

sets in the Precambrian rocks, but, because they appear less well marked, some hesitancy is felt in ascribing both to a single time of joint formation, specially in view of the evidence for the prior existence of at least an east-west set in the Precambrian rocks. It is inferred rather that the coincidence in direction is merely a coincidence.

In the shaly rocks of the Cumberland head series, in the vicinity of Lake Champlain, the stresses which accompanied the folding of the district to the eastward were sufficiently felt to produce cleavage in the weak shales, though the more massive limestones and sandstones beneath were not affected. These shales are found cut by closely parallel cracks with hade of from 30° to 60° . The beds lie nearly horizontally, and this cleavage angle indicates rather a formation of fissility along the shearing planes than a true vertical cleavage in the compression plane. Sharply cut, vertical joints are also present, often in three directions. While the writer has never observed a like structure in any of the Champlain Utica which he has seen, yet the Utica always shows more indications of compressive disturbance, so far as folding is concerned, than any of the remaining Paleozoic rocks of the region. The explanation is undoubtedly to be found in the weak nature of the rocks as compared with the massive, resistant limestones and sandstones beneath, so that folding and shearing were produced in them by forces insufficient to affect the others correspondingly.

TOPOGRAPHY

Introduction

The topography of any old land area is a resultant of the joint action of two great sets of processes. Arising from beneath sea level with the comparatively smooth surface which it possesses because of the rather uniform deposit of sediments on it, it becomes at once subject to the erosive processes which hold sway on all land surfaces, in which atmospheric and aqueous agencies act jointly, but in which running water plays the major role. From time to time it falls under the influence of forces such as that which originally brought it above the sea level, forces originating in the earth's interior in ways not well understood. These vary its altitude with respect to that