

  **Nucleotide**

PubMed Nucleotide Protein Genome Structure PMC Taxonomy OMIM

Search for

Show:

☐ **1:** NC_005044. Capra hircus mito...[gi:33285125]

[Links](#)

LOCUS NC_005044 16640 bp DNA circular MAM 29-JUL-2003
DEFINITION Capra hircus mitochondrion, complete genome.
ACCESSION NC_005044
VERSION NC_005044.1 GI:33285125
KEYWORDS .
SOURCE mitochondrion Capra hircus (goat)
ORGANISM [Capra hircus](#)
Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Euteleostomi;
Mammalia; Eutheria; Cetartiodactyla; Ruminantia; Pecora; Bovoidea;
Bovidae; Caprinae; Capra.
REFERENCE 1 (bases 1 to 16640)
AUTHORS Feligini,M. and Parma,P.
TITLE The complete nucleotide sequence of goat (capra hircus)
mitochondrial genome
JOURNAL DNA Seq. 14 (3), 199-203 (2003)
REFERENCE 2 (bases 1 to 16640)
AUTHORS Feligini,M. and Parma,P.
TITLE Direct Submission
JOURNAL Submitted (29-JUL-2002) Lea- Laboratorio Epigenomica Applicata,
Istituto Spallanzani, Lodi, Italy
COMMENT REVIEWED [REFSEQ](#): This record has been curated by NCBI staff. The
reference sequence was derived from [AF533441](#).
FEATURES Location/Qualifiers
source 1..16640
/organism="Capra hircus"
/organelle="mitochondrion"
/mol_type="genomic DNA"
/db_xref="taxon:9925"
/tissue_type="blood"
[tRNA](#) 1..68
/product="tRNA-Phe"
[rRNA](#) 69..639
/product="12S ribosomal RNA"
[tRNA](#) 1025..1091
/product="tRNA-Val"
[rRNA](#) 1092..2663
/product="16S ribosomal RNA"
[tRNA](#) 2664..2738
/product="tRNA-Leu"
/note="codons recognized: UUR"
[gene](#) 2741..3697
/gene="ND1"
[CDS](#) 2741..3697
/gene="ND1"
/codon_start=1
/transl_table=2
/product="NADH dehydrogenase subunit 1"
/protein_id="[NP_877403.1](#)"
/db_xref="GI:33285126"
/translation="MFMINILTFIIPILLAVAFLTLVERKVLGYMQLRKGPNNVGPYG
LLQPIADAIAIKLFIKEPLRPATSSISMFILAPILALTALTMWIPLMPYPLINMNLGV
LFMLAMSSLAVYSILWSGWASNSKYALIGALRAVAQTISYEVTLAIILLSILLMNGSF

RLSTLIITQEQVWLIFPAWPLAMMWFISTLAETNRAFPDLTEGESELVSGFNVEYAGG
PFALFFMAEYAYIIMMNIFTTTLFLGAFHSPYMPELYTINFIKSLLLTITFLWIRAS
YPRFRYDQLMHLLWKNFLPLTLALCMWHVSLPILSSIPPQT"

[tRNA](#) 3697..3765
/product="tRNA-Ile"

[tRNA](#) complement (3763..3834)
/product="tRNA-Gln"

[tRNA](#) 3837..3905
/product="tRNA-Met"

[gene](#) 3906..4949
/gene="ND2"

[CDS](#) 3906..4949
/gene="ND2"
/note="putative"
/codon_start=1
/transl_table=2
/product="NADH dehydrogenase subunit 2"
/protein_id="NP_877404.1"
/db_xref="GI:33285127"
/translation="MNPIIFIIILMTVMLGTTIVMISSHWLRIWIGFEMNMLAIIPIM
MKKHNPRTAASSDYFLTQSTASMLLMMAIIINLMFSGQWTVTKLFHPTASMLMTMAL
AMKLGMAPFHFVPEVTQGIPLSSGLILLTWQKLVPM SVLYQILPSINLDLILTLSIL
SIMIGGWGGLNQTQLRKIMAYSSIAHMGWMTAILPYNPTMMLNLIIYITMTSTMFL
FMANSTTTLSLSLTWNKMPIMTTLVLITLLSMGGLPPLSGFVPKWMIIQEMTKNNSI
ILPTLMAITALLNLYFYMRLTYSTTLTMFPSTNNMKMKWQFSTTKRMTLLPTLTVLST
MLLPLTPILSILE"

[tRNA](#) 4948..5014
/product="tRNA-Trp"

[tRNA](#) complement (5016..5084)
/product="tRNA-Ala"

[tRNA](#) complement (5086..5158)
/product="tRNA-Asn"

[rep_origin](#) 5161..5196
/note="origin of L-strand replication"

[tRNA](#) complement (5191..5258)
/product="tRNA-Cys"

[tRNA](#) complement (5259..5326)
/product="tRNA-Tyr"

[gene](#) 5328..6872
/gene="COX1"

[CDS](#) 5328..6872
/gene="COX1"
/codon_start=1
/transl_table=2
/product="cytochrome c oxidase subunit I"
/protein_id="NP_877405.1"
/db_xref="GI:33285128"
/translation="MFINRWLFSTNHKDIGTLYLLFGAWAGMVG TALSLLIRAE LGQP
GTLLGDDQIYNVIVTAHAFVMIFFMVMPIMIGGFGNWL VPLMIGAPDMAFPRMNNMSF
WLLPPSFLLLLASSMVEAGAGTGWTVYPPLAGNLAHAGASVDLTIFSLHLAGISSILG
AINFITTIINMKPPAMSQYQTPLFVWSVLITAVLLLLSLP VLAAGITMLLTDRNLNTT
FFDPAGGGDPILYQHLFWFFGHPEVYIILPGFGMISHIVTYYS GKKEPFGYMGMVWA
MMSIGFLGFIVWAHHMFTVGMDDVDTRAYFTSTTMI IAIPTGVKVFWSLATLHGGNIKW
SPAMMWALGFIFLFTVGGLTGIVLANSSLDIVLHDTYYVVAHFHYVLSMGAVFAIMGG
FVHWFP LFSGYTLNDTWAKIHF AIMEFVGVMNTFFPQHFLGLSGMPRRYSDYPDAYTMW
NTISSMGSFISLTAVMLMIFIWEAFASKREVLTVDLT TTNLEWLNGCPPPYHTFEEP
TYVSLK"

