

# ARCHEAN & HADEAN EONS

## L1 Andrew Lawson's great discovery

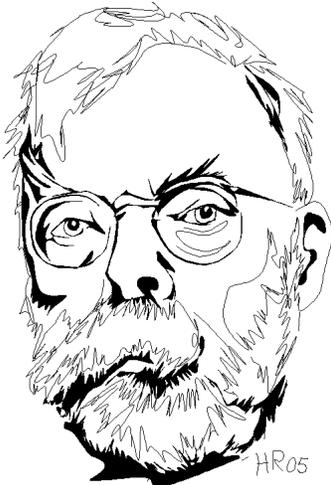
< basalts; not granites, are the oldest rocks of the Canadian Shield >

When we are confronted with unknown sights in visual landscapes of which we have no prior experience, the complex interaction between seeing and knowing becomes openly problematic.  
—Martin Kemp.<sup>1</sup>

The Canadian Shield is a vast area of low elevation, innumerable small lakes, muskeg (Cree: *maskek*, sphagnum-moss covered bogs over permafrost), thin soils developed on glacial-moraine sediments, and knolls of bare Precambrian basement rock.<sup>2</sup> Taiga (boreal spruce forest) of its south gives way in its north to (treeless) mesic tundra.<sup>3</sup>

The shield rocks of Canada (Laurentian Iroquois: *kanata* settlement) are well exposed in the Rainy Lakes area of many small lakes that straddles the boundary of northern Minnesota (Sioux: *minisota* sky-tinted water) and southern Ontario (Iroquoian: a large body of water).<sup>4</sup> Regional mapping of this area by pioneer geologists, by evidence of superposition and unconformities in the Precambrian, established an Archean age for its rocks. The Canadian Geological Survey at that time recognize two Archean formations: granite-gneiss and greenstone. The greenstone formation is basaltic pillow-lavas and lesser amounts, though voluminous in regions, of felsic volcanics and graded-bedded graywackes. Low-grade metamorphism during fold deformation did not erase primary volcanic and sedimentary features (such as pillows and bedding) and petrographic textures of these rocks but their ferromagnesian minerals are mostly altered to chlorite (green mica).

Summertime geological mapping of lake-shoreline rock exposures in the Shield is aided by the outcrop being clean of lichen (pack-ice shifting against the shore keeps it so). Between-lake traverse mapping is less productive because lichen or moss coats rock outcrops. The moss can be peeled back but the lichen is not easily removed. Rock samples must then be taken and these are not necessarily representative of the outcrop if it is a gneiss complex. Also, where there is shelter from the wind, the mosquitoes and the blackfly can be intolerable. As a general rule, the early geological surveys reports are of dubious quality unless the geologist also stated that on the day there was a strong breeze (which, when faced into, can keep the gathering attracted flies in flight mostly to the rear of the head).



### Mente et Malleo

By thought and dint of hammering  
Is the good work done whereof I sing.  
And a jollier crowd you'll rarely find,  
Than the men who chip at earth's old rind,  
And often wear a patched behind,  
By thought and dint of hammering.

Lakeshore reconnaissance mapping requires canoes that can also be portaged between lakes. Paddling a tippy canoe, be it made of fiber glass, or wood-framed covered in canvas or, in pioneer's days, birch bark (**Figure L1.1**) requires the shifting about that wears out the seat of one's pants rapidly. This reality is obliquely and amusingly made reference to by **Andrew Cowper Lawson** (1861-1952) (for he and his like were anything but armchair geologists) in his poem *Mente et Malleo* (*Thought and Hammer*).<sup>5</sup>

In 1881, Lawson published the controversial opinion that the oldest of the Archean formations is the greenstone.<sup>6</sup> Superposition would seem to argue against such a conclusion where lowgrade metamorphic greenstones drape granite-gneiss domes (**Figure L1.12**). But the field evidence is that basement granitic rock is diapiric (of buoyantly intrusive dome-like masses) and where greenstones walked-out cross into gneissic belts of higher metamorphic grade, they fade there ghostlike on strike to become the border zone of the granite-gneiss domes. □

**Figure L1.1** Ojibwa Indian birch-bark canoe. After a painting by Cornelius Kreighoff (1815-1872), held in the Public Archives of Canada.<sup>7</sup>



“The extreme lightness of the birch-bark canoe more than compensated for its frailty, for one man could carry it on his shoulders over several miles of portage. Although cranky, and easily capsized if handled unskillfully, it answered the slightest pressure from the paddle, thus allowing instant changes of direction when running rapids. Moreover, even a seriously damaged canoe could be repaired within a few hours with no other materials than a strip or two of birch bark, a few threads of spruce root to sew them on, and a little spruce gum to cover the seams. The birch-bark canoe was, therefore, an admirable craft for regions abounding in lakes and rivers that were separated only by low watersheds. It was immediately adopted by the early fur-traders, and played a most important part in the exploration and opening up of the Dominion.” —Diamond Jenness, *The Indians of Canada*, 1932.<sup>8</sup>

But geologizing rock outcrop: “Their canoes they had been forced to leave on the Chatte, and to construct new ones of birch-bark would be too long a process. As for floating down the river on rafts, that would be not only inconvenient but dangerous. In the emergency one of the Indians suggested that they should build temporary canoes of spruce-bark. Suitable material was obtained with[out] much difficulty, and soon three excellent canoes were ready to launch. In these frail craft the ‘unknown river’ was safely navigated to its mouth, ...” —Logan, 1844.<sup>9</sup>

**Figure L1.2**<sup>10</sup> Stratigraphic relationships in the Abitibi Greenstone Belt

*Section:* Central volcanism has created the several shield domes in the primarily sedimentary Temiskaming group. Hydrothermal gold ores abound. Also, in this group, mining has proven the persistence of layers of ironformation and of chemical, submarine-exhalite sediments.

