DATA SHEET

Analysis of Biological Diversity between the cyanobacteria Cylindrospermospsis and Sphaerospermopsis

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Data Sheet 1. 16S rRNA Sequences used in this study.

Organism

16S rRNA Sequences

>Cylindrospermopsis raciborskii KLL07 GEN REF

GAACGGGATGCTTAGGCATCTAGTGGCGGACGGGTGAGTAACGCGTGAGAATCTGGCTCCAGGTCGGGGATAACAGTTG GAAACGACTGCTAATACCGGATGTGCCGAGAGGTGAAAGATTTATTGCCTGGAGATGAGCTCGCGTCTGATTAGCTAGTT GGTGGTGTAAGGGACCACCAAGGCATCGATCAGTAGCTGGTCTGAGAGGATGATCAGCCACACTGGGACTGAGACACGG GGAAGGCTCTTGGGTCGTAAACCTCTTTTCTCAAGGAAGAAGAAGTGACGGTACTTGAGGAATAAGCATCGGCTAACTC CGTGCCAGCAGCCGCGTAATACGGAGGATGCAAGCGTTATCCGGAATGATTGGGCGTAAAGGGTCTGCAGGTGGAACT GAAAGTCTGCTGTTAAAGAGTTTGGCTTAACCAAATAAAAGCGGTGGAAACTACAGAACTAGAGTGCGGTAGGGGCAAA AGGAATTCCTGGTGTAGCGGTGAAATGCGTAGATATCAGGAAGAACACCGGTGGCGAAAGCGTTTTGCTAGACCGTAACT GACACTGAGGGACGAAAGCTAGGGGAGCGAATGGGATTAGATACCCCAGTAGTCCTAGCCGTAAACGATGGATACTAGG ACTTGACATCCTGCGAATCCTGGTGAAAGCTGGGAGTGCCTTAGGGAGCGCAGAGACAGGTGGTGCATGGCTGTCAG CTCGTGTCGTGAGATGTTGGGTTAAGTCCCGCAACGAGCGCAACCCTCGTTTTTAGTTGCCAGCATTAAGTTGGGCACTCTAGAGAGACTGCCGGTGACAAACCGGAGGAAGGTGAGGATGACGTCAAGTCAGCATGCCCCTTACGTCTTGGGCTACACA CGTACTACAATGCTGCGGACAGGGCAGCGAGCCAGGGATGGCAAGCGAATCCAGAAACCGTAGCTCAGTTCAGATCGAGAGATCGAGAGATCGAGATTCGAGATTCAGATCGAGATCGAGATCGAGATCGAGATCGAGATCGAGATCGAGATCGAGATCGAGATCGAGATCGAGATCGAGATCGAGATCGAGATTCAGATTCAGATCGAGATCGAGATCGAGATCGAGATCGAGATCGAGATCGAGATCGAGATCGAGATCGAGATCGAGATCGAGATCGAGATCGAGATCGAGATTGAAGGCTGCAACTCGCCTTCGTGAAGGAGGAATCGCTAGTAATTGCAGGTCAGCATACTGCAGTGAATTCGTTCCCGGGCC TTGTACACCCCCGTCACACCATGGAAGTTGGTCACGCCCGAAGTCATTACCCCAACCGAAAGGAGGGGGATGCCTAA GGTAGGACTGGTGACTGGGGTGAAGTCGT

>Cylindrospermopsis curvispora GIHE G1 GEN

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>Cylindrospermopsis raciborskii CENA302 GEN

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>Cylindrospermopsis raciborskii CENA303 GEN

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>Raphidiopsis brookii D9 GEN

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>Sphaerospermopsis torques reginae ITEP 024 GEN REF

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>Sphaerospermopsis kisseleviana NIES 73 GEN

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>Sphaerospermopsis oumiana NIES 1679 NO GEN EX

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>Anabaena cylindrica FACHB 243 GEN

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>Anabaena cylindrica PCC 7122 GEN

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>Aphanizomenon flos aquae DEX188 GEN

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>Nodularia harveyana Huebel 1983 300 NO GEN

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>Nodularia sp LEGE 06071 GEN

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>Nodularia_sp_NIES_3585_GEN

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>Synechococcus elongatus PCC 6301 GEN

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Data Sheet 2. Sequences of 31 conserved proteins in cyanobacteria used in this study.

Organism Sequence

>Cylindrospermopsis_curvispora_GIHE_G1

MOIPRLHPDTVEEVKHRADIVDVISDYVVLRRRGKDFVGLCPFHEEKTPSFTVSPTKQIYYCFGCQASGNAIKFIMDLNKRQFAE VVLDLAKRYQVPVKTLAPEQRQELQRQLSLREQLFEVLASTSQFYQHVLRQDIGQQALQYLQGKRFLKTETVEKFALGYAPPG WETLYHYLVENKNYPAHLVEKAGLIKPRKEGGGYYDVFRNRLMIPIRDVQGRVIAFGGRTLTDEQPKYLNSPETELFDKSKTLF ALDLAKDAISKLDQAVVVEGYFDAIALHAKGINNVVASLGTALSLEQVRLLLRYSESKQLVLNFDGDKAGINATERAIGEISNL AYKGEVQLKILHIPDGKDADEYLKNHSVTDYGQLLVDAPLWLDWQIAQVIQGRDLKQPTDFQLVSREFVKLLQKILNSDTLNY YISHCAEILSLGDSRLIPLRVENLITQVTPTAILRPTPNSTIWSKTSPISHPQPSLLEQAEGLLLRIFLHCPQERQVIIETLGSSNLEFSV SHHRFLWEKSLOFPSOTLDLISQLONLYLETONDLGPVOHIFQLNEKNKQEILLRTNQLVQAAIACMEKVFRENRYRHFLELWQ KTDPNTDPDQYNLYAQTIYADKMRIQELSKQRQLSIADLIDMTLAEAESTMKKTVEATQKAFNSIRTGRANASLLDKVQVEYY GNPAPLKSLANITTPDASTILIQPYDRTSLNIVEKAISLSDVGLTPSNDGSVIRLNIPPLTSERRKELVKLAAKYAEEGRVGIRNIRR DALDSIRKQQKAADISEDESRDQQDKLQKITNIYTAKIDELLAEKEKDISTVMPVIEKKRTRDLPQINERIRFPKIRVIDSEGAQLG IMAPLEALRLAEEKELDLVLLSDKADPPVCRIMDYGKYKFEQEKKAREARKKQHTADVKEVKMRYKIEEHDYNVRVKQAERF LKDGDKVKATVMFRGREIOHSDLAETLLNRMATDLEPFGEVOOAPKKEGRNMMMLISPKKMSMVTLPGLKDLIEKISLERNLP RLAVQSSIREALLKGYERYRRAQNLERRQFDENYFDNFEVELDIDGEGFRVLSTKTIVEEVTNCDHQISLDEVQQVAPEAQSGD SVVLDVTPDQGEFGRMAAMQTKQVLAQKLRDQQRQMVQEEFQDLEGTVLQARVLRFERQSVILAVSSSFGQPEVEAELPKRE QLPNDTYRSNATFKVYLKKVSQGQQRGPQLLVSRADAGLVVYLFANEVPEIEDEVVRIVAVAREANPPSRYVGPRTKIAVDTL DRDVDPVGACIGARGSRIQVVVNELRGEKIDVIRWSPDPATYIANALSPARVDEVRLMDPESRQTHVLVAEDQLSLAIGKEGQN VRLAARLTGWKIDIKDQAKYDYGAEDAKFAAVRANYQDESNQPDSQFEVREEEYEDDPDEGEDEFNSMGEENMSKKSLASLS AADISDKRALVRVDFNVPVDNQGNITDDTRIRAALPTIQDLISKGAKVILASHFGRPKGVDEKLRLTPVAKRLSELLGQEVIKTD DCIGDDVTAQVAALEKGQVLLLENVRFYKEEENNDPEFARQLAANADFYVNDAFGTAHRAHASTEGVTKYLSPSVAGYLVEK ELQYLQGAIEAPQRPLVAIIGGSKVSSKIGVIETLLEKCDKLIIGGGMIFTFYKARGLNVGKSLVEQDKLELASSLEKEAAKRGVT LLLPTDIVAADKFAPDADAVTVSIDHIPDDRMGLDIGPESVKVFQAALADCKTVIWNGPMGVFEFDKFAVGTEAIAQTLAEIGKTGATTIIGGGDSVAAVEKVGLADOMSHISTGGGASLELLEGKVLPGIAALDEAMTKFIFVTGGVVSSIGKGIVAASLGRLLKSRD YSVSILKLDPYINVDPGTMSPFQHGEVFVTQDGAETDLDLGHYERFTDTSMSRLNSVTTGLIYQSVINKERRGDYNGGTVQVIP HITNEIKERVIRVAKETNPAAVITEIGGTVGDIESLPFLEAIRQLRKEVGKQNVLYMHVTLLPWIASAGEMKTKPTQHSVKELRSI GIQPDILVCRCDRPIPVGLKQKLSEFCDVPVECVITCQDASSIYEVPLILEKEGLAQQTLDLLQMEQREPDLTHWETMVERMSHP QSPVEIAIVGKYVRLGDAYLSVVESLRHAAIATYGDLRLRWVNSEILEVEPPDNYLLGVDGIIVPGGFGIRGVDGKISAIEYARN OOIPFLGLCLGMOCSIIEWARNVEGLVGANSAEFDPOTDYPVINLLPEOODVIDLGGTMRLGLYPCHVOPNTLAFDLYOEEVIY

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MQIPRLHPDTVEEVKHRADIVDVISDYVVLRRRGKDFVGLCPFHEEKTPSFTVSPNKQIYYCFGCQASGNAIRFIMDLNKRKFAE VVLDLAKRYQVPVKTLAPEQRQELQRQLSLREQLFEVLASTSQFYQHVLRQDIGQQALQYLQKKRFLKTETVEKFALGYAPPG WETLYHYLVENKSYPAQLVEKAGLIKPRKEGGGYYDVFRNRLMIPIRDVQGRVIAFGGRTLTDEQPKYLNSPETELFDKSKTLF ALDVAKDAISKLDOAVVVEGYFDAIALHANGINNVVASLGTALSLEOVRLLLRYSESKOLVLNFDGDKAGINATERAIGEISNL AYKGEVRLKILHIPDGKDADEYLKNHSVTDYEQLLVEAPLWLDWQIAQVIQGRDLKQPTDFQLVSREFVKLLQKILNSDTLNY YISHCAEILSLGDTRLIPLRVENLITQVAPRRTPTPILRPPASPNTHQISHPQPSLLEQAEGLLLRIFLHCPQERQVIIETLGSSNLEFS VSHYRFLWEKSLQFPSQTLDLISQLQNLYLETQNDLGPVEHIFQLNEKNKQEILLRTNQLVQAAIACMEKVFRENRYRHFLELW QKTDPSTDPDQYNLYAQTIYADKMRIQELSKQRQLSISDLINMKLAEAESTMNKTVEATQRAFNSIRTGRANASLLDKVQVDY YGSPTPLKSLTNITTPDASTILIQPYDRSSLNIVEKAISLSDVGLTPSNDGSVIRLNIPPLTSDRRKELVKLAAKYAEEGRVGIRNIR RDALDSIRKQEKAGEISEDESRDQQDKLQKITGKYTAKIDELLTEKEKDITTVMPVIEKKRTRDLPQINERIRFPKIRVIDSEGAQL GIMAPLEALRLAEEKELDLVLLSDKADPPVCRIMDYGKYKFEQEKKAREARKKQHTADVKEVKMRYKIEEHDYNVRVKQAE RFLKDGDKVKATVMFRGREIQHSDLAETLLNRMATDLEPFGEIQQAPKKEGRNMMMLISPKKMSMVTLPGLKDLIEKISLERN LPRLAVQSSIREALLKGYERYRRAQNLERRQFDENYFDNFEVELDIDGEGFRVLSTKTIVEEVTNGDHQISLDEVQQVAPEAQS GDSVVLDVTPDQGEFGRMAAMQTKQVLAQKLRDQQRQMVQEEFQDLEGTVLQARVLRFERQSVILAVSSSFGQPEVEAELPK REQLPNDTYRSNATFKVYLKKVSQGQQRGPQLLVSRADAGLVVYLFANEVPEIEDEVVRIVAVAREANPPSRYVGPRTKIAVD TLDRDVDPVGACIGARGSRIQVVVNELRGEKIDVIRWSPDPATYIANALSPARVDEVRLMDPESRQTHVLVAEDQLSLAIGKEG QNVRLAARLTGWKIDIKDQAKYDYGAEDAKFAAVRANYQEESNQPDNQFEIIEEGYEDDPDEGEDDFNSMEEENMSKKSLAS LSATDISDKRALVRVDFNVPVDDQGNITDDTRIRAALPTIQDLISKGAKVILASHFGRPKGVDEKLRLTPVAKRLSELLGQEVIKT DDCIGDDVTAQVAALEKGQVLLLENVRFYKEEEKNDPNFARQLAANADFYVNDAFGTAHRAHASTEGVTKYLSPSVAGYLV EKELQYLQAAIEVPQRPLAAIIGGSKVSSKIGVIETLLEKCDKLIIGGGMIFTFYKARGLNVGKSLVEQDKLELASSLEKKAAERG VTLLLPTDIVAADKFAPDADAVTVSIENIPDDRMGLDIGPKSVKLFQDALADCKTVIWNGPMGVFEFDKFAVGTEAIAQTLAEI GKTGATTIIGGGDSVAAVEKVGLADQMSHISTGGGASLELLEGTVLPGIAALDEAMTKFIFVTGGVVSSIGKGIVAASLGRLLKS RDYSVSILKLDPYINVDPGTMSPFQHGEVFVTQDGAETDLDLGHYERFTDTSMSRLNSVTTGLIYQSVINKERRGDYNGGTVQV IPHITNEIKERVIRVAKETNPAAVITEIGGTVGDIESLPFLEAIRQLRKEVGKQNVLYMHVTLLPWIASAGEMKTKPTQHSVKELR SIGIOPDILVCRCDRPIPVGLKQKLSEFCDVPVECVITCQDASSIYEVPLILEKEGLAQQTLDLLQMEQREPDLTHWETMVERMSH PQSPVEIAIVGKYVRLGDAYLSVVESLRHAAIATYGDLRLRWVNSEILEVEPPDNYLLGVDGIIVPGGFGIRGVDGKISAIEYARN RQIPFLGLCLGMQCSIIEWARNVEGLVGANSAEFDPKTDYPVINLLPEQQDVIDMGGTMRLGLYPCHVQPNTLAFDLYQEEVIY ERHRHRYEFNNLYRNHLLNSGYVISGTSPDGRLVEIVEYPQHPFFIACQFHPEFQSRPSHPHPLFKGFMEAAISHTHQGKKQLPQ GFPQFPMVKKVSRRLQALQAKVEERDYAPLEALALLKETATAKFPEAAEAHIRLGIDPKYTDQQLRTTVVLPKGTGQIVRVAVI ARGEKVTEATNAGADIAGSEELIDEIQKGMMDFDKLIATPDVMPQVAKLGKLLGPRGLMPSPKGGTVTFDIASAISEFKAGKLE FRADRTGIVHVMFGKASFSSEDLLVNLKALQETIDRNRPSGAKGRYWRTFYISSTMGPSIKVDINALRDLKTTDAAMGTRSYRP