[tRNA](#) complement (6870..6938)
/product="tRNA-Ser"
/note="codons recognized: UCN"

[tRNA](#) 6946..7013
/product="tRNA-Asp"

[gene](#) 7015..7698
/gene="COX2"

[CDS](#) 7015..7698
/gene="COX2"
/codon_start=1
/transl_table=[2](#)
/product="cytochrome c oxidase subunit II"
/protein_id="[NP_877406.1](#)"
/db_xref="GI:33285129"
/translation="MAYPMQLGFQDATSPIMEELLHFHDHTLMIVFLISSLVLYIISL
MLTTKLTHSTMDAQEVETVWTLPAIILIMIALPSLRILYMMDEINNPSLTVKTMGH
QWYWSYEYTDYEDLSFDSYMIPTSELKPGELRLLEVVDNRVVLPMEMTIRMLISSEDL
HSWAVPSLGLKTDALPGRLNQTTLMSTRPGLFYGCSEICGSNHSFMPIVLELVPLKY
FEKWSASML"

[tRNA](#) 7702..7768
/product="tRNA-Lys"

[gene](#) 7770..7967
/gene="ATP8"

[CDS](#) 7770..7967
/gene="ATP8"
/note="putative"
/codon_start=1
/transl_table=[2](#)
/product="ATP synthase F0 subunit 8"
/protein_id="[NP_877407.1](#)"
/db_xref="GI:33285130"
/translation="MPQLDTSTWLTTLTILSMFLALFIIIFQLKISKYDFYHNPELTAKML
KHNTPWETKWTKIYLP LLLPL"

[gene](#) 7928..8608
/gene="ATP6"

[CDS](#) 7928..8608
/gene="ATP6"
/codon_start=1
/transl_table=[2](#)
/product="ATP synthase F0 subunit 6"
/protein_id="[NP_877408.1](#)"
/db_xref="GI:33285131"
/translation="MNENLFTSFITPMMGLPLVTLIILFPSLLFPSSNRLINNRLVS
LQQWALQLMSKQMSIHNKGTWTLMLMSLILFIGSTNLLGLLPHSFTPTTQLSMNL
GMAIPLWAGAVITGFRNKTKASLAHFYPQGTPTPLIPLMLV IETISLFIQPMALAVRL
TANITAGHLLIHLIGGATLALTSISPTTALITFIILILLTILEFELGTREAYVFTLLV
SLYLHDNT"

[gene](#) 8608..9390
/gene="COX3"

[CDS](#) 8608..9388
/gene="COX3"
/note="TAA stop codon is completed by the addition of 3' A
residues to the mRNA"
/codon_start=1
/transl_except=(pos:9388,aa:TERM)
/transl_table=[2](#)
/product="cytochrome c oxidase subunit III"
/protein_id="[NP_877409.1](#)"
/db_xref="GI:33285132"
/translation="MTHQTHAYHVMNPSWPPLTGALSALLTSGLIMWFHFNSTALLT
LGLTTNMLTMYQWWRDVIRESTFQGHHTPAVQKGLRYGMILFIISEVLFFTGFVWAFY
HSSLAPTPELGGCWPPGTGIHPLNPLEVPLLNSTVLLASGVSIWAHHSLEMEGDRNHML
QALFITIMLGLYFTLLQASEYYEAPFTISDGVYGSTFFVATGFHGLHVIIGSTFLIVC
FFRQLKFHFTSNHHFGFEAAAWYWHFVDVWVWFLYVSIYWWG"

[tRNA](#) 9392..9460
/product="tRNA-Gly"

[gene](#) 9461..9806
/gene="ND3"

[CDS](#) 9461..9806
/gene="ND3"
/note="TAA stop codon is completed by the addition of 3' A

residues to the mRNA"
/codon_start=1
/transl_except=(pos:9806,aa:TERM)
/transl_table=2
/product="NADH dehydrogenase subunit 3"
/protein_id="[NP_877410.1](#)"
/db_xref="GI:33285133"
/translation="MNLMITLLTNFTLATLLVTIAFWLPQLNVYSEKTSPEYECGFDP
GSARLPFSMKFFLVAITFLLFDLEIALLLPLPWASQTTNLTMLTMAALLIFLLAVSL
AYEWTQKGLEWTE"
[tRNA](#) 9808..9876
/product="tRNA-Arg"
[gene](#) 9877..10173
/gene="ND4L"
[CDS](#) 9877..10173
/gene="ND4L"
/note="putative"
/codon_start=1
/transl_table=2
/product="NADH dehydrogenase subunit 4L"
/protein_id="[NP_877411.1](#)"
/db_xref="GI:33285134"
/translation="MSLVYMNIMTAFVAVSLTGLLMYRSHLMSSLLCLEGMMLSLFIMA
TLMILNSHFTLASMMPIILLVFAACEAALGLSLLVMVSNTYGTDYVQNLNLLQC"
[gene](#) 10167..11544
/gene="ND4"
[CDS](#) 10167..11544
/gene="ND4"
/note="TAA stop codon is completed by the addition of 3' A
residues to the mRNA"
/codon_start=1
/transl_except=(pos:11544,aa:TERM)
/transl_table=2
/product="NADH dehydrogenase subunit 4"
/protein_id="[NP_877412.1](#)"
/db_xref="GI:33285135"
/translation="MLKYIIPMTMMLPLTWLSKNNMIWINSTLHSLLLISFTSLLL
MNQFGDNSLNFSLTFFSDSLSTPLLLITMWLLPLMLMASQHHLLKESPTRKKLFISMLVLL
QLFLIMTFTATELIFFYIMFEATLVPTLIIITRWGNQTERLNAGLYFLFYTLTGSLPL
LVALTHIQNTVGSLNFLILQYWAQVPVNSWSNVFLWLACMMAFVMKPLYGLHLWLPK
AHVEAPIAGSMVLAAIILLKLGYGMMRITLLLNPI TDYMAYPFIMLSLWGMIMTSSIC
LRQTDLKSLIAYSSVSHMALVIVAILIQTPWSYMGATALMIAHGLTSSMLFCLANSNY
ERIHRTMILARGLQTLPLMAAWWLLASLTNLALPPTINLIGELFVVMSTFSWSNIT
IILMGLNMVITALYSLYMLITTQRGKHTHHINNILPSTRENALMSLHMLPLLLLSLN
PKIILGPLY"
[tRNA](#) 11545..11614
/product="tRNA-His"
[tRNA](#) 11615..11674
/product="tRNA-Ser"
/note="codons recognized: AGY"
[tRNA](#) 11676..11745
/product="tRNA-Leu"
/note="codons recognized: CUN"
[gene](#) 11746..13566
/gene="ND5"
[CDS](#) 11746..13566
/gene="ND5"
/note="putative"
/codon_start=1
/transl_table=2
/product="NADH dehydrogenase subunit 5"
/protein_id="[NP_877413.1](#)"
/db_xref="GI:33285136"
/translation="MNLFSSSLALTTLTLLTAPIMMTNLNIYKSTNYPLYVKTVVSCAF

