

[Home](#) > [Journal](#) > [Biomedical & Life Sciences](#) | [Medicine & Healthcare](#) | [Social Sciences & Humanities](#) >

AA

[Indexing](#) [View Papers](#) [Aims & Scope](#) [Editorial Board](#) [Guideline](#) [Article Processing Charges](#)

AA &gt; Vol.2 No.3, August 2012



## Tay-Sachs and French Canadians: A Case of Gene-Culture Co-evolution?

PDF (Size: 176KB) PP. 132-138 DOI: 10.4236/aa.2012.23016

### Author(s)

Peter Frost

### ABSTRACT

Tay-Sachs, an inherited neurological disorder, is unusually common among French Canadians from eastern Quebec. Two alleles are responsible, one being specific to the north shore of the St. Lawrence and the other to the south shore. This pattern of convergent evolution suggests the presence of a selection pressure limited to eastern Quebec. Both alleles probably arose after the British conquest of Quebec in 1759 or at least were uncommon previously. To explain the high incidence of Tay-Sachs among Ashkenazi Jews, some authors have invoked heterozygote advantage, i.e., heterozygous individuals enjoy a higher rate of neuronal growth, and thus greater learning capacity, without the neurological deterioration of homozygous individuals. Such an advantage would have helped Ashkenazim perform the mental effort required for work in trade and crafts. A similar situation may have developed in eastern Quebec, where the relative scarcity of British and American merchants made it easier for French Canadians to enter occupations that required literacy, numeracy, and future time orientation.

### KEYWORDS

Neurological Disorder

### Cite this paper

Frost, P. (2012). Tay-Sachs and French Canadians: A Case of Gene-Culture Co-evolution?. *Advances in Anthropology*, 2, 132-138. doi: 10.4236/aa.2012.23016.

### References

- [1] Annweiler, C., Allali, G., Allain, P., Bridenbaugh, S., Schott, A.-M., Kressig, R. W., & Beauchet, O. (2009). Vitamin D and cognitive performance in adults: A systematic review. *European Journal of Neurology*, 16, 1083-1089. doi:10.1111/j.1468-1331.2009.02755.x
- [2] Bélanger, F., Berberi, S., Breton, J.-R., Carrier, D., & Lessard, R. (1990). La Beauce et les Beaucerons. Portraits d' une région 1737-1987. Saint-Joseph-de-Beauce: La Société du patrimoine des Beaucerons.
- [3] Bouchard, G., & Roy, R. (1991). Fécondité et alphabétisation au Saguenay et au Québec (XIXe-XXe siècles). *Annales de démographie historique*, 3, 173-201.
- [4] Branda, K. J., Tomczak, J., & Natowicz, M. R. (2004). Heterozygosity for Tay-Sachs and Sandhoff diseases in Non-Jewish Americans with ancestry from Ireland, Great Britain, or Italy. *Genetic Testing*, 8, 174-180. doi:10.1089/gte.2004.8.174
- [5] Clark, G. (2009a). The indicted and the wealthy: Surnames, reproductive success, genetic selection and social class in pre-industrial England. <http://www.econ.ucdavis.edu/faculty/gclark/Farewell%20to%20Alms/Clark%20-Surnames.pdf>
- [6] Clark, G. (2009b). The domestication of man: The social implications of Darwin. *ArtefaCTos*, 2, 64-80.
- [7] Clark, G. (2007). *A farewell to alms. A brief economic history of the world*. Princeton: Princeton University Press.

- [Open Special Issues](#)
- [Published Special Issues](#)
- [Special Issues Guideline](#)

[AA Subscription](#)
[Most popular papers in AA](#)
[About AA News](#)
[Frequently Asked Questions](#)
[Recommend to Peers](#)
[Recommend to Library](#)
[Contact Us](#)

Downloads:	24,581
------------	--------

Visits:	122,676
---------	---------

[Sponsors >>](#)