YTPSTRQVTISDFAEITKTEPEKSLTESVHRPKGRNNQGRITSRRRGGGHKQLYRIIDFKRDKRDITATVIAVEYDPNRNARIALL EYEDGEKRYILHPNGLKVGAKVTAGPQAPFEDGNALPLSNIPLGTNVHNVEMTPGKGGQIVRAAGATAQLMAKEGNYVTLKL PSGEVRMVRRECYATIGQVGNTDARNLSAGKAGRNRWKGRRPKVRGSVMNPVDHPHGGGEGRAPIGRSGPVTPWGKPALGA KTRKRKKASSKLIVRRRRKSSKRGRGGRQSMSVGILGTKLGMTQIFDEAGVSIPVTVIKAGPCTVTQVKTQPTDGYCAIQVGYG EVKPKALNKPKLGHLAKSSAVPVRYLNEYRTDAAGDYALGQEIKADIFSVGQIVDVIGTSIGRGFAGNQKRNNFGRGPMSHGS KNHRAPGSIGAGTTPGRVYPGKRMAGRLGGSRVTVRKLTVVKVDAERNLILIKGAIPGKPGGLVNVVPTTKVGNKMVESIVKN WOGEEVGOTSFELRVAKEETASHIVHRALVROMTNSRQGTASTKTRAEVRGGGRKPWRQKGTGRARAGSIRSPLWRGGGVIF GPKPREFNIKLNRKERRLALRTAFVSRREDLIVVEEFTDQLQRPKSKELVAALARWGATADQKTLLILSEIGQSTETISLSARNVE NIKVIAADQLNVFDLLHADKIVVTSSALTKIQEVYSAMATTRLKTLYGQTIVPKLTQQFQYTNVHQVPKVLKVTVNRGLGEAA QNAKALEASLSEIALITGQKPVVTRAKKAIAGFKIRQGMPVGIMVTLRGERMYAFLDRLISLALPRIRDFRGVSAKSFDGRGNYT LGVREQLIFPEIEYDRIDQIRGLDISIITTAKTDEEGRALLKEMGMPFRDQMSRIGKRPITIPAKVQVAIDGTKVVVKGPKGELSRD LPTHVTVSQSGETLLVTRRDDTRTSRQMHGLSRTLVANMVEGVSQGFQRRLEIQGVGYRAQVQGANLVLNIGYSHQVQIEPPA GVQFAVENNTNVIVSGYDKEVVGNTAAKIRAVRPPEPYKGKGIRYAGEVVRRKAGKTGGKGKKMAKKVVAVIKLALNAGKA NPAPPVGPALGQHGVNIMMFCKEYNAKTADQAGMVIPVEISVFEDRSFTFVLKTPPASVLIRKAAKIERGSDQPNKKKVGSITR TQLREIAQTKLPDLNANDIEAAMNIVEGTAKNMGVTVKDMSTATDQILEQLKVLTLLEAAELVKQIEEAFGVSAAAPAGGMM VMAAPGAAAAEPVEEQTEFNVVLEEVPADRKIAVLKIVREITGLGLKEAKELVESTPKAVKEGVNKESAEEISKKIADAGGKVV IKMSSKTYLPPEEEIKRDWYVVDAADKRLGRLASEIAMVLRGKRKAEYTPHLDTGDFVVVINAEKVVVTGKKPSQKLYRRHS GRPGGMKTETFAKLQQRLPERIVEHAVKGMLPKNSLGRQLFTKLKVYSGSTHPHTAQKPKELIINTIPGENMIQPQTYLNVADN SGARKLMCIRVLGAGNRRYGGVGDRIIAVVKDAQPNMAVKKSDVVEAVIVRTKKSINRDSGMSIRFDDNAAVIINKEGNPKGT RVFGPVARELRDKNFTKIVSLAPEVLMLSPRRTKFRKQQRGRMEGLAHRGSTLNFGDFALQAQEPCWITSRQIEASRRAMTRYI RRGGKIWIRIFPDKPVTMRPAETRMGSGKGNPEFWVAVVKPGRILFEIAGVSEEIAREAMRLAAYKLPIKTKFIVRSQPQEQEMN AQEIIRSIEAEQLKSDLPQIYVGDTVRVGVKIKEGDKYRVQPYEGVVIGKRNGGINETITVRRVFQGVGVERVFLLHSPRIDNIKI MRRGKVRRAKLYYLRQLSGKATRIKQRFDRALMTRVKRGNVARNRRNKILKLAKGFRGSHSTLFRTANQQVMKALRSAYRD RKKKKRDFRRLWITRINAASRQQGLSYSQLIGNLKKANVELNRKMLAQLAVLDPATFAKVAELASSVKGMAHKKGTGSTRNG RDSNAQRLGVKRFGGQVVRAGNILVRQRGTKFHPGNNVGIGNDDTLFALIDGVVTFERKGKSRKKVSVYPSVTEEAVASMNN ENYTEPSFLLPDLIEIQRSSFRWFLEEGLIEELNSFSPITDYTGKLELHFLGHNYKLKEPKYSVEESKRRDSTYGVQMYVPTRLLN KETGDIKEQEVFIGDLPLMTDRGTFIINGAERVIVNQIVRSPGVYYKSEIDKNGRRTYSASLIPNRGAWLKFETDRNDLVWVRID KTRKLSIQVLLKALGLSDNEILDALRHPEYFQKTIEKEGQFSEEEALLELYRKLRPGEPPTVMGGQQLLESRFFDPKRYDLGRVG RYKLNKKLRLSVPDTTRVLTPGDILSAVDYLINLEYDIGSIDDIDHLGNRRVRSVGELLQNQVRVGLNRLERIIRERMTVSDAEV LTPASLVNPKPLVAAIKEFFGSSQLSQFMDQTNPLAELTHKRRLSALGPGGLTRERAGFAVRDIHPSHYGRICPIETPEGPNAGLI GSLATHARVNQYGFLETPFRPVENGRVCYEKPAVYMTADEEDDLRVAPGDIPVDDNGQILGIQVPVRYRQEFSTTTPEQVDYV AVSPVQIVSVATSMIPFLEHDDANRALMGSNMQRQAVPLLKPERPLVGTGLEAQGARDSGMVIVSRTDGDVVYVDATEIRVR

VKEKAALTNRESETIPHKPQEIKYVLSKYQRSNQDTCLNQKPLVRIGEKVIAGQVLADGSSTEGGELALGQNVIVAYMPWEGY NYEDAILISERLVQEDVYTSIHIEKFEIEARQTKLGPEEITREIPNVGEDALRQLDEQGIIRVGAWVESGDILVGKVTPKGESDQPP EEKLLRAIFGEKARDVRDNSLRVPNGEKGRVVDVRLFTREQGDELPPGANMVVRVYVAQKRKIQVGDKMAGRHGNKGIISRI LPLEDMPYLPDGTPVDIVLNPLGVPSRMNVGQVFECLLGWAGHNLGVRFKITPFDEMYGEESSRRIVHGKLWEAREETSRDWV YNPENPGKIMVYDGRTGEPFDRAVTVGIAYMLKLVHLVDDKIHARSTGPYSLVTQQPLGGKAQQGGQRFGEMEVWALEAFG AAYTLQELLTVKSDDMQGRNEALNAIVKGKAIPRPGTPESFKVLMRELQSLGLDIAVHKVETQTDGSSLDVEVDLMADQVSRR TPPRPTYESFSRDSLDEDEMPVVSLAQMMESGVHFGHQTRRWNPKMSPYIYTARNGVHIIDLVQTAQLMDDAYNYMRSQAEQ GKKFLFVGTKRQAAGIIAQEANRCGSHYINQRWLGGMLTNWATIKTRADRLKDLERREENGALDLLPKKEASMLRREMSKLQ KYLGGIKNMRKVPDVVIIVDQRREYNAVQECQKLSIPIVSMLDTNCDPDTVDVPIPANDDAIRSIKLIVGKLADAIYEGRHGQLE VEPDDEDYDIPEEDYEYNESEMGQKIHPVGFRLGITQEHQSLWFAVPGRYPELLQEDHKLRQYIEQKLGRNAQNNAGLSEIHIE RKADQVDLELRTARPGVVVGRGGQGIEALRTGLQQLLGSHRQVRINVVEVQKVDADAYLIAEYIAQQLERRVSFRRVVRQAIQ RAQRAGVQGIKVQVSGRLNGAEIARTEWTREGRVPLHTLRADIDYSYCTAQTVYGILGIKVWVFKGEIIPGQEDIVSQPVTRER EPRRRQQQRRRQQFEDRSNEAMATGRRKASKAKKEETNWQERVIQIRRVSKVVKGGKKLSFRAIVIVGNERGQVGVGVGKAS DVIGAVKKGVADGKKHLIEIPITKSNSIPHPIDGVGGGAKVIMRPAAPGTGVIAGGAVRTVLELAGVRNVLAKQLGSNNPLNNA RAAVNALSTLRTFAEVAEDRGIAVENLYIMATVAETNSGRALYWGTGRRKSAVAQVRLVPGEGKFVVNGKEGELYFQYNPN YLGVIKAPLETLGLENEYDILVKAKGGGLTGQADSIRLGVARALCQLDPDNRSPLKIEGYLTRDPRAKERKKYGLHKARKAPQ YSKRMATLQQQKIRIRLQAFDRRLLDTSCEKIVDTANRTNATAIGPIPLPTKRKIYCVLRSPHVDKDSREHFETRTHRRIIDIHQPS SKTIDALMKLDLPSGVDIEVKLMARQPTKKTGSKKQKKNVPNGVAYIQSTFNNSIVTITDQNGDVISWASAGSSGFKGAKKGTP FAAQTAAESAGRRAIDQGMRQIQVMVSGPGAGRETAIRALQGAGLEITLIRDVTPIPHNGCRPPKRRRVMARIAGVDLPRDKRV EIGLTYIYGIGLRRSQDILAATDVNPDTRVKDLTDADLAALRAEIESNYQVEGDLRRLEAMNIKRLVDIGCYRGRRHRMGLPVR GQRTRTNARTRRGRRQTVAGKKKAPGKMGRSLKKGPFVADHLLSKLEKLNANNEKQVIKTWSRASTILPLMVGHTIAVHNGK QHVPVFVNEQMVGHKLGEFAPTRTYRGHGKTDKKSGRMSDKNEGYKIISDNRQARYLYEILETYEAGIQLTGTEVKSIRAGKV NLQDGYALLRDGEAWLINAHISPYTASGQYFNHEPRRTRKLLLHGLEIRKLIGKVEQQGLTLIPLKMYFKRGWVKISIGLCRGK KVHDKREDLKRRQDQRDIQRAMKNYMAEISAKLVQDLRQKTGAGIMDCKKALNETQGNIDEAIDWLRKKGIASAGKKSDRV TAEGLVEIYTTPDRSGGVLIEVNCQTDFVARNDAFKLLVKNLAKQAVNADNVTSLLAQPYIENTAVTVDEYIKETIATLGENIQ VRRFVNFSLEGSPGAIDGYIHTGGRVGVLISIGVDTETAAKNEEVQSLAKNTAMQVAACPNVEYVSVDKIPDQVVQKEKEIEM GKEDLGNKPENIKEKIVQGRIDKRLKEMTLLDQPYIRDQSISVAELIKQVESKVSEPIKVHQFVRYILGEGIEKQESNFAQEVAAQ **IGAK**

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MQIPRLHPDTVEEVKHRADIVDVISDYVVLRRRGKDFVGLCPFHEEKTPSFTVSPNKQIYYCFGCQASGNAIRFIMDLNKRKFAE VVLDLAKRYQVPVKTLAPEQRQELQRQLSLREQLFEVLASTSQFYQHVLRQDIGQQALQYLQKKRFLKTETVEKFALGYAPPG WETLYHYLVENKSYPAQLVEKAGLIKPRKEGGGYYDVFRNRLMIPIRDVQGRVIAFGGRTLTDEQPKYLNSPETELFDKSKTLF