ITSMVPTMMFIYTGQEMVISNWHWLSIQTLKLSLSFKMDYFSMMFVPVALFVTWSIME
FSMWYMHSDPNINQFFKYLLLFLLITMLILVTANNLFQLFIGWEGVGMMSLLIGWYWG
RADANTAALQAILYNRTGDIGFILAMAWFLVNLNTWDLQQIFMLKPDNSNLPLMGLVL
AATGKSAQFGLHPWLPSAMEGPTPVASALHSSSTMVAGIFLLIRFYPLTENNKFAQSI
MLCLGAVTTTLFTAMCALTQNDIKKIVAFSTSSQLGLMMVTIGINQPYLAFLHICTHAF
FKAMSFMCSSSIHSLNDEQDIRKMGGFLKAMPFTTTALIIGSLALTGMPFLTGFYSK
DLIIESANTSYTNAWALLMTLITTSFTAIYSTCIIFFALLGQPRFPTLITINENNPFLL
INSIKPLLLIGSLFTGFIISNNIPPMTIPQMTMPHYLKMTALAVTILGFILALEISNMT
HNLKFNHPSNMFKFSNLLGYYPTIMHRLMPYMNLTMSQKSASSLLDLIWLETILPKTI
SLTQMKMSTTITSQKGLIKLYFLSFLVTILVSTILFNFHE"
[gene](#) complement (13550..14077)
/gene="ND6"
[CDS](#) complement (13550..14077)
/gene="ND6"
/note="putative"
/codon_start=1
/transl_table=2
/product="NADH dehydrogenase subunit 6"
/protein_id="[NP_877414.1](#)"
/db_xref="GI:33285137"
/translation="MMYIVFILSVIFVMGVGFSSKPSPIYGGGLGLIVSGGVGCGIV
LNFGGSFLGLMVFLIYLGGMMVVFGYTTAMATEQYPEIWVSNKVVLGAFITGLLMEFL
MVYYVLKDKEVEIVFKFNGMGDWVIYDTGDSGFFSEEAMGIAALYSYGTWLVIVTGWS
LLIGVVVIMEITRGN"
[tRNA](#) complement (13778..14146)
/product="tRNA-Glu"
[gene](#) 14151..15290
/gene="CYTB"
[CDS](#) 14151..15290
/gene="CYTB"
/codon_start=1
/transl_table=2
/product="cytochrome b"
/protein_id="[NP_877415.1](#)"
/db_xref="GI:33285138"
/translation="MTNIRKTHPLMKIVNNAFIDLPTSPNISWWNFGSLLGICLILQ
ILTGLFLAMHYTSDTMTAFSSVTHICRDVNYGWIIRYMHANGASMFFICLFMHIGRGL
YYGSYTFLETWNIGVILLLATMATAFMGYVLPWGQMSFWGATVITNLLSAIPYIGTNL
VEWIWGGFSVDKATLTRFFAFHFILPFIITALAMVHLLFLHETGSNNPTGIPSDTDKI
PFHPYYTIKDILGAMLLILVLMMLLVLPDLLGDPDNYIPANPLNTPPHIKPEWYFLF
AYAILRSIPNKLGGVLALVLSILILVLVPFLHTSKQRSMMFRPISQCMFWILVADLLT
LTWIGGQPVHEPHYIIIGQLASIMYFLIILVMMPAASTIGNNLLKW"
[tRNA](#) 15294..15363
/product="tRNA-Thr"
[tRNA](#) complement (15363..15428)
/product="tRNA-Pro"
[D-loop](#) 15429..16640

