**Supplementary File 1. Amino acid sequences of Hsp104 homologs.**

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| **Species** |  |
| *Galdieria sulphuraria* | MNLDNLTDKAQEAIQASHELALENGHSQLTPLHLAAALFTEDHGLASSVATKAKADPVNVRRELQKAVIRLPSQDPPPTTVPPSQSFLKVIRDAQSLRKKQGDTHLAVDHLLIALCDDKDVIACFSSADLTKHALEEAVKSVRGNRKVDSKAADSTYDALNQYAQDFVALAEEGKLDPVIGRDDEIRRVIRVLCRRRKNNPVLIGDPGVGKTAIVEGLAQRIVRGDVPENLNCRLYALDMGALVAGAKYRGEFEERLKAVLREVKEGEGKIILFIDELHLVLGAGKSDGAMDAANLLKPMLARGELRCIGATTLEEYRKYVEKDAAFERRFQQVFVSEPSVPDTVSILRGLKERYEVHHGVRILDSALVAAAKLSARYITNRFLPDKAIDLVDEACANVRMQLDSQPEVIDTLEHRKLQLEIEIAALEKEKDEASRARLAAVKEELDNVNEKLRPLKARFESERGKMNELKDMMTKLDALKIKLADAERRRDTVQAADLRYYAIPEIEERIRSLKNEIDKEKETDAMETDEESGKLLSDVVGYEQIADVVSRWTGIPTTKLSQSDAERLLSLSASLHQRIIGQDEAVDAVAAAVLRSRAGVSRPTQPLGSFLFLGPTGVGKTELAKALAAELFDDEKHVVRIDCSEYMEQHSVSRLIGAPPGYVGYEEGGQLTEAVLRRPYNVVLFDEVEKAHRNVMNVLLQVLDDGRLTDNQGRTIDFTNTVIILTSNLGAQFLMNIGSKGPAELSEGSDHEGTPVVSIPKEATIDNRTREAVMREVKLHFRPEFLNRLDDIVIFKPLALDELRQIVRLQLDQVAKRLEERDITVSMDNRAADYILREAYDPSFGARPIRRYLEKHVATELSIRLIKGLLTNHSHVQVTRATEGSGLAFQVTPKKRSATDMGNGSVYNKQGIVEEPDEEDM |
| *Monosiga brevicollis* | MAINPNEFTDKVNKTLFEAQNFAIQEGHSQVEPAHVAVILFEDPEGMAKRVVQRAGAALQPVQAALRSLLQRMPRQEPAPLEASLSSDTRRLLQSAAKLQKKNNEAHLAVDHLLGALVQDKQILAKLAESGLAKNHFEETLKRVKGTTTADSKSAEENYDALSKYGVDLVQQAADGKLDPVLGRDEEIRRVIQILARRIKSNPCLVGPPGVGKSAIVEGLAQRIMLGDVPETLKGKLISLDMGALIAGAKYRGEFEERLKAVLEEIKQSEGRIILFVDEVHNVLGAGKTEGSMDAANLLKPLLARGELRMIGATTEDEYRKYVEKDSAFERRFQVVQVREPSVPDTVSILRGLKERYEAHHGVRIADAALVAAAQLSHRYIQGRFLPDKAIDLIDEACANARVQLDSRPEEIDQLERRRLQLQVEATALEKEKDQASKLRLKDVRKELANIEEQLQPLLMKFEMERGRVDELRDLQEKLDSLRSKAQRAERQGDLATAADLKYYAIPDCERRIQQLTLEDEERSAQRSGMDEQEDAPMLSEEVGPEQITDIIARWTGIPVTKLNQSQRERLLALAERIKSRVIGQDHAVDAVAEAVLRSRAGLSRPSQPTGSFLFLGTTGVGKTELAKALAAELFDDDKHIVRIDMSEYMESHAVSRLIGSPPGYVGYEQGGQLTEAVRRRPYNVVLFDEVEKAHPQVLNVLLQVLDDGVLTDGQGRHVDFTNTVIVLTSNIGAHDLLNADVVNGAIDPETEAKVRRQVQQHFRPEFLNRLDEVVMFKPLGQRDLRKICRNMVDLINQRLVDRDIALLVSDDACDLVLDEAYNPAYGARPVRRYVEKHMVTEISRLVLSGELVNHSTVHIDTTKRPDGGRDLSYQVHHSKRPKISEDSA |
