Fungal Genetics Reports

Volume 29 Article 15

The physical and genetic map of mtDNA from Neurospora crassa strain 74-OR23-1A.

R. A. Collins

D. M. Grant

A. M. Lambowitz

Recommended Citation

Collins, R. A., D.M. Grant, and A.M. Lambowitz (1982) "The physical and genetic map of mtDNA from Neurospora crassa strain 74-OR23-1A.," *Fungal Genetics Reports*: Vol. 29, Article 15. https://doi.org/10.4148/1941-4765.1644

The physical and genetic map of mtDNA from Neurospora crassa strain 74-OR23-1A.

Abstract

The physical and genetic map of mtDNA from *Neurospora crassa* strain 74-ORS23-1A.

THE PHYSICAL AND GENETIC MAP OF mtDNA FROM *NEUROSPORA CRASSA* STRAIN 74-OR23-1A

May, 1982.

Richard A. Collins, David M. Grant, and Alan M. Lambowitz. The Department of Biochemistry, Saint Louis University Medical School, St. Louis, MO 63104

Neurospora mtDNA is a circular molecule of approximately 60 kb (2,19).

Thick lines indicate sequences corresponding to rRNA genes; the thin line represents the intron in the large rRNA gene. The organization of the rRNA genes has been determined by Southern and Northern hybridization, R-loop electron microscopy, and S1 nuclease experiments (2,8,10,12,17).

Dots indicate tRNA genes. The locations of several specific tRNA genes have been determined by Southern hybridization and DNA sequence analysis (8,12,13,20,22).

Restriction enzyme maps: EcoRI (2,19); Hind11 (8,9); Hind111 (8,9,11,12,19); BamHI (19). Some sites for other enzymes are also known: BglII (1,14); HpaI (8); HapII (1). More detailed restriction site information and some DNA sequence data have been published for EcoRI-4 (21) and HindIII-7b (12,13,22).

Dashed lines identify putative protein coding regions that have been identified by hybridization with specific fragments of yeast mtDNA containing sequences for cytochrome b (*cob*), subunits I, II, and III of cytochrome c oxidase (*oxi-3*, (1,15,21), *oxi-l* and *oxi-2* respectively), and two ATPase subunits (*oli-1* and *oli-2*). The DNA sequence of the gene for cytochrome oxidase subunit III has been determined (4). It is not known if the gene homologous to oli-1 is functional (21).

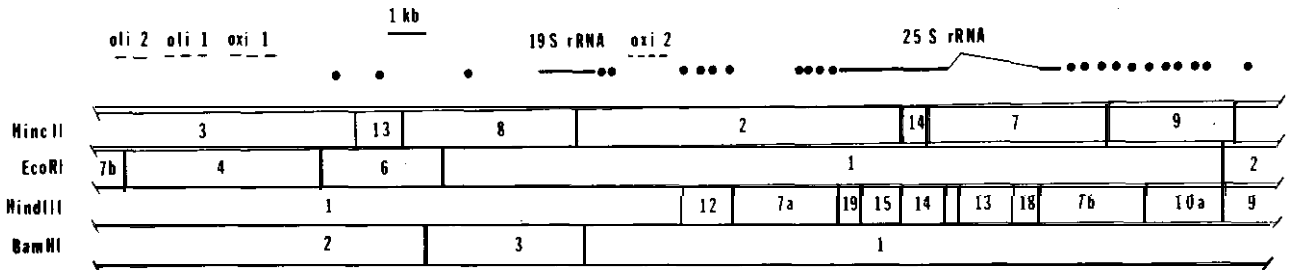
There is suggestive evidence that a replication origin is located near the boundary of EcoRI-4 and 6 (3,6).

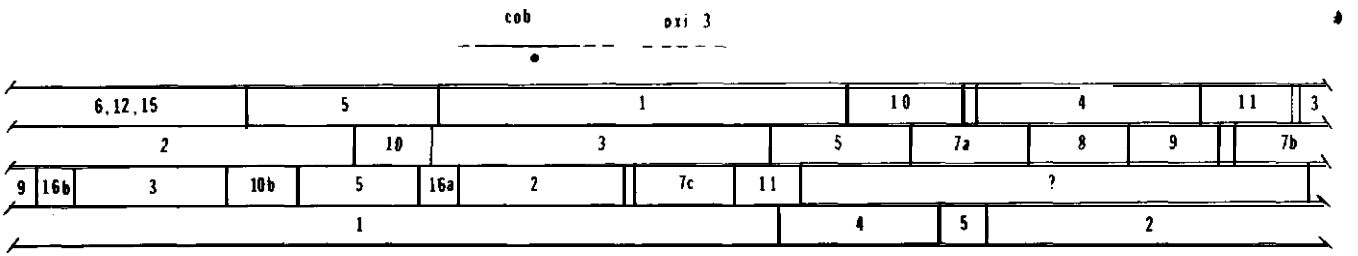
Strain 74A described here is defined as having type II mtDNA (16). The other common laboratory strain, Em5256 (type I), has two detectable differences in its mtDNA when compared to 74A: EcoRI-5 is 1200 bp shorter; EcoRI-9 is 50 bp longer (2,16). Many other structural alterations have recently been found in natural isolates which are not commonly used in laboratories (5,7,18).