BASE COUNT 5569 a 4313 c 2189 g 4569 t

ORIGIN

```
1 gttgatgtag cttaaactta aagcaaggca ctgaaaatgc ctagatgagt gtaccaactc
61 cataaacaca taggtttggt cccagccttc ctgttaactc tcaacagact tacacatgca
121 agcatccacg ccccggtgag taacgccctc caaatcaata agactaagag gagcaggtat
181 caagcacaca tctcgtagct tacaacgcct cgcttaacca caccctacg ggagacagca
241 gtgacaaaaa ttaagccata aacgaaagtt tgactaagcc atgttgacca ggggtgtaa
301 atctcgtgcc agccaccgag gtcatacgat taaccaagc taacaggaat acggcgtaaa
361 acgtgttaaa gcactacatc aaatagagtt aaatttcta taaactgtaa aaagccataa
421 ttacaacaaa aatagatgac gaaagtaacc ctactgcagc tgatacacta tagctaagac
481 caaaactggg attagatacc ccactatgct tagccctaaa cacaaataat tacagaaaca
541 aaattattcg ccagagtact accggcaaca gcccgaact caaaggactt ggcggtgctt
601 tatacccttc tagaggagcc tgttctataa tcgataaacc ccgataaacc tcaccaatcc
661 ttgctaatac agtctatata ccgccatctt cagcaaacc taaaaaggaa caaaagtaag
721 ctcaatcaca acacataaag acgttaggtc aaggtgtaac ccatggaatg ggaagaaatg
781 ggctacattt tctaccttaa gaaaattaat acgaaagcca ttatgaaatt aatgaccaa
841 ggaggattta gtagtaaaact aagaatagag tgcttagttg aattaggcca tgaagcacgc
```

```
901 acacacccgcc cgtcacccctc ctcaagtaaa tacaatgcac tcaagcctat taacacgcat
961 caactacatg agaggagata agtcgtaaca aggttaagcat actggaaagt gtgcttggat
1021 aaatcaagat atagcttaac caaagcacct agtttacacc tagaagattt cacatattat
1081 gaatatcttg aactatatct agcccaatcc cccccccat ctaaattacc aaaacagtct
1141 aaaacaaaac atttacccca attaaagtat aggagataga aatttttaaat atggcgctat
1201 agagaaagta ccgtaaggga atgatgaaag aaaaagaatt aaagtacaaa aaagcaaaga
1261 ttaacccttg taccttttgc ataataaatt aacgagcaaa aaacttaaca aaacgaattt
1321 tagctaagta acccgaaacc agacgagcta ctcatgggca gtttatcaga accaactcat
1381 ctatgtggca aaatagttag aagaccata agtagaggtg acatgcctaa cgagcctggt
1441 gatagctggt tgtccagaaa atgaatttta gttcagcttt aaagatacca aaaatataaa
1501 taaattttac tgtattttta aaagtttagtc taaaaagggt cagcctttta gaaatggata
1561 caaccttcac tagagagtaa gactttacaa caccatagta ggcctaaaag cagccatcaa
1621 ttaagaaagc gttaaagctc aacaataaaa ataaaattaa tcccaacaat agtacaacta
1681 actcctagac ctaatactgg accactctat tattaataat aagcaataat gttaatatga
1741 gtaacaagaa atattttctc cctgcacaag tttaagttag tatctgataa tattctgact
1801 gtttaacagta aataaaaaca acctaacgat aaataattta ttaattatac tgtaaccca
1861 acacaggagt gcaccagga aagattaaaa gaagtaaaag gaactcggca aacacaaacc
1921 ccgcctgttt accaaaaaca tcacctccag catttccagt attggaggca ctgcctgccc
1981 agtgactaaa cggttaaacgg ccgcggtatt ctgaccgtgc aaaggtagca taatcatttg
2041 ttctctaaat aaggacttgt atgaacggcc acacgagggt ttactgtct cttacttcca
2101 atcagtgaat ttgacctccc cgtgaaggag cgggaatgaa ttaacaagac gagaagacc
2161 tatggagctt taactaacta gtccaaaaga aataaattta accaccaagg gataacaaca
2221 tcctttatgg actagcagtt ttggttgggg tgacctcgga gaacaagaga tcctccgagc
2281 gatttttaag actagactta caagtcaaat caaattatcg cttattgatc caaaaaactt
2341 gatcaacgga acaagttacc ctagggataa cagcgcaatc ctattcaaga gtccatatcg
2401 acaatagggg ttacgacctc gatgttggat caggacatcc tgatggtgca accgctatca
2461 aagggttcgtt tgttcaacga ttaaagtcct acgtgatctg agttcagacc ggagcaatcc
2521 aggtcgggtt ctatctgtta tgtatttctc ccagtacgaa aggacaagag aaataaggcc
2581 aacttcaaca aagcgcctta aaccaattaa tgacctatc tcaattaatt ttacaaacaa
2641 aacctgccct agaaaagggc ctagttaagg tggcagagcc cggtaattgc gtaaaaacta
2701 aacctttata ctacagagatt caaatcctct ccttaacaat atgtttataa ttaatattct
2761 aacattcatt attcccattc ttctagccgt agctttcctt acactagtgt aacgaaaagt
2821 ctaggctac atacagctcc gaaaaggccc aaacgctcgt ggaccatacg gcttacttca
2881 accaatcgct gatgcaatta aacttttcat taaagaaccc ttacgacctg ccacatcctc
2941 aatctcaata ttatttctag cccccatttt agctctgacc ctagccttaa ccatatgaat
3001 tcccctaccc ataccctacc cctcatttaa cataaattta ggagtcctct tcatattagc
3061 tcatcaagc ttagccgtat actcaattct ctgatcaggc tgagcttcca actcaaaata
3121 tgctctcatt ggagccttac gagcattagc acaacaatt tcatatgaag taacactagc
3181 aattatocct ctgtcaatct tactaataaa cggatccttt cgcctctcta cactaattat
3241 tacacaggaa caagtatgac taatcttccc agcatgacct ctagcaataa tgtgattcat
3301 ctcaacacta gcagaaacaa accgagcacc atttgacctg accgaaggag aatccgaact
3361 agtatcaggc ttcaacgtag aatatgccgg cggaccattt gccctatttt tcatagcaga
3421 atatgcttat attattataa taaatatctt cacaacaact ctcttcctag gagcatttca
3481 cagcccctat ataccagaac tctacacaat taactttatt atcaaatac tcctacttac
3541 aatcactttc ctatgaatcc gagcatccta ccccgattc cgttacgacc aactaataca
3601 cttattatga aaaaatttcc taccctaac actggcccta tgtatatgac acgtgtcact
3661 accattctc ctatcaagca tccccccaca aacataagaa atatgtctga caaaagagtt
3721 actttgatag agtaaataat agagggtttaa atcctcttat ttctagaatt ataggaattg
3781 aacctactcc taagaaccca aaactcttcg tgctcccaat tacaccaaat tctaatagta
3841 aggtcagcta attaagctat cgggcccata ccccgaaaat gttggtttat atccttcccg
3901 tactaataaa tccaatcatt ttattatta ttctaataac cgttatactt ggaaccacaa
3961 tcgtcataat tagctcccac tgactacgca tctgaatcgg atttgaaata aacatactcg
4021 ccattatccc cattataata aaaaaacata acccacgagc cacagcagca tcaagcgact
4081 attttcttac tcaatcaaca gcctcaatat tactaataat agctattatt attaatttaa
4141 tattctcagg ccaatgaact gtgacaaaac tatttcaccc aacagcctcc taactcataa
4201 caatagccct cgctataaaa ctaggaatag ctccattcca cttctgagtc ccagaagtaa
4261 cacaaggtag cccctatccc tcgggcctaa tcctactcac atgacaaaaa ctagtaccga
4321 tatctgtact ttaccaaata ctcccatcca tcaacctaga cttaatctta accctatcaa
4381 ttttatccat tataattgga ggctgaggag gactaaacca aacccaacta cgcaaaatca
4441 tagcctactc atcaattgcc cacataggtt gaataacagc aattttacca tacaacccca
4501 ccataatact attaaacctt attattttata ttaccatgac ctccactata tttttactat
4561 tcatagctaa ttcaaccaca accacctat cactatcact cacatgaaat aaaataccta
4621 tcataacaac ctagtcctc atcacctcc tatcaatagg aggactcccc ccactatcag
4681 gatttgtacc aaaatgaata attattcaag aaataacaaa aaataacagc attatcttac
```