| *Chlamydomonas reinhardtii* | MSFDTKKATEKVNNVLGEAINLAKEDKHAALTPTHLAVVLFEEPHGLAKVAATKVAGEEVWRSAIRVLRKRLTKLPKVDPAPESVSPGRELSKVLTAAAKLQKDRGDAFLGTDTLLTAVINAAEVSEALGEAGISKAQLETALSEVRQAAGGGPINSETADANFDALAKYGTDLTANAARADPVIGRDDEIRRVVRVLCRRTKNNPVLIGEPGVGKTAIVEGLAQRIVKNDVPETLQGVRLISLDMGSLVAGAKYRGEFEERLKAVLNEVAQQQGKVVLFIDELHLVLGAGKSGDGAMDAANLLKPMLARGELRCIGATTLGEYREHIEKDAAFERRFQQVLVKEPSVPDTIAILRGIKDRYETHHGVHITDRALVVAAELSDRYITTRFLPDKAIDLVDEACANMRVQLDSKPEQLDALERQRQRLQVEAAALAKEKDALSKARAKEVGKELAALEEALRPLQMKYAQEKARLEELRRLGQKRDEILVNIQIAEQHGNLARIADLRYGALPDVEDRIKQVRAAAPSDAMLSEEVGTEEIAVVVSRWTGIPVNRLKQTERDKLLSLRSELQQRVVGQDAAVAAVADAVLRSRAGLAARGRGSSFLFLGPTGVGKTELAKALAQLLFDDEKMMIRIDMGEYMEKHSVSRLIGAPPGYVGHEQGGQLTEAVRRRPYSVVLFDEVEKAHAEVFNVLLSILDDGRVTDSKGRTVNFANTVIILTSNLGAEALLHAAHDVLAHPGKAAAGQDPYKAARESVLAAVRRFFRPEFLNRLDDIVVFEPLRPEQLVDIARLMGNELAARLTPRNITLTFTEPALQFAVSHAYDPAYGARPLRRWMEQKVVTQLSRMVVGGDLPDNSNVEVGLAEGGRDFDYRVWPKPAAEAGGGNGSGAATEALLKKARMYSVEHPDEGEDSMDEGDDVGAMRD |
| *Populus**euphratica* | MDPGKFTHKTNEALATAHELTVGAGHAQITPLHLAVALISDPSGIMRQAVANAGDGENTAQAAERVFNQVLKKLPSQSPPPDEVPPSTSLIKVIRRSQALQKSRGDSYLAVDQMILGLLEDSQIRDLFKEVGVSASTVKSEVEKLRGKEGKKVENASGDTNFQALKTYGRDLVEGAGKLDPVIGRDEEIRRVVRILSRRTKNNPVLIGEPGVGKTAVAEGLAQRIVRGDVPSNLADVRLIALDMGALVAGAKYRGEFEERLKAVLKEVEEAEGKVILFIDEIHLVLGAGRTEGSMDAANLFKPMLARGQLRCIGATTLEEYRKYVEKDAAFERRFQQVYVAEPSVPDTISILRGLKEKYEGHHGVRIQDRALVIAAQLSSRYITGRHLPDKAIDLVDEACANVRVQLDSQPEEIDSLERKRMQLEVELHALEKEKDKASKARLAEVVKELDDLRDKLQPLLMKYKKEKERIDEIRRLKQKREEILFSIQEAERRYDLARVADLRYGALEEVEAAIARLEGSTTDENLMLTETVGPEHIAEVVSRWTGIPFTRLGQNEKERLIGLADRLHHRVVGQDQAVTAVAEAVLRSRAGLGRPQQPTGSFLFLGPTGVGKTELAKALAEQLFDDENQLVRIDMSEYMEQHSVARLIGAPPGYVGHEEGGQLTEAVRRRPYSVVLFDEVEKAHISVFNTLLQVLDDGRLTDGQGRTVDFRNTVIIMTSNLGAEHLLSGLLGKCSMQVARDRVMQEVRKQFRPELLNRLDEIVVFDPLSHDQLRKVARLQMKDVASRLAERGIALAVTDAALDYILAESYDPVYGARPIRRWLERKVVTELSRMLVREEIDENSTVYIDAGPDGQNLVYRVEKNGGLVNAATGQKTDVLIQIPKAPRDDAAQKVKKMKIQEIVDNDDDDEMIE |
| *Salpingoeca**rosetta* | MALNPNEWTEKVQEMYLEAKNVAINNKNAYMDPIHFAVALFEDEGGLPQRVVQKSGASLDAVEGAMRSLLKAIPQQDPAPVDVSTSHKALRFLQNAQKKQKKNDEAHLAIDHLLLALVQEKDILQALAGCGLAKDRFEEIVKKIKGTTRANTKTAESTYDALGKYGVDLVQRAADGKLDPVIGRDEEIRRVIQILARRTKNNPVLVGPPGTGKTAIVEGLAQRILNGDVPETLKARLVSLDMGALIAGAKYRGEFEERLKSVLDEVKQAEGSIILFVDEIHTVLGAGKTEGSMDAANLLKPMLARGELRMIGATTLDEYRKHVEKDAAFERRFQMVHVSEPSVPDTVSILRGLKERYEAHHGVRIQDAALVTAAQLADRYITQRFLPDKAIDLVDEACAKTRVQLDSRPEEIDALERRKLQLEVEATALGKEKDKMSKQRLKEVKKQLADIEEQLGPLKMKFEMERGRVDEMRELQEKLDNLRNKVQRAERAGDLSTAADLKYYAIPDCEKRLKQLIEEQEKRQQEQQSMDVSDEDKPMLSEEVGPDQVTEIVARWTGIPVNKLSQSQRERLLTLEEKIEQRVVGQTAAVKAVCEAVLRSRAGLSRPNQPVGSFLFLGPTGVGKTELAKALAMELFDDDKHIVRVDMSEYMESHSVARLIGSPPGYVGYEEGGQLTEAVRRRPYNLILLDEVEKAHKDVLNVLLQLLDDGILTDGMGRTVDFTNTVVVLTSNIGAPILLSGKVDPETGDLDENTRTQVMHEVQSYFRPEFLNRLDDVIMFKPLQKHALRTICRNMVEQINERLADRDITLDCTDAACDVILLNSFHPQYGARPVRRYIEKQVVTAMSKKMLSNQVPNGSRVTIDGDKQRQELTYSVQAAKRPRMMMDSTSEE |