ALDVAKDAISKLDQAVVVEGYFDAIALHANGINNVVASLGTALSLEQVRLLLRYSESKQLVLNFDGDKAGINATERAIGEISNL AYKGEVRLKILHIPDGKDADEYLKNHSVTDYEQLLVEAPLWLDWQIAQVIQGRDLKQPTDFQLVSREFVKLLQKILNSDTLNY YISHCAEILSLGDTRLIPLRVENLITQVAPRRTPTPILRPPASPNTHQISHPQPSLLEQAEGLLLRIFLHCPQERQVIIETLGSSNLEFS VSHYRFLWEKSLOFPLOTLDLISQLQNLYLETQNDLGPVEHIFQLNEKNKQEILLRTNQLVQAAIACMEKVFRENRYRHFLELW QKTDPSTDPDQYNLYAQTIYADKMRIQELSKQRQLSISDLINMKLAEAESTMNKTVEATQRAFNSIRTGRANASLLDKVQVDY YGSPTPLKSLSNITTPDASTILIQPYDRSSLNIVEKAISLSDVGLTPSNDGSVVRLNIPPLTSDRRKELVKLAAKYAEEGRVGIRNIR RDALDSIRKQEKAGEISEDESRDQQDKLQKITGKYTAKIDELLAEKEKDITTVMPVIEKKRTRDLPQINERIRFPKIRVIDNEGAQ LGIMAPLEALRLAEEKELDLVLLSDKADPPVCRIMDYGKYKFEQEKKAREARKKQHTADVKEVKMRYKIEEHDYNVRVKQA ERFLKDGDKVKATVMFRGREIQHSDLAETLLNRMATDLEPFGEIQQAPKKEGRNMMMLISPKKMSMVTLPGLKDLIEKISLER NLPRLAVQSSIREALLKGYERYRRAQNLERRQFDENYFDNFEVELDIDGEGFRVLSTKIIVEEVTNSDHQISLDEVQQVAPEAQS GDSVVLDVTPDQGEFGRMAAMQTKQVLAQKLRDQQRQMVQEEFQDLEGTVLQARVLRFERQSVILAVSSSFGQPEVEAELPK REQLPNDTYRSNATFKVYLKKVSQGQQRGPQLLVSRADAGLVVYLFANEVPEIEDEVVRIVAVAREANPPSRYVGPRTKIAVD TLDRDVDPVGACIGARGSRIQVVVNELRGEKIDVIRWSPDPATYIANALSPARVDEVRLMDPESRQTHVLVAEDQLSLAIGKEG ONVRLAARLTGWKIDIKDQAKYDYGAEDAKFAAVRANYQEESNQFEVIEEEYERDPDEGEDDFNSMEEENMSKKSLASLSAA DISDKRALVRVDFNVPVDDQGNITDDTRIRAALPTIQDLISKGAKVILASHFGRPKGVDEKFRLTPVAKRLSELLGQEVIKTNDCI GDDVTARVAALEQGQVLLLENVRFHKEEEKNDPEFARQLAANADFYVNDAFGTAHRAHASTEGVTKYLSPSVAGYLVEKEL QYLQAAIEFPQRPLAAIIGGSKVSSKIGVIETLLEKCDKLIIGGGMIFTFYKARGLNVGKSLVEQDKLELASSLEKKAAERGVTLL LPTDIVAADKFAPDADAVTVSIENIPDDRMGLDIGPDSVKLFQDALADCKTVIWNGPMGVFEFDKFAVGTEAIAQTLAEIGKTG ATTIIGGGDSVAAVEKVGLADQMSHISTGGGASLELLEGTVLPGIAALDEAMTKFIFVTGGVVSSIGKGIVAASLGRLLKSRDYS VSILKLDPYINVDPGTMSPFQHGEVFVTQDGAETDLDLGHYERFTDTYMSRLNSVTTGLIYQSVINKERRGDYNGGTVQVIPHIT NEIKERVIRVAKETNPAALITEIGGTVGDIESLPFLEAIRQLRKEVGKQNVLYMHVTLLPWIASAGEMKTKPTQHSVKELRSIGIQ PDILVCRCDRPIPVGLKQKLSEFCDVPVECVITCQDASSIYEVPLILEKEGLAQQTLDLLQMEQREPDLTHWETMVERMSHPQSP VEIAIVGKYVRLGDAYLSVVESLRHAAIATYGDLRLRWVNSEILEVEPPDNYLLGVDGIIVPGGFGIRGVDGKISAIEYARNRQIP FLGLCLGMQCSIIEWARNVEGLVGANSAEFDPKTDYPVINLLPEQQDVIDIGGTMRLGLYPCHVQPNTLAFDLYQEEVIYERHR HRYEFNNLYRNHLLNSGYVISGTSPDGRLVEIVEYPQHPFFIACQFHPEFQSRPSHPHPLFKGFMEAAISHTHQGKKQLPHGFPQF PMVKKVSRRLQALQAKVEERDYAPLEALSLLKETATAKFPEAAEAHIRLGIDPKYTDQQLRTTVVLPKGTGQIVRVAVIARGE KVTEATNAGADIAGSEELIDEIQRGMMDFDKLIATPDVMPQVAKLGKLLGPRGLMPSPKGGTVTFDIASAISEFKAGKLEFRAD RTGIVHVMFGKASFSSEDLLVNLKALQETIDRNRPSGAKGRYWRTFYISSTMGPSIKVDINALRDLKTTDAAMGTRSYRPYTPS TROVTISDFAEITKTEPEKSLTESVHRPKGRNNQGRITSRRRGGGHKQLYRIIDFKRDKRDITATVIAVEYDPNRNARIALLEYED GEKRYILHPNGLKVGAKVTAGPQAPFEDGNALPLSNIPLGTNVHNVEMTPGKGGQIVRAAGATAQLMAKEGNYVTLKLPSGE VRMVRRECYATIGQVGNTDARNLSAGKAGRNRWKGRRPKVRGSVMNPVDHPHGGGEGRAPIGRSGPVTPWGKPALGAKTR KRKKASSKLIVRRRRKSSKRGRGGRQSMSVGILGTKLGMTQIFDEAGVSIPVTVIKAGPCTVTQVKTQPTDGYCAIQVGYGEVK

PKALNQPKLGHLAKSSAGPVRYLNEYRTDAAGDYALGQEIKADIFSVGQIVDVIGTSIGRGFAGNQKRNNFGRGPMSHGSKNH RAPGSIGAGTTPGRVYPGKRMAGRLGGSRVTVRKLTVVKVDAERNLILIKGAIPGKPGGLVNVVPTTKVGNKMVESIVKNWO GEEVGQTSFELRIAKEETASHIVHRALVRQMTNSRQGTASTKTRAEVRGGGRKPWRQKGTGRARAGSIRSPLWRGGGVIFGPK PRDFNIKLNRKERRLALRTAFVSRREDLIVVEEFTDQLQRPKSKELVAALARWGATAEQKTLLILSEIGQSTETISLSARNVENIK VIAADQLNVFDLLHADKIVVTSSALNKIQEVYSAMATTRLKTLYGQTIVPKLTQQFQYTNVHQVPKVLKVTVNRGLGEAAQN AKALEASLSEIALITGOKPVVTRAKKAIAGFKIROGMPVGIMVTLRGERMYAFLDRLISLALPRIRDFRGVSAKSFDGRGNYTLG VREQLIFPEIEYDRIDQIRGLDISIITTAKTDEEGRALLKEMGMPFRDQMSRIGKRPITIPAKVQVAIDGTKVVVKGPKGELSRDLP THVTVSQSGETLLVTRRDDTRTSRQMHGLSRTLVANMVEGVSQGFQRRLEIQGVGYRAQVQGANLVLNIGYSHQVQIEPPAG VQFVVENNTNVIVSGYDKEVVGNTAAKIRAVRPPEPYKGKGIRYAGEVVRRKAGKTGGKGKKMAKKVVAVIKLALNAGKAN PAPPVGPALGQHGVNIMMFCKEYNAKTADQAGMVIPVEISVFEDRSFTFVLKTPPASVLIRKAAKIERGSDQPNKKKVGSITRT QLKEIAQTKLPDLNANDIEAAMNIVEGTAKNMGVTVKDMSTATDQILEQLKVLTLLEAAELVKQIEEAFGVSAAAPAGGMMV MAAPGAAAAEPVEEQTEFNVVLEEVPADKKIAVLKIVREITGLGLKEAKELVESTPKAVKEGVNKESAEEISKKIAEAGGKVVI KMSSKTYLPPEEEIKRDWYVVDAADKRLGRLASEIAMVLRGKRKAEYTPHLDTGDFVVVINAEKVVVTGKKPSQKLYRRHSG RPGGMKTETFAKLQQRLPERIVEHAVKGMLPKNSLGRQLFTKLKVYSGSTHPHTAQKPKELIINTIPGENMIQPQTYLNVADNS GARKLMCIRVLGAGNRRYGGVGDRIIAVVKDAQPNMAVKKSDVVEAVIVRTKKSINRDSGMSIRFDDNAAVIINKEGNPKGTR VFGPVARELRDKNFTKIVSLAPEVLMLSPRRTKFRKQQRGRMEGLAHRGSTLNFGDFALQAQEPCWITSRQIEASRRAMTRYIR RGGKIWIRIFPDKPVTMRPAETRMGSGKGNPEFWVAVVKPGRILFEIAGVSEEIAREAMRLAAYKLPIKTKFIVRSQPQEQEMNA QEIIRSIEAEQLKSDLPQIYVGDTVRVGVKIKEGDKYRVQPYEGVVIGKRNGGINETITVRRVFQGVGVERVFLLHSPRIDNIKIM RRGKVRRAKLYYLRQLSGKATRIKQRFDRALMTRVKRGNVARNRRNKILKLAKGFRGSHSTLFRTANQQVMKALRSAYRDR KKKKRDFRRLWITRINAASRQQGLSYSQLIGNLKKANVELNRKMLAQLAVLDPATFAKVAELASSVKGMAHKKGTGSTRNGR DSNAQRLGVKRFGGQVVRAGNILVRQRGTKFHPGNNVGIGNDDTLFALIDGVVTFERKGKSRKKVSVYPRVTEEAVASMNNE NYMEPSFLLPDLIEIQRSSFRWFLEEGLIEELNSFSPITDYTGKLELHFLGHNYKLKEPKYSVEESKRRDSTYGVQMYVPTRLLNK ETGDIKEQEVFIGDLPLMTDRGTFIINGAERVIVNQIVRSPGVYYKSEIDKNGRRTYSASLIPNRGAWLKFETDRNDLVWVRIDK TRKLSIQVLLKALGLSDNEILDALRHPEYFQKTIEKEGQFSEEEALLELYRKLRPGEPPTVMGGQQLLESRFFDPKRYDLGRVGR YKLNKKLRLSVPDTTRVLTPGDILSAVDYLINLEYDIGSIDDIDHLGNRRVRSVGELLQNQVRVGLNRLERIIRERMTVSDAEVL TPASLVNPKPLVAAIKEFFGSSQLSQFMDQTNPLAELTHKRRLSALGPGGLTRERAGFAVRDIHPSHYGRICPIETPEGPNAGLIG SLATHARVNQYGFLETPFRPVENGRVCYEKPAVYMTADEEDDLRVAPGDIPVDDNGQILGIQVPVRYRQEFSTTTPEQVDYVA VSPVQIVSVATSMIPFLEHDDANRALMGSNMQRQAVPLLKPERPLVGTGLEAQGARDSGMVIVSRTDGDVVYVDATEIRVRV KEKAALTNRESESIPHKPQEVKYVLSKYQRSNQDTCLNQKPLVRIGEKVIAGQVLADGSSTEGGELALGQNVIVAYMPWEGYN YEDAILISERLVQEDVYTSIHIEKFEIEARQTKLGPEEITREIPNVGEDALRQLDEQGIIRVGAWVESGDILVGKVTPKGESDQPPE EKLLRAIFGEKARDVRDNSLRVPNGEKGRVVDVRLFTREQGDELPPGANMVVRVYVAQKRKIQVGDKMAGRHGNKGIISRILP LEDMPYLPDGTPVDIVLNPLGVPSRMNVGQVFECLLGWAGHNLGVRFKITPFDEMYGEESSRRIVHGKLWEAREETSRDWVY

NPENPGKIMVYDGRTGEPFDRAVTVGIAYMLKLVHLVDDKIHARSTGPYSLVTQQPLGGKAQQGGQRFGEMEVWALEAFGA AYTLQELLTVKSDDMQGRNEALNAIVKGKAIPRPGTPESFKVLMRELQSLGLDIAVHKVETQTDGSSLDVEVDLMADQVSRRT PPRPTYESFSRDSLDEDEMPVVSLAQMMESGVHFGHQTRRWNPKMSPYIYTARNGVHIIDLVQTAQLMDDAYNYMRSQAEQG KKFLFVGTKRQAAGIIAQEANRCGSHYINQRWLGGMLTNWATIKTRADRLKDLERREENGALDLLPKKEASMLRREMSKLQK YLGGIKNMRKVPDVVIIVDQRREYNAVQECQKLSIPIVSMLDTNCDPDTVDIPIPANDDAIRSIKLIVGKLADAIYEGRHGQLEVE PDYEDYDIPEEDYEDEEPGYVDHFSDDDDEEMGQKIHPVGFRLGITQEHQSLWFAVPGRYPELLQEDHKLRQYIEQKLGRNAQ NNAGLSEIHIERKADOVDLELRTARPGVVVGRGGQGIEALRTGLQQLLGSHRQVRINVVEVQKVDADAYLIAEYIAQQLERRV SFRRVVRQAIQRAQRAGVQGIKVQVSGRLNGAEIARTEWTREGRVPLHTLRADIDYSYCTAQTVYGILGVKVWVFKGEIIPGQE DIVSQPVTREREPRRRQQQRRRQQFEDRSNEAMATGRRKASKAKKEETNWQERVIQIRRVSKVVKGGKKLSFRAIVIVGNERG QVGVGVGKASDVIGAVKKGVADGKKHLIEIPITKSNSIPHPIDGVGGGAKVIMRPAAPGTGVIAGGAVRTVLELAGVRNVLAK QLGSNNPLNNARAAVNALSTLRTFAEVAEDRGIAVENLYIMATVAETNSGRALYWGTGRRKSAVAQVRLVPGEGKFVVNGK EGELYFQYNPNYLGVIKAPLETLGLENEYDILVKAKGGGLTGQADSIRLGVARALCQLDPDNRSPLKIEGYLTRDPRAKERKKY GLHKARKAPQYSKRMATLQQQKIRIRLQAFDRRLLDTSCEKIVDTANRTNATAIGPIPLPTKRKIYCVLRSPHVDKDSREHFETR THRRIIDIHQPSSKTIDALMKLDLPSGVDIEVKLMARQPTKKTGSKKQKKNVPNGVAYIQSTFNNSIVTITDQNGDVISWASAGS SGFKGAKKGTPFAAQTAAESAGRRAIDQGMRQIQVMVSGPGAGRETAIRALQGAGLEITLIRDVTPIPHNGCRPPKRRRVMARI AGVDLPRDKRVEIGLTYIYGIGLRRSQDILAATDVNPDTRVKDLTDADLAALRAEIESNYQVEGDLRRLEAMNIKRLVDIGCYR GRRHRMGLPVRGQRTRTNARTRRGRRQTVAGKKKAPGKMGRSLKKGPFVADHLLSKLEKLNANNEKQVIKTWSRASTILPL MVGHTIAVHNGKQHVPVFVNEQMVGHKLGEFAPTRTYRGHGKTDKKSGRMSDKNEGYKIISDNRQARYLYEILETYEAGIQL TGTEVKSIRAGKVNLQDGYALLRDGEAWLINAHISPYTASGQYFNHEPRRTRKLLLHGLEIRKLIGKVEQQGLTLIPLKMYFKR GWVKISIGLCRGKKVHDKREDLKRRQDQRDIQRAMKNYMAEISAKLVQDLRQKTGAGMMDCKKALNETQGNIDEAIDWLRK KGIASAGKKSDRVTAEGLVDIYTTPDRSGGVLIEVNCQTDFVARNDAFKLLVKNLAKQAVNADNVTSLLAQPYIENTDVTVTV DDYIKETIATLGENIQVRRFVNFSLEGAPGVIDGYIHTGGRVGVLVSIGVYTETAAKNEEVQSLARNTAMQVAACPNVEYVSVD KIPDQVVQKEKEIEMGKEDLGNKPENIKEKIVQGRIDKRLKEMTLLDQPYIRDQNISVAELIKQVESKLSEPIIVHQFVRYILGEGI **EKQESNFAQEVAAQIGAK**