4741	ccacccttat	agcaatcaca	gcactactaa	acctatatatt	ctacatacga	ctcacatatt
4801	ctaccacact	cacaatatct	cctccacaaa	acaatataaa	aatgaaatga	caattctcga
4861	ccacaaaacg	aataactctc	ctaccaacct	taaccgtact	atctacaata	ctcctaccac
4921	tcacaccaat	cctctcaatt	ctagaatagg	acttttaggt	aaatagacga	agagccttca
4981	aagccctaag	caagtataat	ttactttaatt	cctgataaag	actgcaagac	catactcttac
5041	atcaattgaa	tgcaaatcaa	ccactttaat	taagctaaat	ccttactaga	ctgggtgggct
5101	ccacccccac	gaaacttttag	ttaacagcta	aataccctag	ataactgggt	tcaatctact
5161	tctcccgccg	cgaagaaaaa	aaggcgggag	aagccccggc	agagtttgaa	gctgcttctt
5221	tgaatttgca	attcaatatg	ttaattcact	acaggacttg	gtaaaaaag	gaatcaaacc
5281	tctgtttcta	gatttacagt	ctattgcttt	gctcagccat	tttaccatg	ttcatcaacc
5341	gctgactatt	ttcaaccaac	cacaaagaca	tcggcaccct	ctaccttctg	ttcgggtgcct
5401	gagctggcat	agtagggacc	gccttgagct	tactaattcg	cgccgaacta	ggtcaacccg
5461	gaaccctact	tggagatgac	cagatctaca	atgtaattgt	aactgcacac	gcattcgtaa
5521	taatttttctt	tatagtaata	cctattatga	ttggaggggt	tggcaactga	ctagtcacctc
5581	taataattgg	agccccgat	atagcatttc	ctcggataaa	taatataagc	ttttgactcc
5641	ttccccctc	tttctatta	cttctagcat	cctctatagt	tgaagccgga	gcaggaacag
5701	gttgaaccgt	atatcctcct	ctagcaggta	atctagccca	tgcaggagcc	tcagtagacc
5761	taactatttt	ttccctacac	ctagcaggca	tctcttcaat	tctaggagcc	attaatttta
5821	tcacaactat	cattaacatg	aaaccacccg	caatatcaca	atatcaaact	cccctgtttg
5881	tgtgatctgt	cttaattact	gcctgactac	tcctcctttc	acttctgtga	ttagcagctg
5941	gcatacacaat	actactaaca	gaccgaaacc	taaacacaac	cttctttgac	ccagcaggag
6001	gaggagaccc	tattttatat	caacacctat	tctgattctt	tggacaccct	gaagtatata
6061	ttcttatttt	acctggattt	ggaataatct	ctcacatcgt	aacctactac	tcagggaaaa
6121	aagaaccatt	cgggtacata	ggaatagtgt	gagccataat	atcaatcggg	tttctaggat
6181	ttattgtatg	agcccaccat	atatttacag	tcggaataga	cgctcgataca	cgggcttact
6241	tcacatcaac	taccataatt	atcgctatcc	caactggagt	aaaagtcttc	agttgattag
6301	caacactcca	cggaggcaat	atcaaattgt	ccccgccat	gatatgagcc	ctaggcttca
6361	tcttcctttt	tacagtagga	ggcctaactg	gaattgtttt	agctaactca	tcccttgata
6421	ttgttctcca	cgacacatac	tatgtagtag	ctcatttcca	ctacgttcta	tcaataggag
6481	ctgtgttcgc	tatcataggg	ggatttgtac	actgatttcc	cctattttca	ggctacactc
6541	ttaatgatac	atgagccaaa	atccacttcg	caattatatt	tgtagggtgt	aacatgacct
6601	tcttcccaca	acatttccta	ggattatctg	gtataccacg	acgatactct	gattaccag
6661	acgcatatac	aatatgaaat	actatttcat	ctataggctc	attcatttca	ctaacagcag
6721	taataactaat	aatcttcatt	atctgagaag	catttgcac	caaacgagag	gtcctaactg
6781	tagacctaac	cacaacaaat	ctagagtgc	tgaacggatg	ccccccacca	taccacacat
6841	ttgaagaacc	cacatacggt	agcctaaaat	aagaaaaggaa	ggaatcgaa	cccctattat
6901	tgggtttcaag	ccaacaccat	aaccactatg	tctctctcaa	taaacgagat	gttagtaaaa
6961	tattacataa	tcttgtcaag	attaaattac	aggtgaaaat	cccgtacatc	tcatatggca
7021	tacccatac	aactagggtt	tcaagacgca	acatcaccca	ttatagaaga	actactacat
7081	tttcacgatac	acacactaat	aattgttttc	ctaattagct	cactgggtact	ttatattatt
7141	tcactaatat	taacaacaaa	actaaccac	accagcacca	tagacgcaca	agaagtagaa
7201	acggtctgaa	ccatcttacc	agccattatt	ttaattatga	ttgctctccc	atctttacga
7261	attctatata	taatagacga	gatcaacaac	ccatccctca	cagtaaaaac	tatgggacat
7321	caatgatact	gaagctatga	atatacagac	tatgaagact	taagcttcga	ttcctatata
7381	attccaacat	cagaattaaa	acctggagaa	ctacgactgc	tagaggtaga	taaccgagtt
7441	gtactaccca	tagaaatgac	aattcgaata	ttaatctctt	ccgaagacgt	tctacactca
7501	tgagcagttc	cctctctagg	attaaaaaca	gacgcaattc	caggtcgttt	aaatcaaaca
7561	acccttatgt	cgactcgtcc	aggtctattc	tacggccaat	gctcagaaat	ctgcggatca
7621	aaccatagtt	tcataccaat	cgttctcgag	ctagttccct	taaaaatatt	tgaaaaatga
7681	tctgcatcaa	tactataaag	tcatcaagaa	gctatgtagc	gttaaccttt	taagttaaag