| *Thielavia**terrestris* | MEFTDRAKKALEDAMALAEQYSHSQLVPVHLAVALLDPLPDQSKDQQNAPPGTTSSLFRQVVERANGDPQLFDRALKKSLVRLPSQEPPPESVSMAPSLNTVLRKAMELQKVQKDTYIAVDHLITALSEDPSIQVALKEANIPKSKLVQDAVTAIRGTRRVDSRNADTEQENENLSKFTIDMTAMAREGKIDPVIGREEEIRRVIRILSRRTKNNPVLIGEPGVGKTTIVEGLAQRIVNADVPDNLAACKLLSLDVGALVAGSKYRGEFEERMKGVLKEIQESKETIVLFVDEIHLLMGAGATGEGGMDAANLLKPMLARGQLHCIGATTLGEYRKYIEKDAAFERRFQQVLVKEPSIPETISILRGLKEKYEVHHGVTIADAAIVAAANLAARYLTSRRLPDSAVDLIDEAAAAVRVARESQPEIIDSLERRLRQLKIEIHALSREKDDASKARLAQAKQDAQNVEEELRPLREKYERERQRGKDIQEAKLKLENLRVKAEDASRMGDHGRAADLQYYAIPEQEQVIKRLEKEKAAADAALNANGADVGGSMVTDVVGPEQINEIVARWTGIPVTRLKTSEKEKLLHMERALSKIVVGQKEAVQSVSNAIRLQRSGLSNPNQPPSFLFCGPSGTGKTLLTKALAEFLFDDAKAMIRFDMSEYQERHSLSRMIGAPPGYVGHDAGGQLTEALRRKPFSILLFDEVEKAAKEVLTVLLQLMDDGRITDGQGRVVDAKNCIVVMTSNLGAEYLSRPNGKDGQIDPTTKELVMNTLRNYFLPEFLNRISSIVIFNRLTRREIRKIVDLRIAEIQRRLYDNDRNVQIAVSEAAKDKLGAAGYSPAYGARPLQRLLEKEVLNRLAILILRGNIRDGEVAHVDLVDGKVTVQPNHPDSEGEDEEMMVDEDEALEEIAPDSMDEDDIYSG |
| *Thermomyces**lanuginosus* | MSSAQFTDRANKALLDSNQLAEQYSHTQILPVHLAVSLLNPPRDDEREGAEGASVPLFKQVVERAHGDPQLLERSLMKMLVRQPSQDPPPEHVSVSPALAKVIRSATELSKMQKDSFVAIDHLICALAQDSQIQRALADANIPNVKLIDNAVQQIRGTKRVDSKTADSEEDHENLKRFTVDMTALAREGKIDPVIGREEEIRRVIRILTRRTKNNPVLIGEPGVGKTTIVEGLARRIVNADVPANLAHCKLLSLDVGSLVAGSKYRGEFEERMKGVLKEIEESRDMVVLFVDEIHLLMGAGTSGEGGMDAANLLKPMLARGQLHCIGATTLAEYRKYIEKDQAFERRFQQVFVKEPSVSETISILRGLKEKYEVHHGVNILDAAIVASAELAARYLTARRLPDSAVDLIDEAAAAVRVTRESEPEALDNLERRLRQLQIEIHALEREKDPASKSRLEAAKQEAANVTEELRPLREKYEQEKQRSKAIQDAKVKLDALKVKRDEALRSGDTATAADLEYYAIPETQSLIQKLEAERAKADAEERARAHENGTETLVPDAVGPDQINEIVARWTGIPVTRLKTSEKDRLLQMEKHLGKIVVGQKEAVQTVSNAIRLQRSGLANPNAPPSFLFCGPSGTGKTLLTKALAEFLFDDPKAMVRFDMSEYQERHSLSRMIGAPPGYVGHDAGGQLTEHLRRRPFSILLFDEVEKAAKEVLTVLLQLMDDGRITDGQGRVVDAKNCIVVMTSNLGAEYLSRPTGKNGRIEPQTRELVMGALRDYFLPEFLNRISSIVIFNRLTKREIRQIVELRLDEVQRRLEANGRDVKIECADEVKDYLGEAGYSPAYGARPLSRLIEKEVLNKLAILLLRGNIRDGEVAHCVLKDGRVDVIPNHPSDEMEDDEDMIDPNEALEQVEDTSADMDLYE |