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MQIPRLHPDTVEEVKHRADIVDVISDYVVLRRRGKDFVGLCPFHEEKTPSFTVSPTKQIYYCFGCQASGNAIKFMMDLNKRQFA EVVLDLAKRYQVPVKTLAPEQRQELQRQLSLREQLFEVLASTSQFYQHVLRQDIGQQALQYLQKKRFLKTETVEKFALGYAPP GWETLYHYLVENKNYPAQLVEKAGLIKPRKEGGGYYDVFRNRLMIPIRDVQGRVIAFGGRTLTDEQPKYLNSPETELFDKSKT LFALDVSKDAISKLDQAVVVEGYFDAIALHANGINNVVASLGTALSLEQVRLLLRYSESKQLVLNFDGDKAGINATERAIGEIS NLAYKGEVQLKILHIPDGKDADEYLKNHSVTDYGQLLVDAPLWLDWQIAQVIQGRDLRQPTDFQLVSREFVKLLQKILNSDTL NYYISHCAEILSLGDTRLIPLRVENLITQVAPRRTPTPRPPQPDSTTSPNTHPISHPQPSLLEQAEGLLLRIFLHCPQERQVIIETLGSS NLEFSVSHHRFLWEKSLQFPSQTLDLISQLQNLYLETQNDLGPVQHIFQLNEKNKQEILLRTSQLVQAAIACMEKVFRENRYRHF

LELWQKTDPSTDPDQYSLYAQTIYADKMRIQELSKQRQLSIADLINMNKTVEATQRAFNSIRTGRANASLLDKVQVDYYGSPTS LKSLANITTPDATTILIOPYDRTSLNIVEKAISLSDVGLTPSNDGSVIRLNIPPLTSDRRKELVKLAAKYAEEGRVGIRNIRRDALDS IRKQEKAGEVSEDESRDQQDKLQKITSKYTAKIDELLAEKEKDITTVMPVIEKKRTRDLPQINERIRFPKIRVIDSEGAQLGIMAPL EALRLAEEKELDLVLLSDKADPPVCRIMDYGKYKFEQEKKAREARKKQHTADVKEVKMRYKIEEHDYNVRVKQAERFLKDG DKVKATVMFRGREIQHSDLAETLLNRMATDLEPFGEVQQAPKKEGRNMMMLISPKKMSMVTLPGLKDLIEKISLERNLPRLAV OSSIREALLKGYERYRRAQNLERRQFDENYFDNFEVELDIDGEGFRVLSTKTIVEEVTNGDHQISLDEVQQVAPEAQSGDSVVL DVTPDQGEFGRMAAMQTKQVLAQKLRDQQRQMVQEEFQDLEGTVLQARVLRFERQSVILAVSSSFGQPEVEAELPKREQLPN DTYRSNATFKVYLKKVSQGQQRGPQLLVSRADAGLVVYLFANEVPEIEDEVVRIVAVAREANPPSRYVGPRTKIAVDTLDRDV DPVGACIGARGSRIQVVVNELRGEKIDVIRWSPDPATYIANALSPARVDEVRLMDPESRQTHVLVAEDQLSLAIGKEGQNVRLA ARLTGWKIDIKDQAKYDYGAEDAKFAAVRANYQEESNQLDNQFEVIEEEYEDDPDAGEDDFNSMEEENMSKKSLASLSAADI SGKRALVRVDFNVPVDDQGNITDDTRIRAALPTIQDLISKGAKVILASHFGRPKGVDEKLRLTPVAKRLSELLGQEVIKTDDCIG DDVTTQVAALEKGQVLLLENVRFYKEEEKNDPEFARQLAANADFYVNDAFGTAHRAHASTEGVTKYLSPSVAGYLVEKELQ YLQGAIEVPQRPLVAIIGGSKVSSKITVIETLLEKCDKLIIGGGMIFTFYKARGLNVGKSLVEDDKLVLASSLEKKAAERGVALLL PTDIVAADRFAPDADAVTVSIDSIPDDRMGLDIGPDSVKVFQAALADCKTVIWNGPMGVFEFDKFAVGTEAIAQTLAEISKTGA TTIIGGGDSVAAVEKVGLADQMSHISTGGGASLELLEGKVLPGIAALDEAMTKFIFVTGGVVSSIGKGIVAASLGRLLKSRDYSV SILKLDPYINVDPGTMSPFQHGEVFVTQDGAETDLDLGHYERFTDTSMSRLNSVTTGLIYQSVINKERRGDYNGGTVQVIPHITN EIKERVIRVAKETNPAAVITEIGGTVGDIESLPFLEAIRQLRKEVGKQNVLYMHVTLLPWIASAGEMKTKPTQHSVKELRSIGIQP DILVCRCDRPIPVGLKQKLSEFCDVPVECVITCQDASSIYEVPLILEKEGLAQQTLDLLQMEQREPDLTHWETMVERMSHPQSPV EIAIVGKYVRLGDAYLSVVESLRHAAIATYGDLRLRWVNSEILEVEPPDNYLLGVDGIIVPGGFGIRGVDGKISAIEYARNRQIPF LGLCLGMQCSIIEWARNVEGLVGANSAEFNPQTDYPVINLLPEQQDVIDLGGTMRLGLYPCHVQPNTLAFDLYQEEVIYERHRH RYEFNNLYRNHLLNSGYVISGTSPDGRLVEIVEYPQHPFFIACQFHPEFQSRPSHPHPLFKGFMEAAISHTHQGKKPNYPLRVSSV PMVKKVSRRLQALQAKVEERDYTPLEALALLKETATAKFAEAAEAHIRLGIDPKYTDQQLRTTVVLPKGTGQIVRVAVIARGE KVTEATNAGADIAGSEELIDEIQKGMMDFDKLIATPDVMPQVAKLGKLLGPRGLMPSPKGGTVTFDIASAISEFKAGKLEFRAD RTGIVHVMFGKASFSSEDLLVNLKALQETIDRNRPSGAKGRYWRTFYISSTMGPSIKIDINALRDFKTTDVAMGTRSYRPYTPST RQVTISDFAEITKTEPEKSLTESVHRPKGRNNQGRITSRRRGGGHKQLYRIIDFKRDKRDITATVIAVEYDPNRNARIALVEYEDG EKRYILHPNGLKVGAKITAGPQAPFEDGNALPLSNIPLGTNVHNVEMTPGKGGQIVRAAGATAQLMAKEGNYVTLKLPSGEVR MVRRECYATIGQVGNTDARNLSAGKAGRNRWKGRRPKVRGSVMNPVDHPHGGGEGRAPIGRSGPVTPWGKPALGAKTRKR KKASSKLIVRRRRKSSKRGRGGRQSMSVGILGTKLGMTQIFDEAGVSIPVTVIQAGPCTVTQVKTQPTDGYCAIQVGYGEVKPK ALNKPKLGHLAKSSAGPVRYLNEYRTDAAGDYALGQEIKADIFSVGQIVDVIGTSIGRGFAGNQKRNNFGRGPMSHGSKNHRA PGSIGAGTTPGRVYPGKRMAGRLGGSRVTVRKLTVVKVDAERNLILIKGAIPGKPGGLVNVVPTTKVGNKMVESTVKNWQGE EVGQTSFELRVAKEETASHIVHRALVRQMTNSRQGTASTKTRAEVRGGGRKPWRQKGTGRARAGSIRSPLWRGGGVIFGPKPR DFNIKLNRKERRLALRTAFVSRREDLIVVEEFTDQLQRPKSKELVAALARWGATADQKTLLILSEIGQNTETISLSARNVENIKVI

AADQLNVFDLLHADKIVVTSSALTKIQEVYSAMATTRLKTLYGQTIVPKLTQQFQYTNVHQVPKVLKVTVNRGLGEAAQNAK ALEASLSEIALITGQKPVVTRAKKAIAGFKIRQGMPVGIMVTLRGERMYAFLDRLISLALPRIRDFRGVSAKSFDGRGNYTLGVR EQLIFPEIEYDRIDQIRGLDISIITTAKTDEEGRALLKEMGMPFRDQMSRIGKRPITIPAKVQVAIDGTKVVVKGPKGELSRDLPAH VTVSQSGETLLVTRRDDTRTSRQMHGLSRTLVANMVEGVSQGFQRRLEIQGVGYRAQVQGANLVLNIGYSHQVQIEPPAGVQ FVVENNTNVIVSGYDKEVVGNTAAKIRAVRPPEPYKGKGIRYAGEVVRRKAGKTGGKGKKMAKKVVAVIKLALNAGKANPA PPVGPALGQHGVNIMMFCKEYNAKTADQAGMVIPVEISVFEDRSFTFVLKTPPASVLIRKAAKIERGSDQPNKKKVGSITRTQL KEIAQTKLPDLNANDIEAAMNIVEGTAKNMGVTIKDMSTATDQILEQLKSLTLLEAAELVKQIEEAFGVSAAAPAGGMMMMA APGGAAAAEVVEEKTEFDVILEEVPADKKIAVLKIVREITGLGLKEAKELVESTPKAVKEGVNKEAAEDISKKITEAGGKVAIK MSSKTYLPPEEEIKRDWYVVDAADKRLGRLASEIAMVLRGKRKAEYTPHLDTGDFVVVINAEKVVVTGKKQSQKLYRRHSGR PGGMKTETFAKLQQRLPERIVEHAVKGMLPKNSLGRQLFTKLKVYSGATHPHTAQKPKELIINTIPGENMIQPQTYLNVADNSG ARKLMCIRVLGAGNRRYGGVGDRIIAVVKDAQPNMAVKKSDVVEAVIVRTKKSINRDSGMSIRFDDNAAVIINKEGNPKGTRV FGPVARELRDKNFTKIVSLAPEVLMLSPRRTKFRKQQRGRMEGLAHRGSTLNFGDFALQAQEPCWITSRQIEASRRAMTRYIRR GGKIWIRIFPDKPVTMRPAETRMGSGKGNPEFWVAVVKPGRILFEIAGVSEEIAREAMRLAAYKLPIKTKFIVRSQPQEQEMNA QEIIRSIEAEQLKSDLPQIYVGDTVRVGVKIKEGDKYRVQPYEGVVIGKRNGGINETITVRRVFQGVGVERVFLLHSPRIDNIKIM RRGKVRRAKLYYLRQLSGKATRIKQRFDRALMTRVKRGNVARNRRNKILKLAKGFRGSHSTLFRTANQQVMKALRSAYRDR KKKKRDFRRLWITRINAASRQQGLSYSQLIGNLKKANVELNRKMLAQLAVLDPTTFAKVAELASSVKGNMAHKKGTGSTRNG RDSNAQRLGVKRFGGQVVRAGNILVRQRGTKFHPGNNVGIGNDDTLFALIDGVVTFERKGKSRKKVSVYPRVTEEAVASMNN ENYMEPSFLLPDLIEIQRSSFRWFLEEGLIEELNSFSPITDYTGKLELHFLGHNYKLKEPKYSVEESKRRDSTYGVQMYVPTRLLN KETGDIKEQEVFIGDLPLMTDRGTFIINGAERVIVNQIVRSPGVYYKSEIDKNGRRTYSASLIPNRGAWLKFETDRNDLVWVRID KTRKLSIQVLLKALGLLDNEILDALRHPEYFQKTIEKEGQFSEEEALLELYRKLRPGEPPTVMGGQQLLESRFFDPKRYDLGRVG RYKLNKKLRLSVPDTTRVLTPGDILSAVDYLINLEYDIGSIDDIDHLGNRRVRSVGELLQNQVRVGLNRLERIIRERMTVSDAEV LTPASLVNPKPLVAAIKEFFGSSQLSQFMDQTNPLAELTHKRRLSALGPGGLTRERAGFAVRDIHPSHYGRICPIETPEGPNAGLI GSLATHARVNQYGFLETPFRPVENGRVCYEKPAVYMTADEEDDLRVAPGDIPVDDNGQILGIQVPVRYRQEFSTTTPEQVDYV AVSPVQIVSVATSMIPFLEHDDANRALMGSNMQRQAVPLLKPERPLVGTGLEAQGARDSGMVIVSRTDGDVVYVDATEIRVR VKEKAALTNRESESIPHKPQEIKYVLSKYQRSNQDTCLNQKPLVRIGEKVIAGQVLADGSSTEGGELALGQNVIVAYMPWEGY NYEDAILISERLVQEDVYTSIHIEKFEIEARQTKLGPEEITREIPNVGEDALRQLDEQGIIRVGAWVESGDILVGKVTPKGESDQPP EEKLLRAIFGEKARDVRDNSLRVPNGEKGRVVDVRLFTREQGDELPPGANMVVRVYVAQKRKIQVGDKMAGRHGNKGIISRI LPLEDMPYLPDGTPVDIVLNPLGVPSRMNVGQVFECLLGWAGHNLGVRFKITPFDEMYGEESSRRIVHGKLWEAREETSKDWV YNPENPGKIMVYDGRTGEPFDRAVTVGIAYMLKLVHLVDDKIHARSTGPYSLVTQQPLGGKAQQGGQRFGEMEVWALEAFG AAYTLQELLTVKSDDMQGRNEALNAIVKGKAIPRPGTPESFKVLMRELQSLGLDIAVHKVETQTDGSSLDVEVDLMADQVSRR TPPRPTYESFSRDSLDEDEMPVVSLAQMMESGVHFGHQTRRWNPKMSPYIYTARNGVHIIDLVQTAQLMDDAYNYMRSQAEQ GKKFLFVGTKRQAAGIIAQEANRCGSHYINQRWLGGMLTNWATIKTRADRLKDLERREENGALDLLPKKEASMLRREMSKLQ