7741	accgagagca	taatactctc	cttgatgata	tgccacaact	agacacatcg	acatgactta
7801	caacaatttt	atcaatatct	ctagctctct	ttattatctt	ccaactaaaa	atctcaaagt
7861	acgacttcta	ccacaaccca	gaattaacag	caaaaatact	aaagcataac	acccttgag
7921	aaacaaatg	aacgaaaatc	tatttacctc	ttttattacc	cctataatat	taggcctccc
7981	ccttggtacc	cttattattt	tatttctctag	cttactattt	ccctcatcaa	accgactaat
8041	taacaaccgc	ctcgtctctc	tccaacaatg	ggcacttcaa	ctcatatcaa	aacaataaat
8101	aagtattcat	aacaccaaag	gacaaacatg	aacattaata	ttaatgtccc	taatcctatt
8161	tattggatct	acaaacctat	taggccttct	acccactca	tttacaccaa	ctacacaact
8221	atcaataaat	ctaggcatgg	ctattccctt	atgagcaggg	gctgtaatta	caggttttcg
8281	caacaaaact	aaagcatcac	tcgcccattt	ctaccacaaa	ggaacaccca	ctccactaat
8341	cccaatgcta	gtaattattg	aaaccattag	cctctttatt	caaccaatag	ccctcgccgt
8401	acgactgaca	gccaacatca	cagcaggaca	cttactaatt	cacttaatcg	gagggggcac
8461	ccttgcacta	acaagcatca	gtcctacaac	agcactcatt	acattcatta	ttctaattct
8521	actaacaatt	ctcgaattcg	agctcggtag	ccgggaagcc	tacgtattta	ctctcctagt

```
8581 cagcctatac ctgcacgaca acacataatg acacaccaaa cccatgctta tcacatagta
8641 aatccaagcc cctgaccctt cacaggggca ctatccgctc tcctactaac atccggcctc
8701 atcatatgat ttcaacttcaa ctcaaccgcc ctactaaccg taggtctaac aacaaacatg
8761 cttacaatat accaatgatg acgagatgtg attcgagaaa gtaccttcca aggtcaccat
8821 actccagccg ttcaaaaagg ccttcgctat ggaataatcc tttttatcat ttccgaagtt
8881 ttattcttta ctgggttttt ctgagctttc tatcactcga gccttgcccc cacaccgaa
8941 ttaggcgggt gctgacctcc aacaggcatt caccactta atcccctaga agtcccatta
9001 cttaatactt ccgtccctct agcctcagga gtttccatca cctgagctca ccatagcctt
9061 atggaaggag accgtaacca catactacaa gccttattca ttaccattat actaggctta
9121 tacttcacat tattacaagc atcagaatat tatgaagcac cattcacaat ttcagacgga
9181 gtctacgggt caactttctt cgtagccaca ggattccacg gtcttcatgt tatcatcgga
9241 tctacctttt tgattgtctg ctttttccgt caactaaaat ttcacttcac ctctaatacat
9301 cacttcgggt tcgaagctgc tgcctgatac tgacactttg tagacgtagt atgacttttc
9361 ctctatgtat ccatctattg atgaggctca tgccttttta gtattaatca gtacaactga
9421 cttccaatca gttagtttcg gtacaatccg aaaaagaaca ataaacctca taattactct
9481 cctgactaat tttaactag ctacattact cgtaactatc gcattttgac tcccccaact
9541 aaacgtttac tcagaaaaaa caagcccata tgaatgcgga ttgacccca taggatcggc
9601 tcgccttccc ttctccataa aatttttctt agtagccatc acattttctc tttttgacct
9661 agaaattgca ctacttcttc cactaccatg agcctcaca acaactaatc taaacacact
9721 gcttaccata gcccttctcc taatttttct attagctgta agcctagcct acgaatgaac
9781 tcaaaaagga ctagagtga ctgaatatgg tatttagttt aaaataaaat aagtgatttc
9841 gactcattag attatgatta aactcataat taccaaatgt ccctcgtata cataaatatt
9901 ataacagcat tcgcagtatc tctcacagga ctattgatat atcgatctca cctaatatcc
9961 tccctcttat gcctagaagg aataatatta tctctattta tcatagccac cctaatagatc
10021 ctaaatccac acttcacctt agccagcata atacctatta tcttactagt tttcgcagcc
10081 tgcgaagcag cactaggcct gtccttacta gtaatggtat caaacacata tggtagcgat
10141 tacgtacaaa accttaactt attacaatgc taaaatacat tattcctaca ataatactta
10201 taccctaac ctgactatca aaaaataaca taatctgaat taactccaca cttcatagcc
10261 tactaattag cttcacaagc ctactcctta taaaccaatt cggcgataac agcctcaact
10321 tctcattaac cttcttctcc gactccctat ctactccact actaatccta actatatgac
10381 tccttccctt gatacttata gctagtcaac atcacctatt aaaagaaagt ccaaccgga
10441 aaaaactctt catctcaata ctagtcctat tgcaactgtt cctaattata acattcaccg
10501 ctacagaact aattttcttt tacattatat ttgaagcaac actagtcctt acactcatca
10561 tcatcactcg atgaggaaac caaacagagc gtctaaacgc cggcctctac ttcttgtttt
10621 ataccctaac aggatctcta cccctactag tcgcactaac tcacattcaa aacacagtag
10681 gatccctaaa cttcctaata cttcaatact gagcacaacc agtaccacac tctgatcca
10741 atgttttctt atgattagca tgcataatag ctttcatagt aaaaatacca ttatatggac