| *Saccharomyces**cerevisiae* | MNDQTQFTERALTILTLAQKLASDHQHPQLQPIHILAAFIETPEDGSVPYLQNLIEKGRYDYDLFKKVVNRNLVRIPQQQPAPAEITPSYALGKVLQDAAKIQKQQKDSFIAQDHILFALFNDSSIQQIFKEAQVDIEAIKQQALELRGNTRIDSRGADTNTPLEYLSKYAIDMTEQARQGKLDPVIGREEEIRSTIRVLARRIKSNPCLIGEPGIGKTAIIEGVAQRIIDDDVPTILQGAKLFSLDLAALTAGAKYKGDFEERFKGVLKEIEESKTLIVLFIDEIHMLMGNGKDDAANILKPALSRGQLKVIGATTNNEYRSIVEKDGAFERRFQKIEVAEPSVRQTVAILRGLQPKYEIHHGVRILDSALVTAAQLAKRYLPYRRLPDSALDLVDISCAGVAVARDSKPEELDSKERQLQLIQVEIKALERDEDADSTTKDRLKLARQKEASLQEELEPLRQRYNEEKHGHEELTQAKKKLDELENKALDAERRYDTATAADLRYFAIPDIKKQIEKLEDQVAEEERRAGANSMIQNVVDSDTISETAARLTGIPVKKLSESENEKLIHMERDLSSEVVGQMDAIKAVSNAVRLSRSGLANPRQPASFLFLGLSGSGKTELAKKVAGFLFNDEDMMIRVDCSELSEKYAVSKLLGTTAGYVGYDEGGFLTNQLQYKPYSVLLFDEVEKAHPDVLTVMLQMLDDGRITSGQGKTIDCSNCIVIMTSNLGAEFINSQQGSKIQESTKNLVMGAVRQHFRPEFLNRISSIVIFNKLSRKAIHKIVDIRLKEIEERFEQNDKHYKLNLTQEAKDFLAKYGYSDDMGARPLNRLIQNEILNKLALRILKNEIKDKETVNVVLKKGKSRDENVPEEAEECLEVLPNHEATIGADTLGDDDNEDSMEIDDDLD |
| *Dictyostelium**discoideum* | MSFNPEEFTDKTNTILLRTQELAREKSNVQLAPIHLAVTLLNDEDNLAKSIFEKAGGDVPKIDAGFKRLLAKQPVQNPVPPEISPNSLFLQVLRSAARHQKNNGDSHLAVDHLILGLLDDRDILSVLGDAGATKEQVIQAVKEIRGNKKITSKTAESTYEALSKYGYDLVSQAQEGKLDPVIGRDEEIRRVIRVLSRRTKNNPVLIGEPGVGKTAVVEGLAQRIVRGDIPDNLNARVIALDMGALIAGAKYRGDFEERLKAVLKEVKDSNGGIILFIDEIHLVLGAGKTDGAMDAANLLKPMLARGELRCIGATTLDEYRQYVEKDPAFERRFQQVFVNEPTVNDTISILRGLKERYETHHGVRITDNALVVAAQLSHRYITNRFLPDKAIDLVDEACANTRVQLNSQPEAIDNLERRRLQLEVESAALEKEEDDASKQRLKAVQEELNQIKDELQPLEAKYQKERSRVDKIRELRKKLEDIKVKLSDAERRYDTSAAADYRYFVIPDLEKQIEVCDKERKENKKDAMVSEVVTPEQIADVVSRWTGIPVSKLSQTEKQRLLSLADHLHNRVVGQDEAVDAVADAVLRSKSGLARENQPLGSFLFLGPTGVGKTELAKALALELFDDESHMVRIDMSEYMEQHSVSRLIGAPPGYVGYDQGGQLTEAVRRRPYSVVLFDEVEKAHQQVWNVLLQVLDEGRLTDGQGRTVDFSNVVIIMTSNLGSQYILGEQANKEGGNNSLSQACKDKVIDEVRKHFRPEFLNRLDDIIVFTPLSKENLHSIITLQLRSVEKRLEDQNMSLKISNDALDSIINAAYDPIFGGRPLKRYIEKNIVTELSKLILGGKLKENQGVVVNEKDHHLNFDIIDLKQQQQRPASPTKKQKTIK |
| ClpGGI, from *Pseudomonas aeruginosa* | MAQELCAICHERPAVARVSLVQNGQRRELALCELHYRQLMRQQRMRSPLESLFGGGSPFDEIFSGFGEQSPVTPVRAREPEAVDIAEYFSKQTTEYLQRAAQVAAEFGKREVDTEHLLYALADADVVQAVLKQFGLSPADLKQYIEANAVRGASKGEASEDMTISPRVKSALQHAFALSRELGHSYVGPEHLLLGLAAVPDSFAGTLLKKYGLTEQALRQKAVKVVGKGAEDGRVDGPSNTPQLDKFSRDLTRLAREGKLDPVIGRSKEVETTIEVLARRKKNNPVLIGEPGVGKTAIVEGLAQRMVQGEVPEVLRDKRLVELNINAMVAGAKYRGEFEERLKQVMDELQAAQSEIILFIDEVHTIVGAGQGGGEGGLDVANVLKPAMARGEMNLIGATTLNEYQKYIEKDAALERRFQPVFVPEPTVEQTISILRGLRDKLEGHHKVTIRDEAFVAAAELSDRYIGNRFLPDKAIDLIDQAAARVRIASTSRPAEIQELEAELAQLKREQDYAASRKWYDEAKVFEKRIQERKEHLEQITERWQQTQGSKTEEVRVEDIAEIISRLTGIPVTELTAEEREKLLQMEERLHQRVIGQQEAITAVSDAVRLARAGLRQGSRPIATFLFLGPTGVGKTELAKALAEVVFGDEDAMIRIDMSEYMERHAVSRLIGAPPGYVGYDEGGQLTERVRRRPYSVILLDEIEKAHADVNNILLQVFDDGRLTDGKGRVVDFTNTIIIATSNLGSELIMKNAQAGEFAQPPEKLKRELMTTLRGHFRPEFLNRLDEVIVFESLSKAQIEDIVRLQLERVKRAAHAQDIYLHIDDSLVGHLAEEAYQPEFGARELKRQIRQQLETRLATAMLKGEVKEGETVTFFYDAKDGVGYRKGAAPKPAARKKSGAGETPKGRATAARKPAAKKGAAAKGKADKPKAK |
| ClpB, from *Escherichia coli* | MRLDRLTNKFQLALADAQSLALGHDNQFIEPLHLMSALLNQEGGSVSPLLTSAGINAGQLRTDINQALNRLPQVEGTGGDVQPSQDLVRVLNLCDKLAQKRGDNFISSELFVLAALESRGTLADILKAAGATTANITQAIEQMRGGESVNDQGAEDQRQALKKYTIDLTERAEQGKLDPVIGRDEEIRRTIQVLQRRTKNNPVLIGEPGVGKTAIVEGLAQRIINGEVPEGLKGRRVLALDMGALVAGAKYRGEFEERLKGVLNDLAKQEGNVILFIDELHTMVGAGKADGAMDAGNMLKPALARGELHCVGATTLDEYRQYIEKDAALERRFQKVFVAEPSVEDTIAILRGLKERYELHHHVQITDPAIVAAATLSHRYIADRQLPDKAIDLIDEAASSIRMQIDSKPEELDRLDRRIIQLKLEQQALMKESDEASKKRLDMLNEELSDKERQYSELEEEWKAEKASLSGTQTIKAELEQAKIAIEQARRVGDLARMSELQYGKIPELEKQLEAATQLEGKTMRLLRNKVTDAEIAEVLARWTGIPVSRMMESEREKLLRMEQELHHRVIGQNEAVDAVSNAIRRSRAGLADPNRPIGSFLFLGPTGVGKTELCKALANFMFDSDEAMVRIDMSEFMEKHSVSRLVGAPPGYVGYEEGGYLTEAVRRRPYSVILLDEVEKAHPDVFNILLQVLDDGRLTDGQGRTVDFRNTVVIMTSNLGSDLIQERFGELDYAHMKELVLGVVSHNFRPEFINRIDEVVVFHPLGEQHIASIAQIQLKRLYKRLEERGYEIHISDEALKLLSENGYDPVYGARPLKRAIQQQIENPLAQQILSGELVPGKVIRLEVNEDRIVAVQ |
| *Chaetomium**thermophilum* | MNSKMEFTDRAKKALEDAMALAEQYQHLQLQPVHLAVALLDPTPDPSKDQSIAPGTTSTLFRQVVERAHGDAQAFDRALKKKLVRLPSQDPPPDQVSMSAGCSNVLRKANELQKVQKDSYIAVDHLIAALAEDHAIQEALKEANIPKPKLIQDAIQAIRGNKRVDSRNADTEQENENLSKFCIDMTAMAREGKIDPVIGREEEIRRVIRILSRRTKNNPVLIGEPGVGKTTIVEGLAQRIVNADVPDNLAACKLLSLDVGALVAGSKYRGEFEERMKGVLKEIQESKETIILFVDEIHLLMGAGSSGEGGMDAANLLKPMLARGQLHCIGATTLAEYRKYIEKDAAFERRFQQVLVKEPSISETISILRGLKEKYEVHHGVNIADAAIVAAANLAARYLTSRRLPDSAVDLIDEAAAAVRVARESQPEIIDSLERRLRQLKIEIHALSREKDEASKARLAQAKQDAQNVEEELRPLREKYERERQRGKAIQEAKMKLEALRVKAEDASRMGDHSRAADLQYYAIPEQEAIIKRLEAEKAAADAALNANGADVGGSMITDVVGPDQINEIVARWTGIPVTRLKTSEKEKLLHMEQALSKIVVGQKEAVQSVSNAIRLQRSGLSNPNQPPSFLFCGPSGTGKTLLTKALAEFLFDDPKSMIRFDMSEYQERHSLSRMIGAPPGYVGHDAGGQLTEALRRRPFSILLFDEVEKAAKEVLTVLLQLMDDGRITDGQGRVVDAKNCIVVMTSNLGAEYLSRANNGKDGKIDPTTRELVMNTLRNYFLPEFLNRISSVVIFNRLTRREIRKIVDLRIAEIQKRLTDNDRNVIIKVSEEAKDKLGAQGYSPVYGARPLQRLLEKEVLNRLAILILRGQIREGEVAHVELVDGKVQVLPNHPDSEPEDVDVDMDSDDAVDEVAPDSMDEDIYND |