KYLGGIKNMRKVPDVVIIVDQRREYNAVQECQKLSIPIVSMLDTNCDPDTVDIPIPANDDAIRSIKLIVGKLADAIYEGRHGQLE VESDYEEYESAEEDYEYDESEFVDSFSDDDDEEMGQKIHPVGFRLGITQEHQSLWFAVPGRYPELLQEDHKLRQYIEQKLGRNA QNNAGLSEIHIERKADQVDLELRTARPGVVVGRGGQGIEALRTGLQQLLGSHRQVRINVVEVQKVDADAYLIAEYIAQQLERR VSFRRVVRQAIQRAQRAGVQGIKVQVSGRLNGAEIARTEWTREGRVPLHTLRADIDYSYCTAQTVYGILGIKVWVFKGEIIPGQ EDIVSQPVTREREPRRRQQQRRRQQFEDRSNEAMATGRRKASKAKKEETNWQERVIQIRRVSKVVKGGKKLSFRAIVIVGNER GQVGVGVGKASDVIGAVKKGVADGKKHLIEIPITKSNSIPHPIDGVGGGAKVIMRPAAPGTGVIAGGAVRTVLELAGVRNVLA KQLGSNNPLNNARAAVNALSTLRTFAEVAEDRGIAVENLYIMATVAETNSGRALYWGTGRRKSAVAQVRLVPGEGKFVVNG KEGELYFQYNPNYLGVIKAPLETLGLENEYDILVKAKGGGLTGQADSIRLGVARALCQLDPDNRSPLKIEGYLTRDPRAKERKK YGLHKARKAPQYSKRMATLQQQKIRIRLQAFDRRLLDTSCEKIVDTANRTNATAIGPIPLPTKRKIYCVLRSPHVDKDSREHFET RTHRRIIDIHQPSSKTIDALMKLDLPSGVDIEVKLMARQPTKKTGSKKQKKNVPNGVAYIQSTFNNSIVTITDQNGDVISWASAG SSGFKGAKKGTPFAAQTAAESAGRRAIDQGMRQIQVMVSGPGAGRETAIRALQGAGLEITLIRDVTPIPHNGCRPPKRRRVMAR IAGVDLPRDKRVEIGLTYIYGIGLRRSQDILAATDVNPDTRVKDLTDADLAALRAEIESNYQVEGDLRRLEAMNIKRLVDIGCYR GRRHRMGLPVRGQRTRTNARTRRGRRQTVAGKKKAPGKMGRSLKKGPFVADHLLSKIEKLNANNEKQVIKTWSRASTILPLM VGHTIAVHNGKQHVPVFVNEQMVGHKLGEFAPTRSYRGHGKTDKKSGRMSDKNEGYKIISDNRQARYLYEILETYEAGIQLTG TEVKSIRAGKVNLQDGYALLRDGEAWLINAHISPYTASGQYFNHEPRRTRKLLLHGLEIRKLIGKVEQQGLTLIPLKMYFKRGW VKISIGLCRGKKVHDKREDLKRRQDQRDIQRAMKNYMAEISAKLVQDLRQKTGAGMMDCKKALNETQGNIDEAIDWLRKKG IASAGKKSDRVTAEGLVDIYTTPDKSGGVIIEVNCQTDFVARNDAFKLLVKNLAKQAVNADNVASLLAQPYIEKTDVTVDEYIK ETIATLGENIQVRRFVNFSLEGAPGAIDGYIHTGGRVGVLVSIGVDTETAAKNEELQSLAKNTAMQVAACPNVEYVSVDKIPDQ VVEKEKEIEMGKEDLGNKPANIKEKIVQGRIDKRLKEMTLLDQPYIRDQNISVAELIKQVESKVSEPIKVHQFVRYILGEGIEKQE **SNFAEEVAAQIGAK**

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MQIPRLHPDTVEEVKHRADIVDVISDYVVLRRRGKDFVGLCPFHEEKTPSFTVSPTKQIYYCFGCQASGNAIKFMMDLNKRQFA EVVLDLAKRYQVPVKTLAPEQRQELQRQLSLREQLFEVLASTSQFYQHVLRQDIGQQALQYLQKKRFLKTETVEKFALGYAPP GWETLYHYLVENKNYPAQLVEKAGLIKPRKEGGGYYDVFRNRLMIPIRDVQGRVIAFGGRTLTDEQPKYLNSPETELFDKSKT LFALDVSKDAISKLDQAVVVEGYFDAIALHANGINNVVASLGTALSLEQVRLLLRYSESKQLVLNFDGDKAGINATERAIGEIS NLAYKGEVQLKILHIPDGKDADEYLKNHSVTDYGQLLVDAPLWLDWQIAQVIQGRDLRQPTDFQLVSREFVKLLQKILNSDTL NYYISHCAEILSLGDTRLIPLRVENLITQVAPRRTPTPRPPQPDSTTSPNTHQISHPQPSLLEQAEGLLLRIFLHCPQERQVIIETLGF SNLEFSVSHHRFLWEKSLQFPSQTLDLISQLQNLYLETQNDLGPVQHIFQLNEKNKQEILLRTSQLVQAAIACMEKVFRENRYRH FLELWQKTDPSTDPDQYSLYAQTIYADKMRIQELSKQRQLSIADLINMKLAEAESTMNKTVEATQRAFNSIRTGRANASLLDKV QVDYYGSPTSLKSLANITTPDATTILIQPYDRTSLNIVEKAISLSDVGLTPSNDGSVIRLNIPPLTSDRRKELVKLAAKYAEEGRVG IRNIRRDALDSIRKQEKAGEVSEDESRDQQDKLQKITSKYTAKIDELLAEKEKDITTVMPVIEKKRTRDLPQINERIRFPKIRVIDS EGAQLGIMAPLEALRLAEEKELDLVLLSDKADPPVCRIMDYGKYKFEQEKKAREARKKQHTADVKEVKMRYKIEEHDYNVR

VKQAERFLKDGDKVKATVMFRGREIQHSDLAETLLNRMATDLEPFGEVQQAPKKEGRNMMMLISPKKMSMVTLPGLKDLIEK ISLERNLPRLAVQSSIREALLKGYERYRRAQNLERRQFDENYFDNFEVELDIDGEGFRVLSTKTIVEEVTNGDHQISLDEVQQVA PEAQSGDSVVLDVTPDQGEFGRMAAMQTKQVLAQKLRDQQRQMVQEEFQDLEGTVLQARVLRFERQSVILAVSSSFGQPEVE AELPKREQLPNDTYRSNATFKVYLKKVSQGQQRGPQLLVSRADAGLVVYLFANEVPEIEDEVVRIVAVAREANPPSRYVGPRT KIAVDTLDRDVDPVGACIGARGSRIQVVVNELRGEKIDVIRWSPDPATYIANALSPARVDEVRLMDPESRQTHVLVAEDQLSLA IGKEGONVRLAARLTGWKIDIKDQAKYDYGAEDAKFAAVRANYQEESNQLDHQFEVMEEEYEDDPDAGEDDFNSMEEENMS KKSLASLSAADISDKRALVRVDFNVPVDDQGNITDDTRIRAALPTIQDLISKGAKVILASHFGRPKGVDEKLRLTPVAKRLSELL GQEVIKTDDCIGDDVTAQVAALEKGQVLLLENVRFYKEEENNDPEFARQLAANADFYVNDAFGTAHRAHASTEGVTKYLSPS VAGYLVEKELQYLQGAIEVPQRPLVAIIGGSKVSSKIGVIETLLEKCDKLIIGGGMIFTFYKARGLNVGKSLVEQDKLGLASSLEK KAAERGVTLLLPTDIVAADKFGPDADAVTVSIDHIPDDRMGLDIGPDSVKVFQAALADCKTVIWNGPMGVFEFDKFAVGTEAI AQTLAEISKTGATTIIGGGDSVAAVEKVGLADQMSHISTGGGASLELLEGKVLPGIAALDEAMTKFIFVTGGVVSSIGKGIVAAS LGRLLKSRDYSVSILKLDPYINVDPGTMSPFQHGEVFVTQDGAETDLDLGHYERFTDTSMSRLNSVTTGLIYQSVINKERRGDY NGGTVQVIPHITNEIKERVIRVAKETNPAAVITEIGGTVGDIESLPFLEAIRQLRKEVGKQNVLYMHVTLLPWIASAGEMKTKPT OHSVKELRSIGIOPDILVCRCDRPIPVGLKQKLSEFCDVPVECVITCQDASSIYEVPLILEKEGLAQQTLDLLQMEQREPDLTHWE TMVERMSHPQSPVEIAIVGKYVRLGDAYLSVVESLRHAAIATYGDLRLRWVNSEILEVEPPDNYLLGVDGIIVPGGFGIRGVDG KISAIEYARNQQIPFLGLCLGMQCSIIEWARNVEGLVGANSAEFDPKTDYPVINLLPEQQDVIDLGGTMRLGLYPCHVQPNTLAF DLYQEEVIYERHRHRYEFNNLYRNHLLNSGYVISGTSPDGRLVEIVEYPQHPFFIACQFHPEFQSRPSHPHPLFKGFMEAAISHTH QGSTPMVKKVSRRLQALQAKVEERDYTPLEALALLKETATAKFAEAAEAHIRLGIDPKYTDQQLRTTVVLPKGTGQIVRVAVI ARGEKVTEATNAGADIAGSEELIDEIQKGMMDFDKLIATPDVMPQVAKLGKLLGPRGLMPSPKGGTVTFDIASAISEFKAGKLE FRADRTGIVHVMFGKASFSSEDLLVNLKALQETIDRNRPSGAKGRYWRTFYISSTMGPSIKIDINALRDFKTTDVAMGTRSYRPY TPSTRQVTISDFAEITKTEPEKSLTESVHRPKGRNNQGRITSRRRGGGHKQLYRIIDFKRDKRDITATVIAVEYDPNRNARIALVE YEDGEKRYILHPNGLKVGAKITAGPQAPFEDGNALPLSNIPLGTNVHNVEMTPGKGGQIVRAAGATAQLMAKEGNYVTLKLPS GEVRMVRRECYATIGQVGNTDARNLSAGKAGRNRWKGRRPKVRGSVMNPVDHPHGGGEGRAPIGRSGPVTPWGKPALGAK TRKRKKASSKLIVRRRRKSSKRGRGGRQSMSVGILGTKLGMTQIFDEAGVSIPVTVIQAGPCTVTQVKTQPTDGYCAIQVGYGE VKPKALNKPKLGHLAKSSAGPVRYLNEYRTDAAGDYALGQEIKADIFSVGQIVDVIGTSIGRGFAGNQKRNNFGRGPMSHGSK NHRAPGSIGAGTTPGRVYPGKRMAGRLGGSRVTVRKLTVVKVDAERNLILIKGAIPGKPGGLVNVVPTTKVGNKMVESTVKN WQGEEVGQTSFELRVAKEETASHIVHRALVRQMTNSRQGTASTKTRAEVRGGGRKPWRQKGTGRARAGSIRSPLWRGGGVIF GPKPRDFNIKLNRKERRLALRTAFVSRREDLIVVEEFTDQLQRPKSKELVAALARWGATADQKTLLILSEIGQNTETISLSARNV ENIKVIAADQLNVFDLLHADKIVVTSSALTKIQEVYSAMATTRLKTLYGQTIVPKLTQQFQYTNVHQVPKVLKVTVNRGLGEA AQNAKALEASLSEIALITGQKPVVTRAKKAIAGFKIRQGMPVGIMVTLRGERMYAFLDRLISLALPRIRDFRGVSAKSFDGRGN YTLGVREQLIFPEIEYDRIDQIRGLDISIITTAKTDEEGRALLKEMGMPFRDQMSRIGKRPITIPAKVQVAIDGTKVVVKGPKGELS RDLPAHVTVSQSGETLLVTRRDDTRTSRQMHGLSRTLVANMVEGVSQGFQRRLEIQGVGYRAQVQGANLVLNIGYSHQVQIE

PPAGVQFVVENNTNVIVSGYDKEVVGNTAAKIRAVRPPEPYKGKGIRYAGEVVRRKAGKTGGKGKKMAKKLVAVIKLALNA GKANPAPPVGPALGQHGVNIMMFCKEYNAKTADQAGMVIPVEISVFEDRSFTFVLKTPPASVLIRKAAKIERGSDQPNKKKVGS ITRTQLKEIAQTKLPDLNANDIEAAMNIVEGTAKNMGVTIKDMSTATDQILEQLKSLTLLEAAELVKQIEEAFGVSAAAPVGGM AVIAAPGGAAAAEVVEEQTEFDVILQEVPADKKIAVLKIVREITGLGLKEAKELVESTPKAVKEGVNKEAAEDISKKITEAGGK VAIKMSSKTYLPPEEEIKRDWYVVDAADKRLGRLASEIAMVLRGKRKAEYTPHLDTGDFVVVINAEKVVVTGKKOSOKLYRR HSGRPGGMKTETFAKLQQRLPERIVEHAVKGMLPKNSLGRQLFTKLKVYSGATHPHTAQKPKELIINTIPGENMIQPQTYLNVA DNSGARKLMCIRVLGAGNRRYGGVGDRIIAVVKDAQPNMAVKKSDVVEAVIVRTKKSINRDSGMSIRFDDNAAVIINKEGNPK GTRVFGPVARELRDKNFTKIVSLAPEVLMLSPRRTKFRKQQRGRMEGLAHRGSTLNFGDFALQAQEPCWITSRQIEASRRAMT RYIRRGGKIWIRIFPDKPVTMRPAETRMGSGKGNPEFWVAVVKPGRILFEIAGVSEEIAREAMRLAAYKLPIKTKFIVRSQPQEQ EMNAQEIIRSIEAEQLKSDLPQIYVGDTVRVGVKIKEGDKYRVQPYEGVVIGKRNGGINETITVRRVFQGVGVERVFLLHSPRID NIKIMRRGKVRRAKLYYLRQLSGKATRIKQRFDRALMTRVKRGNVARNRRNKILKLAKGFRGSHSTLFRTANQQVMKALRSA YRDRKKKKRDFRRLWITRINAASRQQGLSYSQLIGNLKKANVELNRKMLAQLAVLDPTTFAKVAELASSVKGNMAHKKGTGS TRNGRDSNAQRLGVKRFGGQVVRAGNILVRQRGTKFHPGNNVGIGNDDTLFALIDGVVTFERKGKSRKKVSVYPRVTEEAVA SMNNENYMEPSFLLPDLIEIQRSSFRWFLEEGLIEELNSFSPITDYTGKLELHFLGHNYKLKEPKYSVEESKRRDSTYGVQMYVP TRLLNKETGDIKEQEVFIGDLPLMTDRGTFIINGAERVIVNQIVRSPGVYYKSEIDKNGRRTYSASLIPNRGAWLKFETDRNDLV WVRIDKTRKLSIQVLLKALGLLDNEILDALRHPEYFQKTIEKEGQFSEEEALLELYRKLRPGEPPTVMGGQQLLESRFFDPKRYD LGRVGRYKLNKKLRLSVPDTTRVLTPGDILSAVDYLINLEYDIGSIDDIDHLGNRRVRSVGELLQNQVRVGLNRLERIIRERMTV SDAEVLTPASLVNPKPLVAAIKEFFGSSQLSQFMDQTNPLAELTHKRRLSALGPGGLTRERAGFAVRDIHPSHYGRICPIETPEGP NAGLIGSLATHARVNQYGFLETPFRPVENGRVCYEKPAVYMTADEEDDLRVAPGDIPVDDNGQILGIQVPVRYRQEFSTTTPEQ VDYVAVSPVQIVSVATSMIPFLEHDDANRALMGSNMQRQAVPLLKPERPLVGTGLEAQGARDSGMVIVSRTDGDVVYVDATE IRVRVKEKAALTNRESESIPHKPQEIKYVLSKYQRSNQDTCLNQKPLVRIGEKVIAGQVLADGSSTEGGELALGQNVIVAYMPW EGYNYEDAILISERLVQEDVYTSIHIEKFEIEARQTKLGPEEITREIPNVGEDALRQLDEQGIIRVGAWVESGDILVGKVTPKGESD QPPEEKLLRAIFGEKARDVRDNSLRVPNGEKGRIVDVRLFTREQGDELPPGANMVVRVYVAQKRKIQVGDKMAGRHGNKGIIS RILPLEDMPYLPDGTPVDIVLNPLGVPSRMNVGQVFECLLGWAGHNLGVRFKITPFDEMYGEESSRRIVHGKLWEAREETSKD WVYNPENPGKIMVYDGRTGEPFDRAVTVGIAYMLKLVHLVDDKIHARSTGPYSLVTQQPLGGKAQQGGQRFGEMEVWALEA FGAAYTLQELLTVKSDDMQGRNEALNAIVKGKAIPRPGTPESFKVLMRELQSLGLDIAVHKVETQTDGSSLDVEVDLMADQVS RRTPPRPTYESFSRDSLDEDEMPVVSLAQMMESGVHFGHQTRRWNPKMSPYIYTARNGVHIIDLVQTAQLMDDAYNYMRSQA EQGKKFLFVGTKRQAAGIIAQEANRCGSHYINQRWLGGMLTNWATIKTRADRLKDLERREENGALDLLPKKEASMLRREMSK LQKYLGGIKNMRKVPDVVIIVDQRREYNAVQECQKLSIPIVSMLDTNCDPDTVDIPIPANDDAIRSIKLIVGKLADAIYEGRHGQ LEVESDYEEYESAEEDYEYDESEFVDSFSDDDDEEMGQKIHPVGFRLGITQEHQSLWFAVPGRYPELLQEDHKLRQYIEQKLGR NAQNNAGLSEIHIERKADQVDLELRTARPGVVVGRGGQGIEALRTGLQQLLGSHRQVRINVVEVQKVDADAYLIAEYIAQQLE RRVSFRRVVRQAIQRAQRAGVQGIKVQVSGRLNGAEIARTEWTREGRVPLHTLRADIDYSYCTAQTVYGILGIKVWVFKGEIIP

