of that age, and Thomas Henry Huxley concurred. With finds of further bones of larger reptiles in the late 1850s, it generally became recognized that both Devonian and Permo-Triassic ('New Red Sandstone') rocks occurred around Elgin.

With further work, it became clear that there were three main formations within the Morayshire Permo-Triassic succession (Peacock *et al.*, 1968), formalized as the 'Hopeman Sandstone Formation', the 'Burghead Sandstone Formation', and the 'Lossiemouth Sandstone Formation' by Warrington *et al.* (1980). The first and last of these formations contained relatively abundant reptilian fossils, and hence could be dated in a general way. The intervening Burghead Sandstone Formation lacks fossils, and cannot be dated directly. The Hopeman Sandstone Formation has long been equated with Late Permian or Early Triassic reptile-bearing units in the Karroo of South Africa and the South Urals in Russia. Most authors have preferred a Late Permian age, although Walker (1973) opted for an Early Triassic one, a view followed by Smith *et al.* (1974) and Warrington *et al.* (1980). Re-consideration of the reptiles and footprints (Benton and Walker, 1985) now points firmly to a latest Permian age, and hence the representative GCR sites are described in the present chapter.

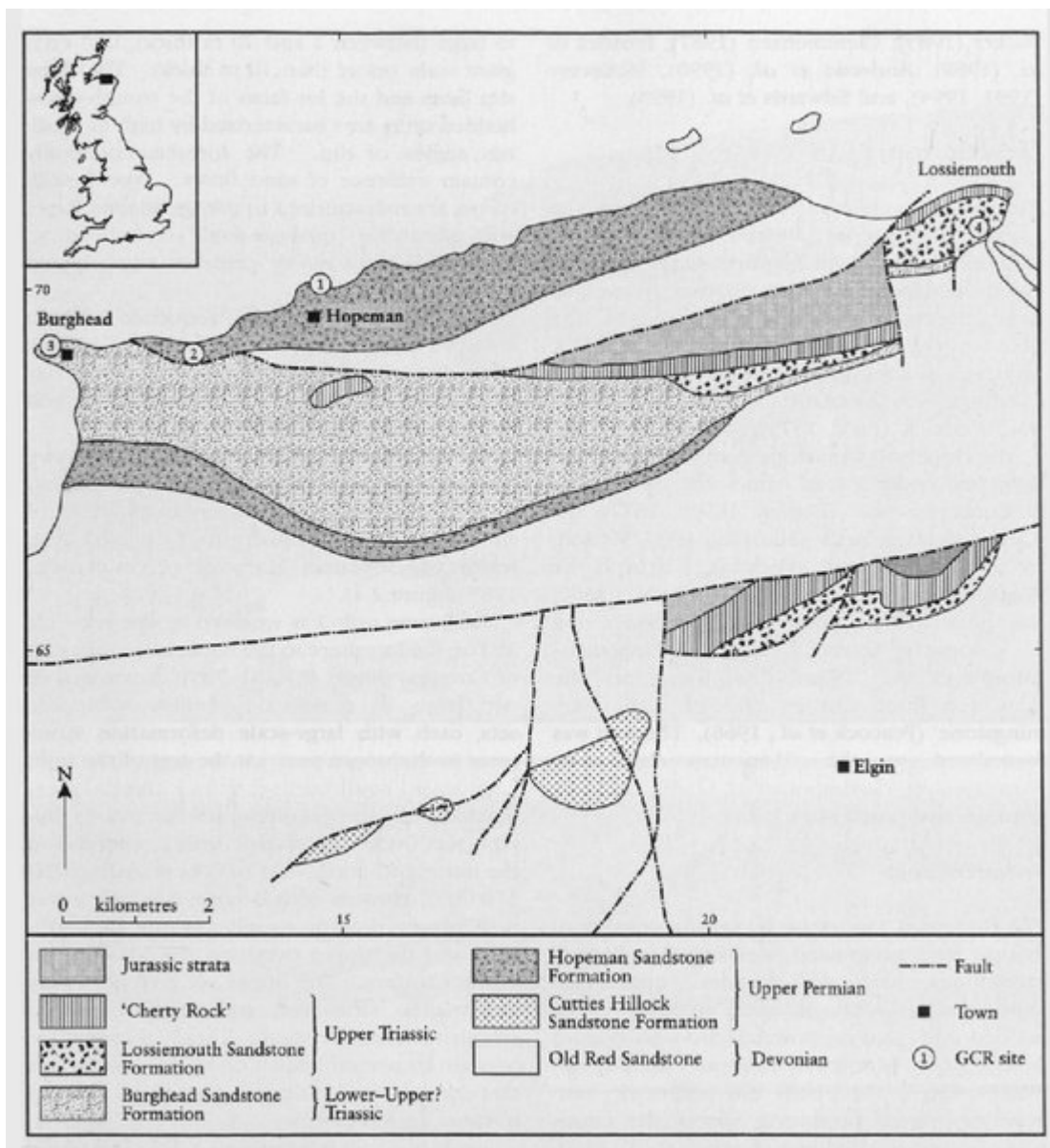
The geology of the Permian strata of the Moray Firth Basin has been described by many authors, for example Duff (1842), Mackie (1897, 1902a,b), Watson and Hickling (1914), Westoll (1948), Peacock (1966, 1977), Peacock *et al.* (1968), Williams (1973), Benton and Walker (1985), Gillen (1987), and Edwards *et al.* (1993). The Permo-Triassic rocks of Morayshire are, in addition, merely a small onshore expression of an extensive development of those deposits offshore in a major basin beneath the Moray Firth (Frostick *et al.*, 1988; Andrews *et al.*, 1990; Edwards *et al.*, 1993).

Two GCR sites have been selected to illustrate the Permian strata of the Moray Firth Basin, the Clashach–Covesea coastal section and Masonshaugh (Figure 2.2) in the type area of the Hopeman Sandstone Formation.

[Clashach to Covesea, Morayshire](#)

[Masonshaugh Quarries, Morayshire](#)

[References](#)



(Figure 2.2) The distribution of Permo-Triassic sediments around Elgin, Morayshire. GCR sites are: (1) Clashach-Covesea (Permian); (2) Masonshaugh Quarries (Permian); (3) Burghead (Triassic); (4) Lossiemouth (Triassic). Based on Peacock et al. (1968) and Benton and Walker (1985).