Find a Gene Project

Renee Zuhars (PID: A17329856)

Table of contents

Question 1:

Beginning my search, I knew I wanted to limit my organism to some kind of fungus, because they are very understudied and I think their diversity and versatility are fascinating!

I decided to narrow my search to those proteins that help the fungus *Ophiocordyceps Unilateralis* "zombify" a host insect by taking over the hosts' neurological systems, eventually killing the host.

protein name: serine/threonine-protein kinase MAK, partial

species: *Ophiocordyceps Unilateralis*

accession number: ADI72911.1

function: The role of MAK-like kinases in this species is to induce behavioral changes in the host by interfering with Mitogen- Activated Protein Kinase signaling pathways. (ChatGPT)

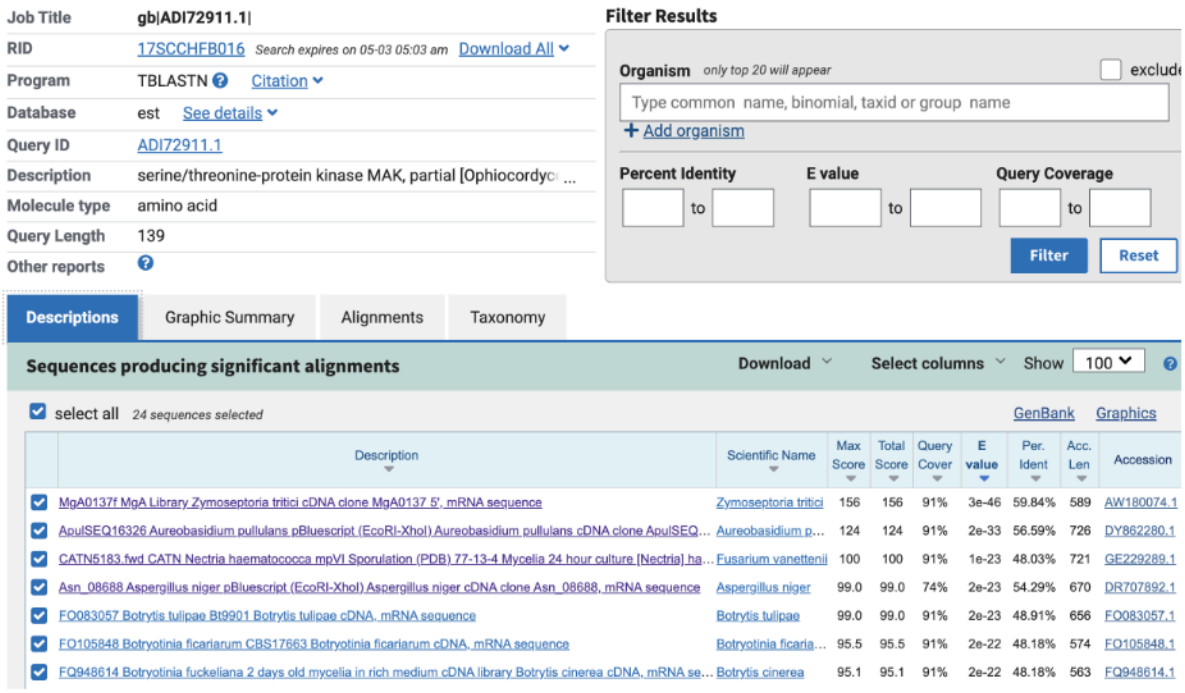
```
knitr::include_graphics("ophiocordyceps.png")
```

Question 2

To attempt to find a homologous protein, I inputted the accession number into NCBI's tblastn search, using the est database, and did not add any limits or restrictions.

My BLAST results were as followed:

```
knitr::include_graphics("original protein blast results.png")
```



I decided to focus on the first result, "MgA0137f MgA Library Zymoseptoria tritici cDNA clone MgA0137 5', mRNA sequence".

Question 3

Here is some information about the homolog I am looking into:

FASTA format sequence, translated using EMBOSS Transeq: AW180074.1_1 MgA0137f MgA Library Zymoseptoria tritici cDNA clone MgA0137 5', mRNA sequence RQLSVNSQGNHYAEIHRQEAERALVGASALKSPTGSQRESFFSHLRKRARRLSGRNSGVI TPSMDAMETSAGCVPWAANKQTTFDTHSIASAAADPSSDPNFAELDRALQSVRYSLDAAA NATQQARKPTNRVVEQPSLKRHHSLPHGVRHKTNPTTVYHDEH*STPRAADTRPPTKKKN SRRSHELSASRRTAFSX