GQEDIVSQPVTREREPRRRQQQRRRQQFEDRSNEAMATGRRKASKAKKEETNWQERVIQIRRVSKVVKGGKKLSFRAIVIVGN ERGQVGVGVGKASDVIGAVKKGVADGKKHLIEIPITKSNSIPHPIDGVGGGAKVIMRPAAPGTGVIAGGAVRTVLELAGVRNVL AKQLGSNNPLNNARAAVNALSTLRTFAEVAEDRGIAVENLYIMATVAETNSGRALYWGTGRRKSAVAQVRLVPGEGKFVVN GKEGELYFQYNPNYLGVIKAPLETLGLENEYDILVKAKGGGLTGQADSIRLGVARALCQLDPDNRSPLKIEGYLTRDPRAKERK KYGLHKARKAPQYSKRMATLQQQKIRIRLQAFDRRLLDTSCEKIVDTANRTNATAIGPIPLPTKRKIYCVLRSPHVDKDSREHFE TRTHRRIIDIHQPSSKTIDALMKLDLPSGVDIEVKLMARQPTKKTGSKKQKKNVPNGVAYIQSTFNNSIVTITDQNGDVISWASA GSSGFKGAKKGTPFAAQTAAESAGRRAIDQGMRQIQVMVSGPGAGRETAIRALQGAGLEITLIRDVTPIPHNGCRPPKRRRVMA RIAGVDLPRDKRVEIGLTYIYGIGLRRSQDILAATDVNPDTRVKDLTDADLAALRAEIESNYQVEGDLRRLEAMNIKRLVDIGCY RGRRHRMGLPVRGQRTRTNARTRRGRRQTVAGKKKAPGKMGRSLKKGPFVADHLLSKIEKLNANNEKQVIKTWSRASTILPL MVGHTIAVHNGKQHVPVFVNEQMVGHKLGEFAPTRSYRGHGKTDKKSGRMSDKNEGYKIISDNRQARYLYEILETYEAGIQL TGTEVKSIRAGKVNLQDGYALLRDGEAWLINAHISPYTASGQYFNHEPRRTRKLLLHGLEIRKLIGKVEQQGLTLIPLKMYFKR GWVKISIGLCRGKKVHDKREDLKRRQDQRDIQRAMKNYMAEISAKLVQDLRQKTGAGMMDCKKALNETQGNIDEAIDWLRK KGIASAGKKSDRVTAEGLVDIYTTPDKSGGVIIEVNCQTDFVARNDAFKLLVKNLAKQAVNADNVASLLDQPYIEKTDVTVDE YIKETIATLGENIQVRRFVNFSLEGAPGAIDGYIHTGGRVGVLVSIGVDTETAAKNEELQSLAKNTAMQVAACPNVEYVSVDKI PDQVVEKEKEIEMGKEDLGNKPANIKEKIVQGRIDKRLKEMTLLDQPYIRDQNISVAELIKQVESKVSEPIKVHQFVRYILGEGIE **KQESNFAEEVAAQIGAK**

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MQIPRLHPDTVEEVKHRADIVDVISDYVVLRRRGKDFVGLCPFHEEKTPSFTVSPTKQIYYCFGCQASGNAIKFMMDLNKRQFA EVVLDLAKRYQVPVKTLAPEQRQELQRQLSLREQLFEVLASTSQFYQHVLRQDIGQQALQYLQKKRFLKTETVEKFALGYAPP GWETLYHYLVENKNYPPQLVEKAGLIKPRKEGGGYYDVFRNRLMIPIRDVQGRVIAFGGRTLTDEQPKYLNSPETELFDKSKTL FALDVSKDAISKLDQAVVVEGYFDAIALHANGINNVVASLGTALSLEQVRLLLRYSESKQLVLNFDGDKAGINATERAIGEISN LAYKGEVQLKILHIPDGKDADEYLKNHSVTDYGQLLVDAPLWLDWQIAQVIQGRDLRQPTDFQLVSREFVKLLQKILNSDTLN YYISHCAEILSLGDTRLIPLRVENLITQVAPRRTPTPRPPQPDSTTSPNTHQISHPQPSLLEQAEGLLLRIFLHCPQERQVIIETLGSS NLEFSVSHHRFLWEKSLQFPSQTLDLISQLQNLYLETQNDLGPVQHIFQLNEKNKQEILLRTSQLVQAAIACMEKVFRENRYRHF LELWQKTDPSTDPDQYSLYTQTIYADKMRIQELSKQRQLSIADLINMKLAEAESTMNKTVEATQRAFNSIRTGRANASLLDKVQ VDYYGSPTSLKSLANITTPDATTILIQPYDRTSLNIVEKAISLSDVGLTPSNDGSVIRLNIPPLTSDRRKELVKLAAKYAEEGRVGI RNIRRDALDSIRKQEKAGEVSEDESRDQQDKLQKITSKYTAKIDELLAEKEKDITTVMPVIEKKRTRDLPQINERIRFPKIRVIDSE GAQLGIMAPLEALRLAEEKELDLVLLSDKADPPVCRIMDYGKYKFEQEKKAREARKKQHTADVKEVKMRYKIEEHDYNVRV KQAERFLKDGDKVKATVMFRGREIQHSDLAETLLNRMATDLEPFGEVQQAPKKEGRNMMMLISPKKMSMVTLPGLKDLIEKI SLERNLPRLAVQSSIREALLKGYERYRRAQNLERRQFDENYFDNFEVELDIDGEGFRVLSTKTIVEEVTNGDHQISLDEVQQVAP EAQSGDSVVLDVTPDQGEFGRMAAMQTKQVLAQKLRDQQRQMVQEEFQDLEGTVLQARVLRFERQSVILAVSSSFGQPEVEA ELPKREQLPNDTYRSNATFKVYLKKVSQGQQRGPQLLVSRADAGLVVYLFANEVPEIEDEVVRIVAVAREANPPSRYVGPRTKI

AVDTLDRDVDPVGACIGARGSRIQVVVNELRGEKIDVIRWSPDPATYIANALSPARVDEVRLMDPESRQTHVLVAEDQLSLAIG KEGONVRLAARLTGWKIDIKDOAKYDYGAEDAKFAAVRANYQEESNOLDNOFEVIEEEYEDDPDAGEDEFNSMEEENMSKK SLASLSAADISDKRALVRVDFNVPVDNQGNITDDTRIRAALPTIQDLISKGAKVILASHFGRPKGVDEKLRLTPVAKRLSELLGQ EVIKTDDCIGDDVTTQVAALEKGQVLLLENVRFYKEEEKNDPEFARQLAANADFYVNDAFGTAHRAHASTEGVTKYLSPSVA GYLVEKELOYLOGAIEVPORPLVAIIGGSKVSSKITVIETLLEKCDKLIIGGGMIFTFYKARGLNVGKSLVEDDKLVLASSLEKKA AERGVTLLLPTDIVAANTFAPDADAVTVSIDHIPDDRMGLDIGPDSVKVFQAALADCKTVIWNGPMGVFEFDKFAVGTEAIAQT LAEISKNGATTIIGGGDSVAAVEKVGLADQMSHISTGGGASLELLEGKVLPGIAALDEAMTKFIFVTGGVVSSIGKGIVAASLGR LLKSRDYSVSILKLDPYINVDPGTMSPFQHGEVFVTQDGAETDLDLGHYERFTDTSMSRLNSVTTGLIYQSVINKERRGDYNGG TVQVIPHITNEIKERVIRVAKETNPAAVITEIGGTVGDIESLPFLEAIRQLRKEVGKQNVLYMHVTLLPWIASAGEMKTKPTQHSV KELRSIGIQPDILVCRCDRPIPVGLKQKLSEFCDVPVECVITCQDASSIYEVPLILEKEGLAQQTLDLLQMEQREPDLTHWETMVE RMSHPQSPVEIAIVGKYVRLGDAYLSVVESLRHAAIATYGDLRLRWVNSEILEVEPPDNYLLGVDGIIVPGGFGIRGVDGKISAIE YARNRQIPFLGLCLGMQCSIIEWARNVEGLVGANSAEFNPQTDYPVINLLPEQQDVIDLGGTMRLGLYPCHVQPNTLAFDLYQE EVIYERHRHRYEFNNLYRNHLLNSGYVISGTSPDGRLVEIVEYPQHPFFIACQFHPEFQSRPSHPHPLFKGFMEAAISHTHQGKKP NYPLRVSSVPMVKKVSRRLQALQAKVEERDYTPLEALALLKETATAKFAEAAEAHIRLGIDPKYTDQQLRTTVVLPKGTGQIV RVAVIARGEKVTEATNAGADIAGSEELIDEIQKGMMDFDKLIATPDVMPQVAKLGKLLGPRGLMPSPKGGTVTFDIASAISEFK AGKLEFRADRTGIVHVMFGKASFSSEDLLVNLKALQETIDRNRPSGAKGRYWRTFYISSTMGPSIKIDINALRDFKTTDVAMGT RSYRPYTPSTRQVTISDFAEITKTEPEKSLTESVHRPKGRNNQGRITSRRRGGGHKQLYRIIDFKRDKRDITATVIAVEYDPNRNA RIALVEYEDGEKRYILHPNGLKVGAKITAGPQAPFEDGNALPLSNIPLGTNVHNVEMTPGKGGQIVRAAGATAQLMAKEGNYV TLKLPSGEVRMVRRECYATIGQVGNTDARNLSAGKAGRNRWKGRRPKVRGSVMNPVDHPHGGGEGRAPIGRSGPVTPWGKP ALGAKTRKRKKASSKLIVRRRRKSSKRGRGGRQSMSVGILGTKLGMTQIFDEAGVSIPVTVIQAGPCTVTQVKTQPTDGYCAIQ VGYGEVKPKALNKPKLGHLAKSSAGPVRYLNEYRTDAAGDYALGQEIKADIFSVGQIVDVIGTSIGRGFAGNQKRNNFGRGPM SHGSKNHRAPGSIGAGTTPGRVYPGKRMAGRLGGSRVTVRKLTVVKVDAERNLILIKGAIPGKPGGLVNVVPTTKVGNKMVES TVKNWQGEEVGQTSFELRVAKEETASHIVHRALVRQMTNSRQGTASTKTRAEVRGGGRKPWRQKGTGRARAGSIRSPLWRG GGVIFGPKPRDFNIKLNRKERRLALRTAFVSRREDLIVVEEFTDQLQRPKSKELVAALARWGATADQKTLLILSEIGQNTETISLS ARNVENIKVIAADQLNVFDLLHADKIVVTSSALTKIQEVYSAMATTRLKTLYGQTIVPKLTQQFQYTNVHQVPKVLKVTVNRG LGEAAQNAKALEASLSEIALITGQKPVVTRAKKAIAGFKIRQGMPVGIMVTLRGERMYAFLDRLISLALPRIRDFRGVSAKSFDG RGNYTLGVREQLIFPEIEYDRIDQIRGLDISIITTAKTDEEGRALLKEMGMPFRDQMSRIGKRPITIPAKVQVAIDGTKVVVKGPK GELSRDLPAHVTVSQSGETLLVTRRDDTRTSRQMHGLSRTLVANMVEGVSQGFQRRLEIQGVGYRAQVQGANLVLNIGYSHQ VQIEPPAGVQFVVENNTNVIVSGYDKEVVGNTAAKIRAVRPPEPYKGKGIRYAGEVVRRKAGKTGGKGKKMAKKVVAVIKLA LNAGKANPAPPVGPALGQHGVNIMMFCKEYNAKTADQAGMVIPVEISVFEDRSFTFVLKTPPASVLIRKAAKIERGSDQPNKK KVGSITRTQLKEIAQTKLPDLNANDIEAAMNIVEGTAKNMGVTIKDMSTATDQILEQLKSLTLLEAAELVKQIEEAFGVSAAAP VGGMAVIAAPGGAAAAEVVEEQTEFDVILQEVPADKKIAVLKIVREITGLGLKEAKELVESTPKAVKEGVNKEAAEDISKKITE