10801 tccacctttg actacctaaa gcccacgtag aagccccaat cgcaggctct atagtccttg
10861 cagcaatcct actaaaacta ggaggatatg gcatgatacg aatcacacta ctccttaatc
10921 caatcaccca ctatatagca tatccattta ttatactatc attatgaggc ataattataa
10981 ccagctcaat ttgtctccgt caaacggacc tgaaatcact catcgcatat tcttccgtca
11041 gtcatatagc gctcgttata gtcgccatcc ttatccagac accctgaagc tacataggag
11101 ccaactgcct aataattgcc catggcctta catcatctat acttttctgc ctagcaaatt
11161 ctaactatga gcgaatccac agccgtacaa taatttttagc ccgcggcctc caaacactcc
11221 ttocactaat ggctgcctga tgactcctag caagcctaac taatctggcc ctaccccaa
11281 caatcaacct aattggagaa ctattcgtag taatatcaac tttttcatga tctaactaca
11341 caattattct aataggactt aacatagtgga tcaccgccct atactccctc tacatactaa
11401 ttacaacgca acggggtaaa catacccata acatcaacaa catcttacct tctttcacac
11461 gagaaaatgc actcatatca cttcatatat taccactact acttctatcc ctaaacccaa
11521 aaattatcct agggccctta tactgtaaat atagttttaa aaaaacatta gattgtgaat
11581 ctaacaatag aagcctatca cttcttatt taccgaaaaa gtatgcaaga actgctaact
11641 ctatgcttcc atgtctaaca acatggcttt ttcaaaactt taaaggatgg tagttatcca
11701 ttggtcttag gagccaaaaa attggtgcaa ctccaaataa aagtaataaa cctgttttct
11761 tctcttgca taaccacctt aaccttatta accgcacca tcataataac caacctcaat
11821 atctacaat ccaccaacta cccactttat gtaaaaacgg tcgtttcatg tgcctttatc
11881 actagcatag tccccacaat aatattcatt tatcacggac aagaaatagt catttcaaac
11941 tgacactgac tatctatcca aaccttaaaa ttatcgctca gttcaagat agactatttc
12001 tcaataatat ttgtcccagt agcactattc gtcacatgat ccatcataga attctcaatg
12061 tgatatatac actcagaccc caacatcaac caatttttca agtacttact cctatttctc
12121 atcacaatac tcattctcgt cactgcaaat aacctctttc aactatttat cggctgagaa
12181 ggagtaggaa tgatatcatt attactaatc ggatggtggt atggacgagc agacgcaaac
12241 acagcagccc tacaagcgat tctgtataac cgcaccggcg acatcggatt catcctggca
12301 atagcatgat tcctagtcaa ccttaacact tgggaccttc aacaaatctt tatactaaaa
12361 ccagacaact caaatctacc cctaataaggc ttagtattag ccgcaaccgg aaaatccgca
```



```
12421 caattcggcc tacacccatg actgccctct gcaatagaag gcccaactcc cgtctcagca
12481 tcactccact caagtacaat agtagtagca ggcatttttc tactaattcg tttctaccca
12541 ctaacagaaa ataataaatt tgcccaatct attatattat gcctaggggc tgttaccaca
12601 ctattcacag caatatgtgc ccttacccaa aatgacatca aaaaaatcgt cgccttctcc
12661 acatccagcc aactcggcct tataatggta acaattggaa ttaaccaacc ctatttggca
12721 tttctccaca tctgcaccca cgccttcttc aaagccatat cattcatatg ctccagttct
12781 attatccaca gcctaaatga cgaacaagat attcgaaaaa taggaggcct attcaaagca
12841 ataccattta ccacaacagc cctcattatt ggcagtctcg cgctaacagg aatacccttc
12901 ctaccgggat tctattccaa agacctaat attgaatccg ccaacacatc atataccaac
12961 gcctgagccc tcttaataac actaatcact acctctttca cagccatcta cagcacctgt
13021 attatttttt tcgcactcct aggacaacc cgaattccaa ctcttattac tattaatgaa
13081 aacaacccat tcctaattaa ctcaatcaaa cccttattaa ttggaagcct tttcacagga
13141 tttatcattt ccaacaatat tcccccaata acaatccccc aaataactat accccactat
13201 ctaaaaaata ctgccctagc agtcacaatc ctaggcttta ttttagcgct agagattagc
13261 aacataaccc ataacctaaa atttaaccac ccatcaaaac tattcaaatt ctctaattta
13321 ttaggatatt atcccacaat tatacaccgc ttaatgccct acataaacct aacaataagc
13381 caaaaatcag catcctccct cctagatcta atctgactag aaaccatttt accaaagacc
13441 atttactaaa cccaaataaa aatatctacc acaattacaa gccaaaaagg cctaattaaa
13501 ttatttttcc tctccttctc agtcacaatc ctgctcagca caattttatt taattttcac
13561 gagtaatctc tataattact acaacaccaa ttaataaaga tcaaccagta acaataacca
13621 atcaagtacc ataactgtat aaagcagcaa tccctatagc ttcttcacta aaaaaccag
13681 aatccctgtg atcataaata acccaatccc ctataccatt aaattttaaat acaatctcca