AW180074.1_2 MgA0137f MgA Library Zymoseptoria tritici cDNA clone MgA0137 5', mRNA sequence DNYQSTHRAITTPKFTGRKLSVLWLAQALSSHRLAAKEKASSLICARGREDFPAATQVSS HLQWMLWKPALGAFLGLLTNKPPSTPTRSRLPQPIRHQTPISLSWIVHCKVYDTAWMPPR TRLNKLGSLRTA*LSNHH*SVTTRFLTALDTRPTQPPYTTTSTEARHEQPIQDPRRRRRI LDEVMNSAHLAARRSR

AW180074.1_3 MgA0137f MgA Library Zymoseptoria tritici cDNA clone MgA0137 5', mRNA sequence TIISQLTGQSLRRNSPAGS*ACSGWRKRSQVTDWQPKRKLLLSSAQEGEKTFRPQLRCHH TFNGCYGNQRWVRSLGC*QTNHLRHPLDRVCRSRSVIRPQFR*AGSCTAKCTIQPGCRRE*

*RDSTS*EAYEPRS*ATIIEASPLASSRR*TQDQPNHRIPRRALKHATSSRYKTPDEEEEF
STKS*TQRISPHGVLX

AW180074.1_4 MgA0137f MgA Library Zymoseptoria tritici cDNA clone MgA0137 5', mRNA sequence RERRAARCAEFMTSSRILLLRRGSCIGCSWRASVLVVVYG-GWVGLVSNAVRKRVVTLQ*W LLNYAVRRLPSLLSRVRGGIQAVSYTLQCTIQL-SEIGV**RIGCGRRDRVGVEGGLFVSS PRNAPSAGFHSIH*RCDDT*VAAGKSSRPLAQMREEAF *VNFGVVIAL*VD**LS

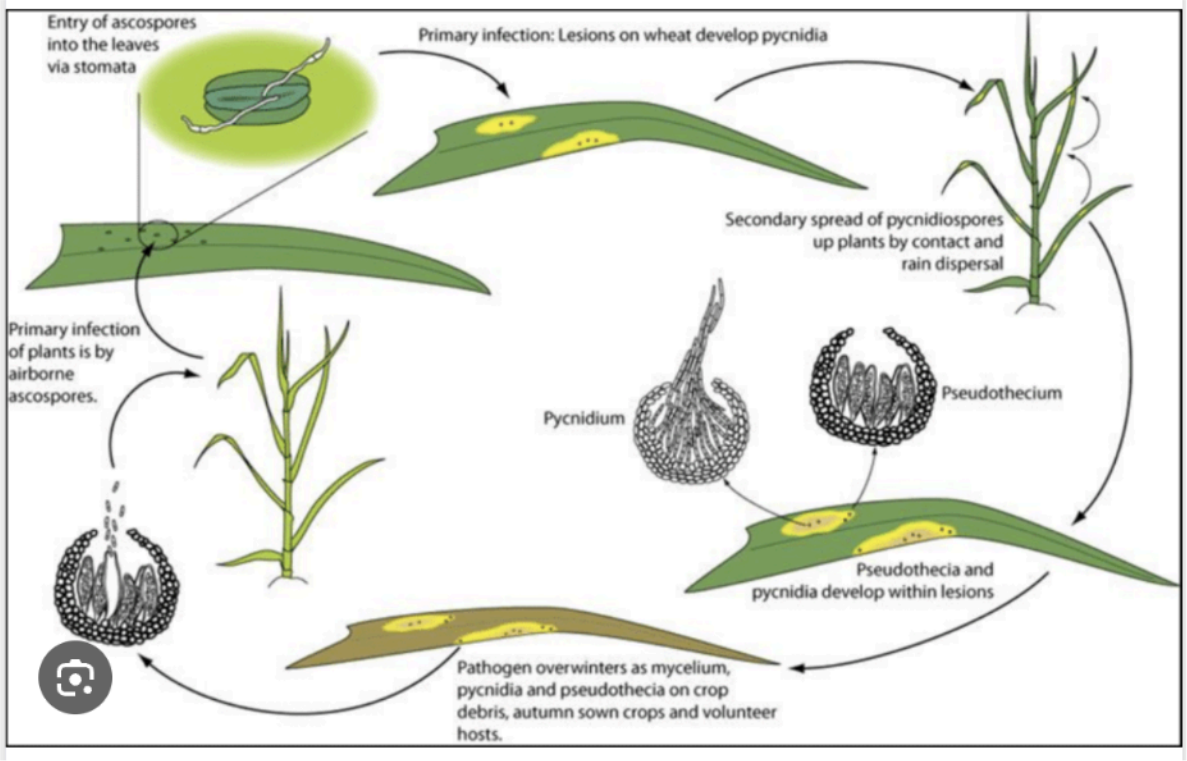
AW180074.1_5 MgA0137f MgA Library Zymoseptoria tritici cDNA clone MgA0137 5', mRNA sequence SRTPCGEMR*VHDFVENSSSSSGVLYRLLVACFSARRGIRWLGWSCV*RREEASGDASMM VAQLRGS*AS*LVESRSRRHPGCIVHFAVHDPAQRNWGLMTDRLRQTRSSGCRRWFVC*Q PKERTQRWFP*HPLKV**HLSCGRKVFSPSCADERRSFLFGCQSVT*ERLRQPEHAQLPA GEFRRSDCPVS*LIIVX