AGGKVAIKMSSKTYLPPEEEIKRDWYVVDAADKRLGRLASEIAMVLRGKRKAEYTPHLDTGDFVVVINAEKVVVTGKKQSQK LYRRHSGRPGGMKTETFAKLQQRLPERIVEHAVKGMLPKNSLGRQLFTKLKVYSGATHPHTAQKPKELIINTIPGENMIQPQTY LNVADNSGARKLMCIRVLGAGNRRYGGVGDRIIAVVKDAQPNMAVKKSDVVEAVIVRTKKSINRDSGMSIRFDDNAAVIINKE GNPKGTRVFGPVARELRDKNFTKIVSLAPEVLMLSPRRTKFRKQQRGRMEGLAHRGSTLNFGDFALQAQEPCWITSRQIEASRR AMTRYIRRGGKIWIRIFPDKPVTMRPAETRMGSGKGNPEFWVAVVKPGRILFEIAGVSEEIAREAMRLAAYKLPIKTKFIVRSOP QEQEMNAQEIIRSIEAEQLKSDLPQIYVGDTVRVGVKIKEGDKYRVQPYEGVVIGKRNGGINETITVRRVFQGVGVERVFLLHSP RIDNIKIMRRGKVRRAKLYYLRQLSGKATRIKQRFDRALMTRVKRGNVARNRRNKILKLAKGFRGSHSTLFRTANQQVMKAL RSAYRDRKKKKRDFRRLWITRINAASRQQGLSYSQLIGNLKKANVELNRKMLAQLAVLDPTTFAKVAELASSVKGNMAHKKG TGSTRNGRDSNAQRLGVKRFGGQVVRAGNILVRQRGTKFHPGNNVGIGNDDTLFALIDGVVTFERKGKSRKKVSVYPRVTEE AVASMNNENYMEPSFLLPDLIEIQRSSFRWFLEEGLIEELNSFSPITDYTGKLELHFLGHNYKLKEPKYSVEESKRRDSTYGVQM YVPTRLLNKETGDIKEQEVFIGDLPLMTDRGTFIINGAERVIVNQIVRSPGVYYKSEIDKNGRRTYSASLIPNRGAWLKFETDRN DLVWVRIDKTRKLSIQVLLKALGLLDNEILDALRHPEYFQKTIEKEGQFSEEEALLELYRKLRPGEPPTVMGGQQLLESRFFDPK RYDLGRVGRYKLNKKLRLSVPDTTRVLTPGDILSAVDYLINLEYDIGSIDDIDHLGNRRVRSVGELLQNQVRVGLNRLERIIRER MTVSDAEVLTPASLVNPKPLVAAIKEFFGSSQLSQFMDQTNPLAELTHKRRLSALGPGGLTRERAGFAVRDIHPSHYGRICPIET PEGPNAGLIGSLATHARVNQYGFLETPFRPVENGRVCYEKPAVYMTADEEDDLRVAPGDIPVDDNGQILGIQVPVRYRQEFSTT TPEQVDYVAVSPVQIVSVATSMIPFLEHDDANRALMGSNMQRQAVPLLKPERPLVGTGLEAQGARDSGMVIVSRTDGDVVYV DATEIRVRVKEKAALTNRESESIPHKPQEIKYVLSKYQRSNQDTCLNQKPLVRIGEKVIAGQVLADGSSTEGGELALGQNVIVA YMPWEGYNYEDAILISERLVQEDVYTSIHIEKFEIEARQTKLGPEEITREIPNVGEDALRQLDEQGIIRVGAWVESGDILVGKVTP KGESDQPPEEKLLRAIFGEKARDVRDNSLRVPNGEKGRIVDVRLFTREQGDELPPGANMVVRVYVAQKRKIQVGDKMAGRHG NKGIISRILPLEDMPYLPDGTPVDIVLNPLGVPSRMNVGQVFECLLGWAGHNLGVRFKITPFDEMYGEESSRRIVHGKLWEARE ETSKDWVYNPENPGKIMVYDGRTGEPFDRAVTVGIAYMLKLVHLVDDKIHARSTGPYSLVTQQPLGGKAQQGGQRFGEMEV WALEAFGAAYTLQELLTVKSDDMQGRNEALNAIVKGKAIPRPGTPESFKVLMRELQSLGLDIAVHKVETQTDGSSLDVEVDL MADQVSRRTPPRPTYESFSRDSLDEDEMPVVSLAQMMESGVHFGHQTRRWNPKMSPYIYTARNGVHIIDLVQTAQLMDDAYN YMRSQAEQGKKFLFVGTKRQAAGIIAQEANRCGSHYINQRWLGGMLTNWATIKTRADRLKDLERREENGALDLLPKKEASML RREMSKLQKYLGGIKNMRKVPDVVIIVDQRREYNAVQECQKLSIPIVSMLDTNCDPDTVDIPIPANDDAIRSIKLIVGKLADAIYE GRHGQLEVESDYEEYESAEEDYEYDESEFVDSFSDDDDEEMGQKIHPVGFRLGITQEHQSLWFAVPGRYPELLQEDHKLRQYIE QKLGRNAQNNAGLSEIHIERKADQVDLELRTARPGVVVGRGGQGIEALRTGLQQLLGSHRQVRINVVEVQKVDADAYLIAEYI AQQLERRVSFRRVVRQAIQRAQRAGVQGIKVQVSGRLNGAEIARTEWTREGRVPLHTLRADIDYSYCTAQTVYGILGIKVWVF KGEIIPGQEDIVSQPVTREREPRRRQQQRRRQQFEDRSNEAMATGRRKASKAKKEETNWQERVIQIRRVSKVVKGGKKLSFRAI VIVGNERGQVGVGVGKASDVIGAVKKGVADGKKHLIEIPITKSNSIPHPIDGVGGGAKVIMRPAAPGTGVIAGGAVRTVLELAG VRNVLAKQLGSNNPLNNARAAVNALSTLRTFAEVAEDRGIAVENLYIMATVAETNSGRALYWGTGRRKSAVAQVRLVPGEG KFVVNGKEGELYFQYNPNYLGVIKAPLETLGLENEYDILVKAKGGGLTGQADSIRLGVARALCQLDPDNRSPLKIEGYLTRDPR

AKERKKYGLHKARKAPQYSKRMATLQQQKIRIRLQAFDRRLLDTSCEKIVDTANRTNATAIGPIPLPTKRKIYCVLRSPHVDKD SREHFETRTHRRIIDIHQPSSKTIDALMKLDLPSGVDIEVKLMARQPTKKTGSKKQKKNVPNGVAYIQSTFNNSIVTITDQNGDVI SWASAGSSGFKGAKKGTPFAAQTAAESAGRRAIDQGMRQIQVMVSGPGAGRETAIRALQGAGLEITLIRDVTPIPHNGCRPPKR RRVMARIAGVDLPRDKRVEIGLTYIYGIGLRRSQDILAATDVNPDTRVKDLTDADLAALRAEIESNYQVEGDLRRLEAMNIKRL VDIGCYRGRRHRMGLPVRGQRTRTNARTRRGRRQTVAGKKKAPGKMGRSLKKGPFVADHLLSKIEKLNANNEKQVIKTWSR ASTILPLMVGHTIAVHNGKQHVPVFVNEQMVGHKLGEFAPTRSYRGHGKTDKKSGRMSDKNEGYKIISDNRQARYLYEILETY EAGIQLTGTEVKSIRAGKVNLQDGYALLRDGEAWLINAHISPYTASGQYFNHEPRRTRKLLLHGLEIRKLIGKVEQQGLTLIPLK MYFKRGWVKISIGLCRGKKVHDKREDLKRRQDQRDIQRAMKNYMAEISAKLVQDLRQKTGAGMMDCKKALNETQGNIDEAI DWLRKKGIASAGKKSDRVTAEGLVDIYTTPDKSGGVIIEVNCQTDFVARNDAFKLLVKNLAKQAVNADNVASLLAQPYIEKTD VTVDEYIKETIATLGENIQVRRFVNFSLEGAPGAIDGYIHTGGRVGVLVSIGVDTETAAKNEELQSLAKNTAMQVAACPNVEYV SVDKIPDQVVEKEKEIEMGKEDLGNKPANIKEKIVQGRIDKRLKEMTLLDQPYIRDQNISVAELIKQVESKVSEPIKVHQFVRYIL GEGIEKQESNFAEEVAAQIGAK

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MOIPRLHPDTVEEVKHRADIVDVISDYVVLRRRGKDFVGLCPFHEEKTPSFTVSPTKQIYYCFGCQASGNAIKFMMDLNKRQFA EVVLDLAKRYQVPVKTLAPEQRQELQRQLSLREQLFEVLASTSQFYQHVLRQDIGQQALQYLQKKRFLKTETVEKFALGYAPP GWETLYHYLVENKNYPPQLVEKAGLIKPRKEGGGYYDVFRNRLMIPIRDVQGRVIAFGGRTLTDEQPKYLNSPETELFDKSKTL FALDVSKDAISKLDQAVVVEGYFDAIALHANGINNVVASLGTALSLEQVRLLLRYSESKQLVLNFDGDKAGINATERAIGEISN LAYKGEVQLKILHIPDGKDADEYLKNHSVTDYGQLLVDAPLWLDWQIAQVIQGRDLRQPTDFQLVSREFVKLLQKILNSDTLN YYISHCAEILSLGDTRLIPLRVENLITQVAPRRTPTPRPPQPDSTTSPNTHQISHPQPSLLEQAEGLLLRIFLHCPQERQVIIETLGSS NLEFSVSHHRFLWEKSLQFPSQTLDLISQLQNLYLETQNDLGPVQHIFQLNEKNKQEILLRTSQLVQAAIACMEKVFRENRYRHF LELWQKTDPSTDPDQYSLYTQTIYADKMRIQELSKQRQLSIADLINMKLAEAESTMNKTVEATQRAFNSIRTGRANASLLDKVQ VDYYGSPTSLKSLANITTPDATTILIQPYDRTSLNIVEKAISLSDVGLTPSNDGSVIRLNIPPLTSDRRKELVKLAAKYAEEGRVGI RNIRRDALDSIRKQEKAGEVSEDESRDQQDKLQKITSKYTAKIDELLAEKEKDITTVMPVIEKKRTRDLPQINERIRFPKIRVIDSE GAQLGIMAPLEALRLAEEKELDLVLLSDKADPPVCRIMDYGKYKFEQEKKAREARKKQHTADVKEVKMRYKIEEHDYNVRV KQAERFLKDGDKVKATVMFRGREIQHSDLAETLLNRMATDLEPFGEVQQAPKKEGRNMMMLISPKKMSMVTLPGLKDLIEKI SLERNLPRLAVQSSIREALLKGYERYRRAQNLERRQFDENYFDNFEVELDIDGEGFRVLSTKTIVEEVTNGDHQISLDEVQQVAP EAQSGDSVVLDVTPDQGEFGRMAAMQTKQVLAQKLRDQQRQMVQEEFQDLEGTVLQARVLRFERQSVILAVSSSFGQPEVEA ELPKREQLPNDTYRSNATFKVYLKKVSQGQQRGPQLLVSRADAGLVVYLFANEVPEIEDEVVRIVAVAREANPPSRYVGPRTKI AVDTLDRDVDPVGACIGARGSRIQVVVNELRGEKIDVIRWSPDPATYIANALSPARVDEVRLMDPESRQTHVLVAEDQLSLAIG KEGQNVRLAARLTGWKIDIKDQAKYDYGAEDAKFAAVRANYQEESNQLDNQFEVIEEEYEDDPDAGEDEFNSMEEENMSKK SLASLSAADISDKRALVRVDFNVPVDNQGNITDDTRIRAALPTIQDLISKGAKVILASHFGRPNGVDEKLRLTPVAKRLSELLGQ EVIKTDDCIGDDVTTQVAALEKGQVLLLENVRFYKEEEKNDPEFARQLAANADFYVNDAFGTAHRAHASTEGVTKYLSPSVA

GYLVEKELQYLQGAIEVPQRPLVAIIGGSKVSSKITVIETLLEKCDKLIIGGGMIFTFYKARGLNVGKSLVEDDKLVLASSLEKKA AERGVTLLLPTDIVAANTFAPDADAVTVSIDHIPDDRMGLDIGPDSVKVFQAALADCKTVIWNGPMGVFEFDKFAVGTEAIAQT LAEISKTGATTIIGGGDSVAAVEKVGLADQMSHISTGGGASLELLEGKVLPGIAALDEAMTKFIFVTGGVVSSIGKGIVAASLGR LLKSRDYSVSILKLDPYINVDPGTMSPFQHGEVFVTQDGAETDLDLGHYERFTDTSMSRLNSVTTGLIYQSVINKERRGDYNGG TVQVIPHITNEIKERVIRVAKETNPAAVITEIGGTVGDIESLPFLEAIRQLRKEVGKQNVLYMHVTLLPWIASAGEMKTKPTQHSV KELRSIGIQPDILVCRCDRPIPVGLKQKLSEFCDVPVECVITCQDASSIYEVPLILEKEGLAQQTLDLLQMEQREPDLTHWETMVE RMSHPQSPVEIAIVGKYVRLGDAYLSVVESLRHAAIATYGDLRLRWVNSEILEVEPPDNYLLGVDGIIVPGGFGIRGVDGKISAIE YARNRQIPFLGLCLGMQCSIIEWARNVEGLVGANSAEFNPQTDYPVINLLPEQQDVIDLGGTMRLGLYPCHVQPNTLAFDLYQE EVIYERHRHRYEFNNLYRNHLLNSGYVISGTSPDGRLVEIVEYPQHPFFIACQFHPEFQSRPSHPHPLFKGFMEAAISHTHQGKKP NYPLRVSSVPMVKKVSRRLQALQAKVEERDYTPLEALALLKETATAKFAEAAEAHIRLGIDPKYTDQQLRTTVVLPKGTGQIV RVAVIARGEKVTEATNAGADIAGSEELIDEIQKGMMDFDKLIATPDVMPQVAKLGKLLGPRGLMPSPKGGTVTFDIASAISEFK AGKLEFRADRTGIVHVMFGKASFSSEDLLVNLKALQETIDRNRPSGAKGRYWRTFYISSTMGPSIKIDINALRDFKTTDVAMGT RSYRPYTPSTRQVTISDFAEITKTEPEKSLTESVHRPKGRNNQGRITSRRRGGGHKQLYRIIDFKRDKRDITATVIAVEYDPNRNA RIALVEYEDGEKRYILHPNGLKVGAKITAGPQAPFEDGNALPLSNIPLGTNVHNVEMTPGKGGQIVRAAGATAQLMAKEGNYV TLKLPSGEVRMVRRECYATIGQVGNTDARNLSAGKAGRNRWKGRRPKVRGSVMNPVDHPHGGGEGRAPIGRSGPVTPWGKP ALGAKTRKRKKASSKLIVRRRRKSSKRGRGGRQSMSVGILGTKLGMTQIFDEAGVSIPVTVIQAGPCTVTQVKTQPTDGYCAIQ VGYGEVKPKALNKPKLGHLAKSSAGPVRYLNEYRTDAAGDYALGQEIKADIFSVGQIVDVIGTSIGRGFAGNQKRNNFGRGPM SHGSKNHRAPGSIGAGTTPGRVYPGKRMAGRLGGSRVTVRKLTVVKVDAERNLILIKGAIPGKPGGLVNVVPTTKVGNKMVES TVKNWQGEEVGQTSFELRVAKEETASHIVHRALVRQMTNSRQGTASTKTRAEVRGGGRKPWRQKGTGRARAGSIRSPLWRG GGVIFGPKPRDFNIKLNRKERRLALRTAFVSRREDLIVVEEFTDQLQRPKSKELVAALARWGATADQKTLLILSEIGQNTETISLS ARNVENIKVIAADQLNVFDLLHADKIVVTSSALTKIQEVYSAMATTRLKTLYGQTIVPKLTQQFQYTNVHQVPKVLKVTVNRG LGEAAQNAKALEASLSEIALITGQKPVVTRAKKAIAGFKIRQGMPVGIMVTLRGERMYAFLDRLISLALPRIRDFRGVSAKSFDG RGNYTLGVREQLIFPEIEYDRIDQIRGLDISIITTAKTDEEGRALLKEMGMPFRDQMSRIGKRPITIPAKVQVAIDGTKVVVKGPK GELSRDLPAHVTVSQSGETLLVTRRDDTRTSRQMHGLSRTLVANMVEGVSQGFQRRLEIQGVGYRAQVQGANLVLNIGYSHQ VQIEPPAGVQFVVENNTNVIVSGYDKEVVGNTAAKIRAVRPPEPYKGKGIRYAGEVVRRKAGKTGGKGKKMAKKVVAVIKLA LNAGKANPAPPVGPALGQHGVNIMMFCKEYNAKTADQAGMVIPVEISVFEDRSFTFVLKTPPASVLIRKAAKIERGSDQPNKK KVGSITRTQLKEIAQTKLPDLNANDIEAAMNIVEGTAKNMGVTIKDMSTATDQILEQLKSLTLLEAAELVKQIEEAFGVSAAAP VGGMAVIAAPGGAAAAEVVEEQTEFDVILQEVPADKKIAVLKIVREITGLGLKEAKELVESTPKAVKEGVNKEAAEDISKKITE AGGKVAIKMSSKTYLPPEEEIKRDWYVVDAADKRLGRLASEIAMVLRGKRKAEYTPHLDTGDFVVVINAEKVVVTGKKQSQK LYRRHSGRPGGMKTETFAKLQQRLPERIVEHAVKGMLPKNSLGRQLFTKLKVYSGATHPHTAQKPKELIINTIPGENMIQPQTY LNVADNSGARKLMCIRVLGAGNRRYGGVGDRIIAVVKDAQPNMAVKKSDVVEAVIVRTKKSINRDSGMSIRFDDNAAVIINKE GNPKGTRVFGPVARELRDKNFTKIVSLAPEVLMLSPRRTKFRKQQRGRMEGLAHRGSTLNFGDFALQAQEPCWITSRQIEASRR