| *Lachancea**thermotolerans* | MNDETQFTERALTILTLAQKLAQDHQHAQLQPVHILGAFVETPEDGSIPYLQNLIEKARYDYDTFRRTVNKHVVRIPQQNPAPAQVTPSYATGQVLQEAMKIQKQQKDSFVAQDHILFALFKDSTIQQIFKEAQVDVEAVKQQALELRGNQKIDSRGADTSSSLEYLSKYAIDMTEQARMGKLDPVIGREEEIRSTIRVLARRIKSNPCLIGEPGIGKTAIIEGVAQRIIDDDVPSILFGSKLFSLDLAALTAGAKYKGDYEERLKGVLKEVEESKTLIILFIDEIHMLMGNGKDDAANILKPALSRGHLKVIGATTNNEYRSIVEKDGAFERRFQKIDVQEPTTRQTVAILRGLQQKYEIHHGVRILDSALVTASQLAKRYLPYRRLPDSALDLVDISCAGVAVARDSKPEELDSKERALQLLQVEIKALERDEEADPTTKERLQQARQREASLQEELEPLRQRYNEERKGHEELTKAKKKLEELENKAADAERRYDTATAADLRYFAIPDLKNQIEVLENQVLEEESRAGSGAMVQNVVDSDTIAETAARLTGIPVNKLTESENEKLIHMERELSSEVVGQSEAIKAVSNAVRLSRSGLSNPRQPASFLFLGLSGSGKTELAKRIAAFLFNDSDAMIRVDCSELSEKYSVSKLLGTTAGYVGYEEGGFLTNQLQRRPYSVLLFDEVEKAHPDVLTVMLQMLDDGRLTSGQGKTIDCSNCIIIMTSNLGATFISSQSGSRIEESTKNLVMGAVKQHFRPEFLNRISSIVVFNKLSPKAIHRIVDIRLKEIEDRFEENDKHYKLDLTPEAKNYLARNGYSEDMGARPLNRLIQNEILNRMAMRILKGQIKDKETVRVVLKHNENPDMEEPDQLDVLPNHQSSDADMDVDNDWDEDLDDSVTDATPLD |
| *Myceliophthora**thermophila* | MNSKMEFTDRAKKALEDAMALAEQYAHSQLLPVHLAVALLDPLPDPSRDQQNAAPGTTSTLFRQVIERAHGDPQQFDRALKKTLVRLPSQDPPPDQVSMAPSFNTVLRKAMELQKVQKDTYIAVDHLITALAEDHTIQTALKEANIPKPKLIQDAISAIRGTKRVDSRNADAEEENENLAKFTVDMTAMAREGKLDPVIGREEEIRRVIRILSRRTKNNPVLIGEPGVGKTTVVEGLAQRIVNADVPDNLAACKLLSLDVGALVAGSKYRGEFEERMKSVLKEIEESKDMIVLFVDEIHLLMGAGSSGEGGMDAANLLKPMLARGQLHCIGATTLAEYRKYIEKDAAFERRFQQVIVKEPSIPETISILRGLKEKYEVHHGVNIADGAIVAAANLAARYLTSRRLPDSAVDLIDEAAAAVRVARESQPEIIDSLERRLRQLKIEIHALSREKDEASKARLAQAKQDAQNVEEELRPLREKYERERQRGKDIQEARLKLENLRVKAEDASRMGDHSRAADLQYYAIPEQEQIIKRLEKEKAAADAALNESGPDTGGAMVTDVVGPDQINEIVARWTGIPVTRLKTSEKERLLHMEQALSKIVVGQKEAVQSVSNAIRLQRSGLANPNQPPSFLFCGPSGTGKTLLTKALAEFLFDDPKAMIRFDMSEYQERHSLSRMIGAPPGYVGHDAGGQLTEALRRKPFSILLFDEVEKAAKEVLTVLLQLMDDGRITDGQGRIVDAKNCIVVMTSNLGAEYLSRPNGKDGKVDPTTKELVMNALRNYFLPEFLNRISSIVIFNRLTRREIRKIVDLRIAEIQKRLQDNDRNVTIRVSDAAKDKLGAAGYSPVYGARPLQRLLEKEVLNRMAILILRGSIRDGEVANVDLVDGKVTVIPNHPDSEGEDEDMMVDEDEALDEVAPDSMDEDIYD |