13741 cctccttata cttcaatacg taatagacta taagaaactc cattaacaaa ccagtaataa
13801 atgcccctaa aacaacctta ttagagactc aaatctcagg atattgctca gtagccatag
13861 ccgttgtata accaaaaaac accattatac cccccaaaata aattaaaaaa accattaaac
13921 ctaaaaaaga cccacaaaaa ttcaacacaa taccacatcc caccaccaca ctcacatta
13981 accctaacc cccataaata ggogaagggt ttgaagaaaa cccacaaaaa cctattacaa
14041 agataacgct taaaataaat acaatatata ttatcattat tctcacatgg aatctaacca
14101 tgaccaatga tatgaaaaac catcgttgtt attcaactac aagaacacta atgaccaaca
14161 tccgaagac ccacccatta ataaaaattg taaacaacgc atttattgac ctcccaaccc
14221 catcaaacat ctcatcatga tgaaactttg gatccctcct aggaatttgc ctaatcttac
14281 aaatcctgac aggcctattc ctagcaatac actatacatc cgacacaata acagcatttt
14341 cctctgtaac tcacatttgt cgagatgtaa attatggctg aatcatccga tacatacacg
14401 caaacggagc atcaatatcc tttatctgcc tattcataca tatcggaaga ggtctatatt
14461 atggatcata tacctttcta gaaacatgaa acattggagt aatcctcctg ctgcgaacaa
14521 tggccacagc attcataggc tatgtttttc catgaggaca aatatcattt tgaggggcaa
14581 cagtcacac taatcttctt tcagcaatcc catatatggg cacaaaccta gtcgaatgaa
14641 tctgaggggg gttctcagta gacaaagcca ctctcacccg attcttcgcc ttccacttta
14701 tcttcccatt catcatcaca gccctcgcca tagtccacct gctcttcctc cacgaaacag
14761 gatcgaacaa cccacacagga attccatcag acacagataa aatcccattt cacccttact
14821 acaccattaa agatatctta ggcgccatgc tactaattct tgttctaata ttactagtac
14881 tattcacacc cgacctactc ggagaccag acaactatat cccagcaaata ccactcaata
14941 caccacctca cattaaacct gagtggtatt tcctatttgc atacgcaatc ctacgatcaa
15001 tccccacaa actaggagga gtcctagccc tagtctctc aatcctaata ttagtacttg
15061 tacccttctt ccacacatct aaacaacgaa gcataatatt ccgccaatc agccaatgca
15121 tattctgaat cctggtagca gatctattaa cactcacatg aattggagga cagccagtcg
15181 aacatcccta cattattatt ggacaactag catctattat atatttcctc atcattctag
15241 taataatacc agcagctagc accattggaa acaaccttct aaaatgaaga caagtctttg
15301 tagtacaatc aatacactgg tcttgtaaac cagaaaagga gaatagccaa tctccctaag
15361 actcaaggaa gaagccatag cctcactatc agcacccaaa gctgaaattc tatttaaact
15421 attccctgaa ccactattaa ccacatctat taatataccc ccaaaaatat taagagcctc
15481 ccagtgatta aatttactaa aaatttcaaa tatacaacac aaacttccca ctccacaagc
15541 ctacagacat gccacaacac cacacgtata aaaacatccc aatcctaacc caacttagat
15601 acccacaaa acgccaacac cacacaatat tacgtgtatg caagtacatt acaccgctcg
15661 cctacacaca aatacattta ctacaatcca taaacgcgg acatacagcc ttcatatagt
15721 ttactgtata tctaccctac acatatgcag tactaatcca gcataaacgt aatgtatgta
15781 cattacattt tatgatctac ttcattgtgt cgtacataat attaatgtaa caaggacata
15841 gtatgtatat agtacattaa acgattttcc acatgcataat taaggacgta catcagtatt
15901 aatgtaataa ggacatagta tgtatattgt acattaaacg atcttctctc tgcataaag
15961 catgtataat atttctatcg gcagtacata gtacatttta ctgcatattc gtacatggca
16021 cataggggtc aatccattct tgccaacatg cgtatcccgt ccactagatc acgagcttgt
16081 tgaccatgcc gcgtgaaacc agcaaccgcg ttggcaggga tccctcttct cgctccgggc
16141 ccattaaccg tgggggtcgc tatttaaatga actttatcag acatctggtt ctttcttcag
16201 ggccatctca cctaaaatcg cccactcttc cctcttaaatt aagacatctc gatggactaa
```

```
16261 tgactaatca gcccatgctc acacataact gtgctgtcat acatttggtta ttttttaatt
16321 ttcggggatg cttggactca gctatggccg tctgaggccc cgaccggag cataaattgt
16381 agctggactt aactgcatct tgagcatccc cataatggta ggcatgggca ttacagttaa
16441 tggtcacagg acataatttat tatgttgcac ttcacatgc atccgctcca cctttcccc
16501 cctccttctt agatatatac caccgtttta aacacgctcc ctccatagata ttagtgcaaa
16561 atttttctac ttccaatact caaatcttta ctccagccaa ggtaaataata taagtgcctg
16621 ggtctttttac atggtaagtg
```

//

[Disclaimer](#) | [Write to the Help Desk](#)
[NCBI](#) | [NLM](#) | [NIH](#)

Aug 6 2003 13:17:41