AW180074.1_6 MgA0137f MgA Library Zymoseptoria tritici cDNA clone MgA0137 5', mRNA sequence ENAVRRDALSS*LRREFFFFVGGLVSAARGVLQCSSWYTVVGLVLCLTP*GSEW*RFNDG CSTTRFVGFLAC*VAFAAASRLYRTLCSARSSSAKLGSDDGSAAADAIEWVSKVVCLLAA QGTHPALVSIASIEGVMTPELRPESLLALLRR*EKKLSLWLPVGDLRALAPTRARSASCR* ISA**LPCELTDNCR

Name: MgA0137f MgA Library Zymoseptoria tritici cDNA clone MgA0137 5', mRNA sequence

Species Derived from: Zymoseptoria tritici : this is a pathogenic fungus that attacks wheat plants. It is resistant to multiple fungicides, and causes septoria leaf blotch.

```
knitr::include_graphics("zymoseptoria tritici.png")
```

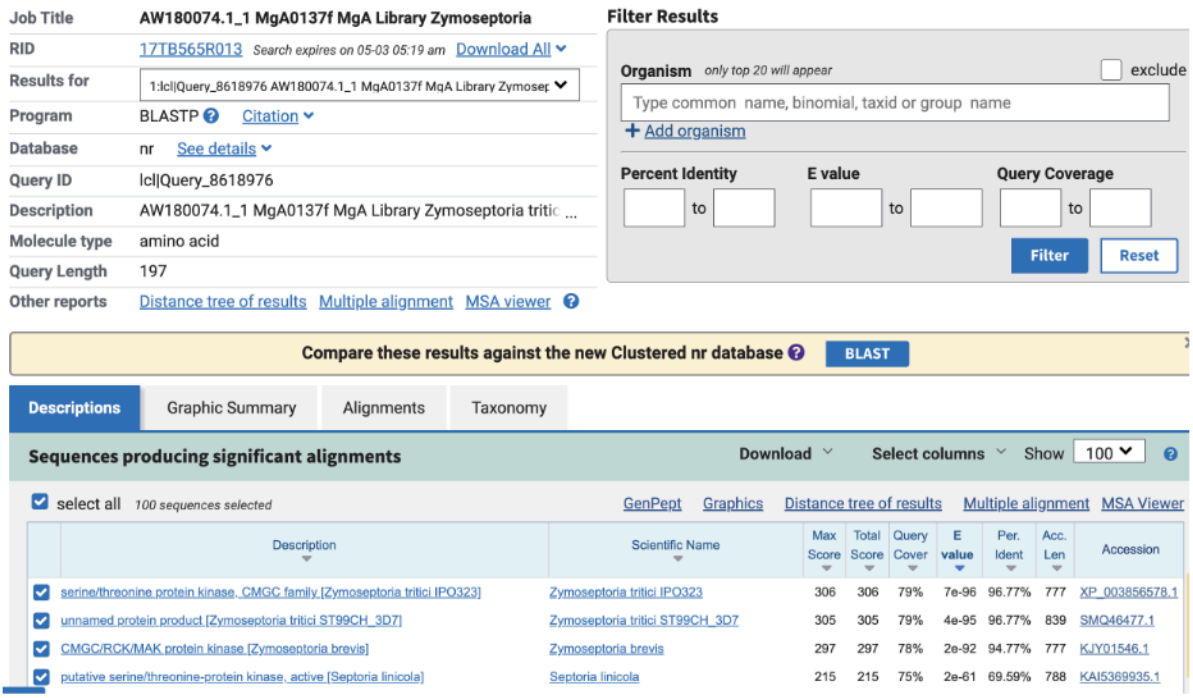


Question 4

To determine if my protein is novel, I used the "blastp" tool and NCBI's nr database and ran the above FASTA format sequence through it.

My results were as followed:

```
knitr::include_graphics("novel protein blast results.png")
```



There is no match with 100% identity!