| *Scytalidium**thermophilum* | MNSKMEFTDRAKKALEDAMVLAEQYAHSQLVPVHLAISLLDPLPDPSKDQQNQAPGTTSSLFRQVVERANGDPQAFDRALKRTLVRLPSQDPPPEQVSMSPSFNKVLRQAMELQKVQKDTYIAVDHLISALSEDNTIQAALKEANIPKPKLIQEAISTIRGTRRVDSRSADTESENENLAKFTIDMTAQAREGKIDPVIGREEEIRRVIRILSRRTKNNPVLIGEPGVGKTTVVEGLAQRIVNADVPDNLANCKLLSLDVGALVAGSKYRGEFEERMKGVLKEIQESKDTIILFVDEIHLLMGAGASGEGGMDAANLLKPMLARGQLHCIGATTLAEYRKYIEKDAAFERRFQQVLVKEPTIPETISILRGLKEKYEVHHGVTIADAAIVAAANLAARYLTQRRLPDSAVDLIDEAAAAVRVARESQPEIIDSLERRLRQLKIEIHALSREKDEASKARLAQAKQDAQNVEEELRPLREKYERERQRGKAIQEAKLKLENLRVKAEEASRMGDHSRAADLQYYAIPEQEQIIKRLEREKAAADAALNESGADVGGSMITDVVGPDQINEIVARWTGIPVTRLRTSEKEKLLHMEKHLAKIVVGQKEAVQSVSNAIRLQRSGLANPNQPPSFLFCGPSGTGKTLLTKALAEFLFDDPKSMIRFDMSEYQERHSLSRMIGAPPGYVGHDAGGQLTEALRRKPFSILLFDEVEKAAKEVLTVLLQLMDDGRITDGQGRIVDAKNCIVVMTSNLGAEYLARPSGKDGKIDPTTKELVMNALRNYFLPEFLNRISSIVIFNRLTRREIRKIVDLRIAEIQKRLRDNDRNVTIIVSDAAKDKLGAAGYSPAYGARPLQRLLEKEVLNRLAILILRGNIRDGEVARVDVVDGKVTVLPNHEDEMSDEEMLVDEEDAVEEVAPDSMDEDIYD |
| *Thermoascus**aurantiacus* | MNGTQFTDRANKALLDSNNLAEQYAHSQILPLHLAISLLTPPQDEMEKQPAGHPSHEGAAAPLFRQVVERAHGDPQLLERNLMKMLVRQPSQDPPPERVAVSPALAKVIRQATELSKTQKDSYVAIDHLILAVVQDSQIQRALADANIPNVKLIDSAVQQIRGNKRVDSKTADAEGDNENLKKFTIDMTAMAREGKIDPVIGREEEIRRVIRILSRRTKNNPVLIGEPGVGKTTVVEGLARRIVNADVPANLAQCRLLSLDVGSLVAGSKYRGEFEERMKGVLKEIEDSKDMIVLFVDEIHLLMGAGSSGEGGMDAANLLKPMLARGQLHCIGATTLGEYRKYIEKDQAFERRFQQVLVKEPTVNETISILRGLKEKYEVHHGVNILDAAIVAAANLAARYLTARRLPDSAVDLIDEAAAAVRVTRESEPEALDNLERKLRQLQIEIHALEREQDPASKQRLEAAKQEAANVTEELRPLREKYESEKKRSKDIQDAKIKLDSLKVKRDEAERSGDTQTAADLEYYAIPETKALIERLEADRARADAEARARQGEAGETLLADAVGPDQINEIVARWTGIPVTRLKTTEKDKLLNMEKHLHRIVVGQKEAVTSVSNAIRLQRSGLSNPNSPPSFLFCGPSGTGKTLLTKALAEFLFDDPKAMIRFDMSEYQERHSLSRMIGAPPGYVGHDAGGQLTENLRRRPFSILLFDEVEKAAKEVLTVLLQLMDDGRITDGQGRIVDARNCIVVMTSNLGAEYLSRPTTKDGKIEPQTRELVMGALRDYFLPEFLNRISSIIIFNRLTKREIRKIVELRLSEVQRRLEQNDRNVKIECTEEVKDYLGDAGYSPAYGARPLSRLIEREVLNRLAVLILRGAIRDGEVARVVMREGRVEVLPNHIEPMEDEEMLDEEEALAEIEENAGGDMDLYE |
| *Arabidopsis**thaliana* | MNPEKFTHKTNETIATAHELAVNAGHAQFTPLHLAGALISDPTGIFPQAISSAGGENAAQSAERVINQALKKLPSQSPPPDDIPASSSLIKVIRRAQAAQKSRGDTHLAVDQLIMGLLEDSQIRDLLNEVGVATARVKSEVEKLRGKEGKKVESASGDTNFQALKTYGRDLVEQAGKLDPVIGRDEEIRRVVRILSRRTKNNPVLIGEPGVGKTAVVEGLAQRIVKGDVPNSLTDVRLISLDMGALVAGAKYRGEFEERLKSVLKEVEDAEGKVILFIDEIHLVLGAGKTEGSMDAANLFKPMLARGQLRCIGATTLEEYRKYVEKDAAFERRFQQVYVAEPSVPDTISILRGLKEKYEGHHGVRIQDRALINAAQLSARYITGRHLPDKAIDLVDEACANVRVQLDSQPEEIDNLERKRMQLEIELHALEREKDKASKARLIEVRKELDDLRDKLQPLTMKYRKEKERIDEIRRLKQKREELMFSLQEAERRYDLARAADLRYGAIQEVESAIAQLEGTSSEENVMLTENVGPEHIAEVVSRWTGIPVTRLGQNEKERLIGLADRLHKRVVGQNQAVNAVSEAILRSRAGLGRAQQPTGSFLFLGPTGVGKTELAKALAEQLFDDENLLVRIDMSEYMEQHSVSRLIGAPPGYVGHEEGGQLTEAVRRRPYCVILFDEVEKAHVAVFNTLLQVLDDGRLTDGQGRTVDFRNSVIIMTSNLGAEHLLAGLTGKVTMEVARDCVMREVRKHFRPELLNRLDEIVVFDPLSHDQLRKVARLQMKDVAVRLAERGVALAVTDAALDYILAESYDPVYGARPIRRWMEKKVVTELSKMVVREEIDENSTVYIDAGAGDLVYRVESGGLVDASTGKKSDVLIHIANGPKRSDAAQAVKKMRIEEIEDDDNEEMIED |
| *Calcarisporiella**thermophila* | MSSMQFTDKATETLNAAAKYAAENSHVQLHPSHVAVVMLDEENSLFRSILEKAGGDVVSIERGFKKIMVRQPSQDPPPTEMGHSPELAKLLHYAHEHMKKQRDLYIAQDHLILALADLPSMAQVLKEGGVTKKSLENAVTHVRGNRRVESKSAEEAYEALSKYCIDLTELAASGKLDPVIGRDEIISRVIRVLSRRTKNNPCLVGEPGVGKTAIAEGLANRIVKGDIPSSLQKKVYSLDIGSLLAGAKYRGEFEERLKAVLKELKEAQAIVFIDEIHTVLGAGKSEGAIDAANLLKPMLARGELRCIGATTLTEYRQYVEKDPAFERRFQLVMVEEPSVTDTISILRGLKERYETHHGVRIADAAIVAAAQLAARYITQRFMPDKAIDLIDEACANTRVQLDSQPEAIDKLERRHLQLEVEATALEKEKDAASKQRLQEVRAEMARIQEELRPLKMKYESEKGRLDEIRNLSQRLDELKAKAEDAERRYDLARAADIRYYAIPDLEKRLAQLQAEKSQADAERADGLLAEVVGPDQIMEVVSRWTGIPVSNLQRSEKEKLLHMEEYMKQHVVGQDEAIKAICDAIRLSRTGLQNRNRPLASFLFLGPTGCGKTLCVKELAAFLFNDPGAIVRIDMSEYMEKHAVSRLVGAPPGYIGHDEGGQLTEAVRRRPYTVVLFDEMEKAHKDVSNLLLQILDDGHCTDSKGRRVDFKNTIIVMTSNLGADLFELDEGDKVSQATKNAVLATARRHFANEFINRIDELIVFNRLTPSNIRKIVDVRLKEVQERLDEKQITLDVDDKAKDLLAQQGFDPVYGARPLNRLIQHALLTQLSRLLLDGGVRPGEIAKVTVDQEGEIIVIRNHGIESPAPWADEDMVEDEDMEI |
| *Plasmodium**falciparum* | MAPDNKQEQGKYLNRTINILNAGKNIAKSYGHNKLKPIHILSALAKSDYGSTLFKENNVNAANLKEYIDIALEQTRAGAPLDNKSKIVNSAEVKETLALAEAAANKYKSPKVDVEHLLSGLSNDELVNEIFNEVYLTDEAIKAILKRKFEKTKKDKDGKTGTLYIEQFGSNMNEKVRNGKLQGIYGRDEEIRAIIESLLRYNKNSPVLVGNPGTGKTTIVEGLVYRIEKGDVPKELQGYTVISLNFRKFTSGTSYRGEFETRMKNIIKELKNKKNKIILFVDEIHLLLGAGKAEGGTDAANLLKPVLSKGEIKLIGATTIAEYRKFIESCSAFERRFEKILVEPPSVDMTVKILRSLKSKYENFYGINITDKALVAAAKISDRFIKDRYLPDKAIDLLNKACSFLQVQLSGKPRIIDVTERDIERLSYEISTLEKDVDKVSKKKYNKLIKEFEEKKEQLKKYYEEYVITGERLKRKKEIEKKLNDLKELTQNYVYSNKEPPIELQNSLKEAQQKYLELYKETVAYVEAKTHNAMNVDAVYQEHVSYIYLRDSGMPLGSLSFESSKGALKLYNSLSKSIIGNEDIIKSLSDAVVKAATGMKDPEKPIGTFLFLGPTGVGKTELAKTLAIELFNSKDNLIRVNMSEFTEAHSVSKITGSPPGYVGFSDSGQLTEAVREKPHSVVLFDELEKAHADVFKVLLQILGDGYINDNHRRNIDFSNTIIIMTSNLGAELFKKKLFFDADNSGTPEYKRVMEDVRLSLIKKCKKVFKPEFVNRIDKIGVFEPLNKKNLHKIVALRFKKLEKRLEEKNIQVSVSEKAIDYIIDQSYDPELGARPTLIFIESVIMTKFAIMYLKKELVDDMDVFVDYNSKAKNLVINLSKT |