



Significance of the Horsefly Fossil Site, British Columbia

Compiled by the British Columbia Paleontological Alliance

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The Horsefly fossil locality in British Columbia is a preserved lacustrine (lake) sedimentary succession that provides a significant record of life in British Columbia during the Eocene Epoch, some 50 million years ago. The importance of the site is reflected in the enormous amount of discussion about the site that has appeared in the scientific literature over the years. As a good example, the recent issue (February 2005) of the *Canadian Journal of Earth Sciences* (http://pubs.nrc-cnrc.gc.ca/cgi-bin/rp/rp2_to_cs_e?cjes_cjes2-05_42) contains 10 scientific papers analyzing the Eocene fossils, rocks and environments of British Columbia, and detailed information about the Horsefly site can be found in 6 of those papers. An appendix to this report provides a partial listing of additional scientific papers in which the site and its fossil biota have been discussed.



Specifically, the Horsefly site is considered of high paleontological significance because:

- The site records evidence of life during the Eocene, a geological epoch when the world was substantially warmer than today, in part due to a naturally-enhanced greenhouse effect caused by higher than present-day levels of greenhouse gases such as carbon dioxide.
- The quality of preservation of the macrofossils (mainly fish, insects and plants) and the microfossils (mainly pollen and diatoms) found at the site is simply

extraordinary. Preservation of compressed macrofossils is outstanding, and includes fossilized color patterns, as well as evidence of interactions between insects and plants, predators and prey, and between scavengers and carcasses. In addition, the site has good potential for accurate radiometric dating.

- Unlike many other fossil sites of Eocene age, which typically show evidence of tropical-like environmental conditions, Horsefly records the presence of a temperate flora, and evidence of seasonally cooler temperatures. This difference is likely due to the combined effects of its moderate elevation and higher latitude.



Scorpionfly from Horsefly



March flies from Horsefly



Fossil leaf from Horsefly



Fossil fish from Horsefly

- The remarkable varved sediments at Horsefly provide evidence of a seasonal climate acting on the lake. These varved sediments represent a continuous record of 1000's of years of the local history of the lake, and of the plants and animals of its surroundings. The varved sediments have been used to study fish populations in the lake over millennial scales, but they also provide an opportunity to study changes in vegetation across the Eocene landscape, responding to millennial-scale variations in climate. Such a study has already been initiated, and has the potential to detect vegetation responses to climatic-forcing factors such as changes in the Earth's orbital parameters (Milankovitch cyclicity), processes known to have influenced climates and vegetation patterns during the Pleistocene glacial-interglacial shifts and known to influence modern climates as well.



Sediment layers forming varves at Horsefly

- The fossil record succession preserved at Horsefly is a high-resolution fossil record that is not known to exist anywhere else in British Columbia, and in fact is one of only a handful of such sites in the world in terms of length and quality of record.



The right bank of the creek has produced research-quality fossil materials

As demonstrated in the attached Appendix, the Horsefly site has been the focus of an amazing amount of scientific study over the past 50 years. However, the work done to date has only begun to touch on the potential scientific contributions of the site. It would be truly unfortunate if

this site was to be collected indiscriminately. It would also be a great tragedy for science if the site was to be collected aggressively (i.e., mined) for its fossils, as this would destroy the chronological sequence of annual varved layers that makes the Horsefly locality of international scientific importance.

It would be a wonderful educational tool if the site could be dedicated for interpretive development, either on the site itself or nearby. At Horsefly, people can experience the beauty of the river and the falls, learn about the local gold-mining history, observe the salmon run and other aspects of the modern biota, and of course learn about the fossils and environmental change. Few other fossil sites in British Columbia offer so many options for educational development. It would be critical, however, that such development proceed without damaging the primary goals of conservation and scientific study.

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- March 21, 2005

Appendix

Bibliography of Scientific Papers Dealing with the Horsefly Locality

Compiled by Mark V.H. Wilson with additions from others, March 2005

Publications in which the Horsefly deposit and its fossils are a major focus

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