

## TECTONIC DEVELOPMENT OF IDAHO-WYOMING THRUST BELT<sup>1</sup>

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### ABSTRACT

Three stages are evident in the tectonic development of southeastern Idaho and western Wyoming. First are the changing patterns of tectonic elements during deposition; second, development of northward-trending folds and thrust faults; and third, development of block faults that produced horst ranges and graben valleys.

During Paleozoic time about 50,000 feet of marine sediments, mostly limestone and dolomite, were deposited in a miogeosyncline and about 6,000 feet of mixed marine sediments were deposited on the shelf to the east. Detritus came from both east and west from Cambrian time on. Starting in Mississippian time, the belt between shelf and miogeosyncline, where thicknesses increase westward, shifted progressively eastward.

During Mesozoic time about 35,000 feet of marine and continental sediments were deposited in the western part of the region and about 15,000 feet in the eastern part, with terrestrial deposits becoming increasingly dominant. Western positive areas became the chief source of detritus. The belt of maximum thickness and the site of maximum deposition were relocated progressively eastward; maximum thicknesses of succeeding geologic systems are not superposed. In Late Triassic a belt on the west rose and the miogeosyncline started to break up. As Mesozoic time progressed the western belt spread eastward, until by the end of the Jurassic the miogeosyncline gave way to intracratonic foreclinal basins that received thick deposits, particularly in Cretaceous time. Cenozoic sedimentary rocks are products of orogeny in the region.

The second stage, which overlapped the first, produced folds overturned toward the east and thrust faults dipping gently west in a zone, convex to the east, 200 miles long and 60 miles wide. Topographic throw on many larger faults is about 20,000 feet; horizontal displacement is at least 15 miles. Lack of metamorphism and mylonite along the faults is striking. From west to east, the thrust faults cut progressively younger beds, have progressively younger rocks in their upper plates, and are estimated to be successively younger. Thrusting started in the west in latest Mesozoic and ended in the east perhaps as late as early Eocene time. Detritus shed from emergent upper plates is preserved in coarse terrestrial strata of corresponding ages.

West of the thrust belt is a northwestward-trending area underlain mostly by lower Paleozoic rocks and flanked on east and west by upper Paleozoic and Mesozoic rocks. Scattered pieces of eastward-dipping thrust faults have been reported west of the older rocks. This central area of old rocks has been interpreted as: (1) part of a large continuous thrust sheet moved scores of miles from the west; or (2) an uplifted segment of the earth's crust from which thrust sheets on the east and west were derived. Both interpretations have defects; relative thrust ages are difficult to explain under the first; a large positive gravity anomaly, expectable under the second, is apparently absent.

Block faulting, the third stage of tectonic development, started in Eocene time. Faulting has continued to the Recent, as indicated by broken alluvial fans, displaced basalt flows less than 1000 years old, and earthquakes. North-trending and east-trending fault sets are recognized. Old north-trending steep faults in the Bear River Range may be tear faults genetically related to thrusting. Movement along many faults has been recurrent. Patches of coarse Tertiary gravel on the flanks of horst ranges, for which there is no provenance with present topography, may record reversed movement along some north-trending faults. Present topographic relief of basins and horsts is tectonic.

### INTRODUCTION

Hundreds of man-years have been devoted to geologic studies of the thrust belt of

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southeastern Idaho and western Wyoming. The stimulus has been economic.

Classic reports resulted from the search for coal, oil, and gas (Veatch, 1907; Schultz, 1914), and phosphate (Mansfield, 1927). The region

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