k27 Huronian series < glaciation 2.3 Ga >

> It is possible to destroy the vitality of a subject by dismembering it, and reducing it to formal definitions. Worse than this, it is possible to convey an artificial and even a false impression of the subject, rather than the true and natural one, by enforced system and rigid formalism in its presentation.
>
> —T. C. Chamberlin, 1883.[1]

Huronian and Animikean have been used interchangeably to refer to Early Proterozoic series of the Great Lake region (***Figure k27.1***) but the Huronian series (comprising the eastern Cobalt group and the western Elliot Lake group) in its type area in Ontario on the north side of Lake Huron is not easily correlated with the Animikean series in its type area that at closest is 300 kilometers to the west and, through most of its thickness, is older.

Both series are isoclinally folded. The orogenic deformation, called the *Hudsonian* (or *Penokian*) culminated 1.6-1.8 Ga. Careful attention to *geopetal structures* (term introduced by Bruno Sander in 1936 in his unrelated study of Triassic carbonate sediments but now generally used for fabrics that record way-up at the time of deposition) (***Figure k27.2***) allows the almost vertical axial-planes of folds to be recognized and the folds unfolded so that the succession can be reconstructed (***Figure k27.3***). Correlation is still made difficult by numerous steeply dipping faults that strike parallel the fold-trends and by facies changes over short distances. Until Harold Lloyd James in 1960 [2] made a persuasive case to reject "layer cake" stratigraphy correlations, geologists had been tempted to reverted to it for the "Huronian succession" described in the Bruce Mines, Ontario, area originally: Its upper part is a distinctive thick, cross-bedded shallow marine orthoquartzite (Loraine formation). These extremely mature (pure quartz) sandstones with enigmatic stromatoforms are indicative of passive-margin accumulation of sediments shed from a continent (now part of the Canadian shield north of it) that had stabilized as a craton. Downward in the succession, sandy sediments are less mature and grade through arkoses (lower member of Loraine formation) to well-bedded graywackes (in the upper part of the Gowganda formation).

The Huronian succession records a passive margin that received sediment from a decreasingly mountainous (by progressive erosional lowering of its elevations) continental interior.[3]

Within the basal half of the Gowganda, which includes dikes and sills of basalt emplaced 2.1 Ga, are varved argillites with glacial dropstone and tillites.[4] These, on striated bedrock in places, were deposited in a prolonged interval beginning 2.3 Ga. Same-age glacials are found at widely separated places, as the Medicine Bow Mountains sediments, Wyoming, and in Huronian sediments at Chibougamou, Quebec. Taken together these indicate Paleoproterozoic continental glaciation.

James E. Thompson in 1962, summarizes: "the stratigraphy of the Huronian basins reveals a miogeosynclinal (non-volcanic) environment."[5] A marker for the regional unconformity at the base of the Huronian in highly deformed parts of its area [6] is a radioactive pebble-conglomerate at, or near, it that intensive mineral exploration from 1953 to 1958 located. The type Huronian (its thickness as much as 4000 m) does not contain BIF or volcanics.

Southeast of the Huronian type area, are similarly folded and faulted sediments (with a thickness of 7000 m where their structures are transected by the Grenville front). The presence of BIF and the absence of the radioactive pebble bed at the base of these otherwise identical sediments was enough for Thompson in 1962 assign them a pre-Huronian (i.e. Archean) age. However, the extraordinary similarity of succession in these otherwise, even to tillites, is, in spite of all warnings, hard to ignore. They could be Lower Proterozoic and, part of the answer for their difference is, in Thompson's summation: "the stratigraphy of the region indicates a eugeosynclinal (volcanic-sedimentary) environment." [5] ❑

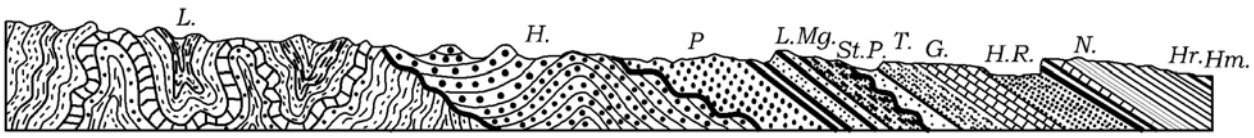

Figure k27.1 [7] General section of the formations of Wisconsin
The inclination of the unflexed beds is exaggerated. *Key*: *L*. Laurentian, *H*. Huronian, *P*. Potsdam sandstone. *L. Mg.* Lower Magnesian limestone. *St. P.* St. Peter sandstone. *T*. Trenton limestone. *G.* Galena limestone. *H.R*. Hudson River (Cincinnati) shales. *N*. Niagara limestone. *Hr*. Lower Helderberg limestone. *Hm*. Hamilton limestone (cement rock).

Figure k27.2
Some 'way up' criteria proven useful for recognizing folds in isoclinally folded Huronian and Animikean strata.

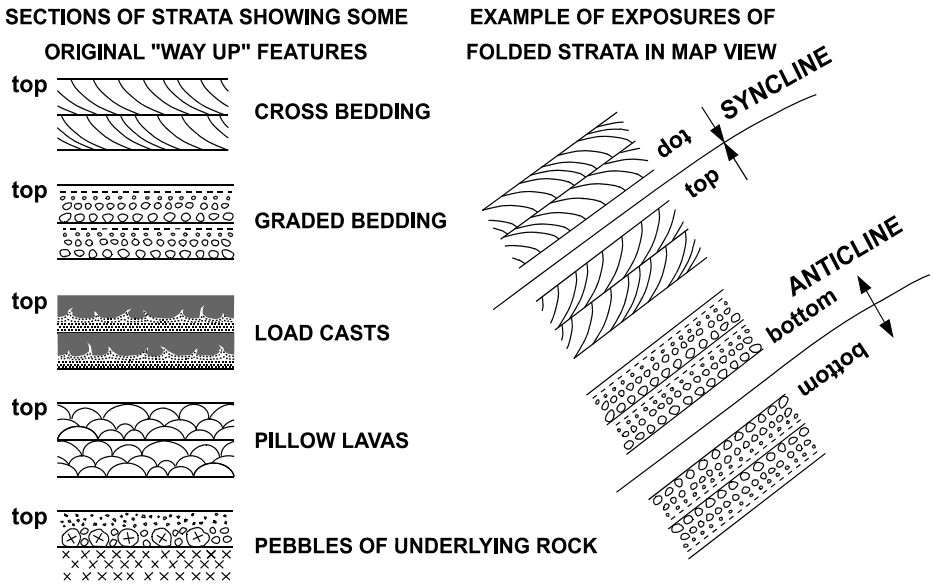

Figure k27.3 [8] Illustration of the Huronian system (supergroup) showing the occurrence of Lower Proterozoic glacials in the Gowganda formation.