- [8] Cochran, G., Hardy, J., & Harpending, H. (2006). Natural history of Ashkenazi intelligence. *Journal of Biosocial Science*, 38, 659-693. doi:10.1017/S0021932005027069
- [9] Courville, S., Poulin, P. C., Rodrigue, B., Allard, M., Girard, D., Grenier, F., Hatvany, M., Larocque, M.-J., Mcquillan, A., Poulin, P., Pronovost, C., Routhier, G., Schwartz, K., & St-Hilaire, M. (2003). *Histoire de Beauce-Etchemin-Amiante*. Quebec City: Presses de l' Université Laval.
- [10] De Braekeleer, M. (1995). Inbreeding, kinship and surnames in hereditary disorders: The experience in Saguenay-Lac-Saint-Jean (Quebec). *Collegium Antropologicum*, 19, 289-304.
- [11] De Braekeleer, M., Hechtman, P., Andermann, E., & Kaplan, F. (1992). The French Canadian Tay-Sachs disease deletion mutation: Identification of probable founders. *Human Genetics*, 89, 83-87. doi:10.1007/BF00207048
- [12] De Tocqueville, A. (2003) [1831]. *Regards sur le Bas-Canada*. Montreal: Typo.
- [13] Eyles, D., Brown, J., Mackay-Sim, A., Mcgrath, J., & Feron, F. (2003). Vitamin D3 and brain development. *Neuroscience*, 118, 641-653. doi:10.1016/S0306-4522(03)00040-X
- [14] Ferron, M., & Cliché, R. (1982). *Les Beaucerons. Ces insoumis, suivi de Quand le peuple fait la loi*. Montreal: Hurtubise HMH.
- [15] Fortin, J.-C., & Lechasseur, A. (1993). *Histoire du Bas-Saint-Laurent*. Quebec City: Presses de l' Université Laval.
- [16] Genetic Alliance UK (2010). Incidence of genetic disorders, URL (last checked 25 June 2012). <http://www.geneticalliance.org.uk/education3.htm>
- [17] Hawks, J., Wang, E. T., Cochran, G. M., Harpending, H. C., & Moyzis, R. K. (2007). Recent acceleration of human adaptive evolution. *Proceedings of the National Academy of Sciences of USA*, 104, 2075320758.
- [18] Hechtman, P., Boulay, B., De Braekeleer, M., Andermann, E., Melançon, S., Larochelle, J., Prevost, C., & Kaplan, F. (1992). The intron 7 donor splice site transition: A second Tay-Sachs disease mutation in French Canada. *Human Genetics*, 90, 402-406. doi:10.1007/BF00220467
- [19] Kelly, T. E., Chase, G. A., Kaback, M. M., Kumor, K., & McKusick, V. A. (1975). Tay-Sachs disease: High gene frequency in a non-Jewish population. *American Journal of Human Genetics*, 27, 287-291.
- [20] Laberge, A.-M., Michaud, J., Richter, A., Lemyre, E., Lambert, M., Brais, B., & Mitchell, G. A. (2005). Population history and its impact on medical genetics in Quebec. *Clinical Genetics*, 68, 287-301. doi:10.1111/j.1399-0004.2005.00497.x
- [21] Lapointe, N. (1996). *Le capitalisme marchand au Saguenay-Lac-Saint-Jean: John Guay (1828-1880), négociant et propriétaire foncier*. Master's Thesis, Quebec City: Université du Québec à Chicoutimi.
- [22] Marcoux, R. (2009). Transition démographique et mise au travail des enfants dans la ville de Québec à la fin du XIXe siècle. In B. Caulier, & Y. Rousseau (Eds.), *Temps, espace et modernités* (pp. 107-120). Quebec City: Presses de l' Université Laval.
- [23] Marcoux, R., St. Hilaire, M., & Harton, M.-E. (2006). Modes de production et comportements en matière de fécondité à Québec au début du 20e siècle: La nécessité de saisir le travail des femmes en milieu urbain. *Population et travail—Dynamique démographique et travail* (pp. 73-85). Actes des Colloques de l' AIDELF.
- [24] McDowell, G. A., Mules, E. H., Fabacher, P., Shapira, E., & Blitzer, M. G. (1992). The presence of two different infantile Tay-Sachs disease mutations in a Cajun population. *American Journal of Human Genetics*, 51, 1071-1077.
- [25] Milot, E., Mayer, F. M., Nussey, D. H., Boisvert, M., Pelletier, F., & Réale, D. (2011). Evidence for evolution in response to natural selection in a contemporary human population. *Proceedings of the National Academy of Sciences of USA*, 108, 17040-17045. doi:10.1073/pnas.1104210108
- [26] Mules, E. H., Hayflick, S., Dowling, C. E., Kelly, T. E., Akerman, B. R., Gravel, R. A., & Thomas, G. H. (1992). Molecular basis of Hexosaminidase A deficiency and pseudodeficiency in the Berks County Pennsylvania Dutch. *Human Mutation*, 1, 298-302. doi:10.1002/humu.1380010406
- [27] Murray, C. (2007). Jewish genius. *Commentary*, April.
- [28] Murray, J. (1902) [1762]. Report of the state of the government of Quebec in Canada. Quebec City:

- [29] Ouellet, F. (1966). Histoire économique et sociale du Québec 1760-1850, structures et conjoncture. Fides: Montreal and Paris.