References

1. Agsteribbe, E., Samallo, J., de Vries, H., Hensgens, L. and Grivell, L. (1980). In: The Organization and Expression of the Mitochondrial Genome (A. Kroon and C. Saccone, eds.), Elsevier/North-Holland Biomedical Press, Amsterdam, pp. 51-60.
2. Bernard, U., Goldthwaite, C. and Kuntzel, H. (1976). Nucl. Acids Res. 3: 3101-3108.
3. Bertrand, H., Collins, R.A., Stohl, L.L., Goewert, R.R. and Lambowitz, A.M. (1980). Proc. Nat. Acad. Sci. USA 77: 6032-6036.
4. Browning, K.S. and RajBhandary, U.L. (1982). J. Biol. Chem. 257:5253-5256.
5. Collins, R.A., Stohl, L.L., Cole, M.D. and Lambowitz, A.M. (1981). Cell 24: 443-452.
6. Collins, R.A. and Lambowitz, A.M. (1981). Curr. Genet. 4: 131-133.
7. Collins, R.A. and Lambowitz, A.M., in preparation.
8. de Vries, H., de Jonge, J.C., Bakker, H., Meurs, H. and Kroon, A. (1979). Nucl. Acids Res. 5: 1791-1803.
9. Grant, D.M., Collins, R.A. and Lambowitz, A.M., unpublished data.
10. Green, M.R., Grimm, M.F., Goewert, R.R., Collins, R.A., Cole, M.D., Lambowitz, A.M., Heckman, J.E., Yin, S. and RajBhandary, U.L. (1981). J. Biol. Chem. 256: 2027-2034.
11. Hahn, U., Lazarus, C.M., Lunsdorf, H. and Kuntzel, H. (1979). Cell 17: 191-200.
12. Heckman, J.E. and RajBhandary, U.L. (1979). Cell 17: 583-595.

13. Heckman, J.E., Yin, S., Alzner-DeWeerd, B. and RajBhandary, U.L. (1979). J. Biol. Chem. 254: 12694-12700.
14. Kroon, A.M., de Vries, H. and Saccone, C. (1980). In: Endosymbiosis and Cell Research (W. Schwemmler and H. Schenk, eds.), W. de Gruyter, Berlin, pp. 797-806.
15. Macino, G. (1980). J. Biol. Chem. 255: 10563-10565.
16. Mannella, C.A., Pittenger, T.H. and Lambowitz, A.M. (1979). J. Bact. 137: 1449-1451.
17. Mannella, C.A., Collins, R.A., Green, M.R. and Lambowitz, A.M. (1979). Proc. Nat. Acad. Sci. USA 76: 2635-2639.
18. Stohl, L.L., Collins, R.A., Cole, M.D. and Lambowitz, A.M. (1982). Nucl. Acids Res. 10:1439-1458.
19. Terpstra, P., Holtrop, M. and Kroon, A.M. (1977). Biochim. Biophys. Acta 475: 571-588.
20. Terpstra, P., de Vries, H. and Kroon, A.M. (1977). In: Mitochondria 1977 (W. Bandlow, R.J. Schweyen, K. Wolf and F. Kaudewitz, eds.), de Gruyter, Berlin, pp. 291-302.
21. van den Boogaart, P., Samallo, J., van Dijk, S. and Agsteribbe, E. (1981). In: Mitochondrial Genes (P. Slonimski, P. Borst and G. Attardi, eds.), Cold Spring Harbor Press, Cold Spring Harbor, NY, in press.
22. Yin, S., Heckman, J. and RajBhandary, U.L. (1981). Cell 26: 325-332.





13. Heckman, J.E., Yin, S., Alzner-DeWeerd, B. and RajBhandary, U.L. (1979). J. Biol. Chem. 254: 12694-12700.
14. Kroon, A.M., de Vries, H. and Saccone, C. (1980). In: Endosymbiosis and Cell Research (W. Schwemmler and H. Schenk, eds.), W. de Gruyter, Berlin, pp. 797-806.
15. Macino, G. (1980). J. Biol. Chem. 255: 10563-10565.
16. Mannella, C.A., Pittenger, T.H. and Lambowitz, A.M. (1979). J. Bact. 137: 1449-1451.
17. Mannella, C.A., Collins, R.A., Green, M.R. and Lambowitz, A.M. (1979). Proc. Nat. Acad. Sci. USA 76: 2635-2639.
18. Stohl, L.L., Collins, R.A., Cole, M.D. and Lambowitz, A.M. (1982). Nucl. Acids Res. 10:1439-1458.
19. Terpstra, P., Holtrop, M. and Kroon, A.M. (1977). Biochim. Biophys. Acta 475: 571-588.
20. Terpstra, P., de Vries, H. and Kroon, A.M. (1977). In: Mitochondria 1977 (W. Bandlow, R.J. Schweyen, K. Wolf and F. Kaudewitz, eds.), de Gruyter, Berlin, pp. 291-302.
21. van den Boogaart, P., Samallo, J., van Dijk, S. and Agsteribbe, E. (1981). In: Mitochondrial Genes (P. Slonimski, P. Borst and G. Attardi, eds.), Cold Spring Harbor Press, Cold Spring Harbor, NY, in press.
22. Yin, S., Heckman, J. and RajBhandary, U.L. (1981). Cell 26: 325-332.