AMTRYIRRGGKIWIRIFPDKPVTMRPAETRMGSGKGNPEFWVAVVKPGRILFEIAGVSEEIAREAMRLAAYKLPIKTKFIVRSQP QEQEMNAQEIIRSIEAEQLKSDLPQIYVGDTVRVGVKIKEGDKYRVQPYEGVVIGKRNGGINETITVRRVFQGVGVERVFLLHSP RIDNIKIMRRGKVRRAKLYYLRQLSGKATRIKQRFDRALMTRVKRGNVARNRRNKILKLAKGFRGSHSTLFRTANQQVMKAL RSAYRDRKKKKRDFRRLWITRINAASRQQGLSYSQLIGNLKKANVELNRKMLAQLAVLDPTTFAKVAELASSVKGNMAHKKG TGSTRNGRDSNAQRLGVKRFGGQVVRAGNILVRQRGTKFHPGNNVGIGNDDTLFALIDGVVTFERKGKSRKKVSVYPRVTEE AVASMNNENYMEPSFLLPDLIEIQRSSFRWFLEEGLIEELNSFSPITDYTGKLELHFLGHNYKLKEPKYSVEESKRRDSTYGVQM YVPTRLLNKETGDIKEQEVFIGDLPLMTDRGTFIINGAERVIVNQIVRSPGVYYKSEIDKNGRRTYSASLIPNRGAWLKFETDRN DLVWVRIDKTRKLSIQVLLKALGLLDNEILDALRHPEYFQKTIEKEGQFSEEEALLELYRKLRPGEPPTVMGGQQLLESRFFDPK RYDLGRVGRYKLNKKLRLSVPDTTRVLTPGDILSAVDYLINLEYDIGSIDDIDHLGNRRVRSVGELLQNQVRVGLNRLERIIRER MTVSDAEVLTPASLVNPKPLVAAIKEFFGSSQLSQFMDQTNPLAELTHKRRLSALGPGGLTRERAGFAVRDIHPSHYGRICPIET PEGPNAGLIGSLATHARVNQYGFLETPFRPVENGRVCYEKPAVYMTADEEDDLRVAPGDIPVDDNGQILGIQVPVRYRQEFSTT TPEQVDYVAVSPVQIVSVATSMIPFLEHDDANRALMGSNMQRQAVPLLKPERPLVGTGLEAQGARDSGMVIVSRTDGDVVYV DATEIRVRVKEKAALTNRESESIPHKPQEIKYVLSKYQRSNQDTCLNQKPLVRIGEKVIAGQVLADGSSTEGGELALGQNVIVA YMPWEGYNYEDAILISERLVQEDVYTSIHIEKFEIEARQTKLGPEEITREIPNVGEDALRQLDEQGIIRVGAWVESGDILVGKVTP KGESDQPPEEKLLRAIFGEKARDVRDNSLRVPNGEKGRIVDVRLFTREQGDELPPGANMVVRVYVAQKRKIQVGDKMAGRHG NKGIISRILPLEDMPYLPDGTPVDIVLNPLGVPSRMNVGQVFECLLGWAGHNLGVRFKITPFDEMYGEESSRRIVHGKLWEARE ETSKDWVYNPENPGKIMVYDGRTGEPFDRAVTVGIAYMLKLVHLVDDKIHARSTGPYSLVTQQPLGGKAQQGGQRFGEMEV WALEAFGAAYTLQELLTVKSDDMQGRNEALNAIVKGKAIPRPGTPESFKVLMRELQSLGLDIAVHKVETQTDGSSLDVEVDL MADQVSRRTPPRPTYESFSRDSLDEDEMPVVSLAQMMESGVHFGHQTRRWNPKMSPYIYTARNGVHIIDLVQTAQLMDDAYN YMRSQAEQGKKFLFVGTKRQAAGIIAQEANRCGSHYINQRWLGGMLTNWATIKTRADRLKDLERREENGALDLLPKKEASML RREMSKLQKYLGGIKNMRKVPDVVIIVDQRREYNAVQECQKLSIPIVSMLDTNCDPDTVDIPIPANDDAIRSIKLIVGKLADAIYE GRHGQLEVESDYEEYESAEEDYEYDESEFVDSFSDDDDEEMGQKIHPVGFRLGITQEHQSLWFAVPGRYPELLQEDHKLRQYIE QKLGRNAQNNAGLSEIHIERKADQVDLELRTARPGVVVGRGGQGIEALRTGLQQLLGSHRQVRINVVEVQKVDADAYLIAEYI AQQLERRVSFRRVVRQAIQRAQRAGVQGIKVQVSGRLNGAEIARTEWTREGRVPLHTLRADIDYSYCTAQTVYGILGIKVWVF KGEIIPGQEDIVSQPVTREREPRRRQQQRRRQQFEDRSNEAMATGRRKASKAKKEETNWQERVIQIRRVSKVVKGGKKLSFRAI VIVGNERGQVGVGVGKASDVIGAVKKGVADGKKHLIEIPITKSNSIPHPIDGVGGGAKVIMRPAAPGTGVIAGGAVRTVLELAG VRNVLAKQLGSNNPLNNARAAVNALSTLRTFAEVAEDRGIAVENLYIMATVAETNSGRALYWGTGRRKSAVAQVRLVPGEG KFVVNGKEGELYFQYNPNYLGVIKAPLETLGLENEYDILVKAKGGGLTGQADSIRLGVARALCQLDPDNRSPLKIEGYLTRDPR AKERKKYGLHKARKAPQYSKRMATLQQQKIRIRLQAFDRRLLDTSCEKIVDTANRTNATAIGPIPLPTKRKIYCVLRSPHVDKD SREHFETRTHRRIIDIHQPSSKTIDALMKLDLPSGVDIEVKLMARQPTKKTGSKKQKKNVPNGVAYIQSTFNNSIVTITDQNGDVI SWASAGSSGFKGAKKGTPFAAQTAAESAGRRAIDQGMRQIQVMVSGPGAGRETAIRALQGAGLEITLIRDVTPIPHNGCRPPKR RRVMARIAGVDLPRDKRVEIGLTYIYGIGLRRSQDILAATDVNPDTRVKDLTDADLAALRAEIESNYQVEGDLRRLEAMNIKRL

VDIGCYRGRRHRMGLPVRGQRTRTNARTRRGRRQTVAGKKKAPGKMGRSLKKGPFVADHLLSKIEKLNANNEKQVIKTWSR ASTILPLMVGHTIAVHNGKQHVPVFVNEQMVGHKLGEFAPTRSYRGHGKTDKKSGRMSDKNEGYKIISDNRQARYLYEILETY EAGIQLTGTEVKSIRAGKVNLQDGYALLRDGEAWLINAHISPYTASGQYFNHEPRRTRKLLLHGLEIRKLIGKVEQQGLTLIPLK MYFKRGWVKISIGLCRGKKVHDKREDLKRRQDQRDIQRAMKNYMAEISAKLVQDLRQKTGAGMMDCKKALNETQGNIDEAI DWLRKKGIASAGKKSDRVTAEGLVDIYTTPDKSGGVIIEVNCQTDFVARNDAFKLLVKNLAKQAVNADNVASLLAQPYIEKTD VTVDEYIKETIATLGENIQVRRFVNFSLEGAPGAIDGYIHTGGRVGVLVSIGVDTETAAKNEELQSLAKNTAMQVAACPNVEYV SVDKIPDQVVEKEKEIEMGKEDLGNKPANIKEKIVQGRIDKRLKEMTLLDQPYIRDQNISVAELIKQVESKVSEPIKVHQFVRYIL GEGIEKQESNFAEEVAAQIGAK

>Cylindrospermopsis raciborskii CYLP

MQIPRLHPDTVEEVKHRADIVDVISDYVVLRRRGKDFVGLCPFHEEKTPSFTVSPNKQIYYCFGCQASGNAIRFIMDLNKRKFAE VVLDLAKRYQVPVKTLAPEQRQELQRQLSLREQLFEVLASTSQFYQHVLRQDIGQQALQYLQKKRFLKTETVEKFALGYAPPG WETLYHYLVENKSYPAQLVEKAGLIKPRKEGGGYYDVFRNRLMIPIRDVQGRVIAFGGRTLTDEQPKYLNSPETELFDKSKTLF ALDVAKDAISKLDQAVVVEGYFDAIALHANGINNVVASLGTALSLEQVRLLLRYSESKQLVLNFDGDKAGINATERAIGEISNL AYKGEVRLKILHIPDGKDADEYLKNHSVTDYEQLLVEAPLWLDWQIAQVIQGRDLKQPTDFQLVSREFVKLLQKILNSDTLNY YISHCAEILSLGDTRLIPLRVENLITQVAPRRTPTPILRPPASPNTHQISHPQPSLLEQAEGLLLRIFLHCPQERQVIIETLGSSNLEFS VSHYRFLWEKSLOFPSQTLDLISQLQNLYLETQNDLGPVEHIFQLNEKNKQEILLRTNQLVQAAIACMEKVFRENRYRHFLELW QKTDPSTDPDQYNLYAQTIYADKMRIQELSKQRQLSISDLINMKLAEAESTMNKTVEATQRAFNSIRTGRANASLLDKVQVDY YGSPTPLKSLTNITTPDASTILIQPYDRSSLNIVEKAISLSDVGLTPSNDGSVIRLNIPPLTSDRRKELVKLAAKYAEEGRVGIRNIR RDALDSIRKQEKAGEISEDESRDQQDKLQKITGKYTAKIDELLTEKEKDITTVMPVIEKKRTRDLPQINERIRFPKIRVIDSEGAQL GIMAPLEALRLAEEKELDLVLLSDKADPPVCRIMDYGKYKFEQEKKAREARKKQHTADVKEVKMRYKIEEHDYNVRVKQAE RFLKDGDKVKATVMFRGREIQHSDLAETLLNRMATDLEPFGEIQQAPKKEGRNMMMLISPKKMSMVTLPGLKDLIEKISLERN LPRLAVQSSIREALLKGYERYRRAQNLERRQFDENYFDNFEVELDIDGEGFRVLSTKTIVEEVTNGDHQISLDEVQQVAPEAQS GDSVVLDVTPDQGEFGRMAAMQTKQVLAQKLRDQQRQMVQEEFQDLEGTVLQARVLRFERQSVILAVSSSFGQPEVEAELPK REQLPNDTYRSNATFKVYLKKVSQGQQRGPQLLVSRADAGLVVYLFANEVPEIEDEVVRIVAVAREANPPSRYVGPRTKIAVD TLDRDVDPVGACIGARGSRIQVVVNELRGEKIDVIRWSPDPATYIANALSPARVDEVRLMDPESRQTHVLVAEDQLSLAIGKEG ONVRLAARLTGWKIDIKDOAKYDYGAEDAKFAAVRANYQEESNOPDNOFEIIEEGYEDDPDEGEDDFNSMEEENKKVIASLSA TDISDKRALVRVDFNVPVDDQGNITDDTRIRAALPTIQDLISKGAKVILASHFGRPKGVDEKLRLTPVAKRLSELLGQEVIKTDD CIGDDVTAQVAALEKGQVLLLENVRFYKEEEKNDPNFARQLAANADFYVNDAFGTAHRAHASTEGVTKYLSPSVAGYLVEKE LQYLQAAIEVPQRPLAAIIGGSKVSSKIGVIETLLEKCDKLIIGGGMIFTFYKARGLNVGKSLVEQDKLELASSLEKKAAERGVTL LLPTDIVAADKFAPDADAVTVSIENIPDDRMGLDIGPKSVKLFQDALADCKTVIWNGPMGVFEFDKFAVGTEAIAQTLAEIGKT GATTIIGGGDSVAAVEKVGLADQMSHISTGGGASLELLEGTVLPGIAALDEAMTKFIFVTGGVVSSIGKGIVAASLGRLLKSRDY SVSILKLDPYINVDPGTMSPFQHGEVFVTQDGAETDLDLGHYERFTDTSMSRLNSVTTGLIYQSVINKERRGDYNGGTVQVIPHI

TNEIKERVIRVAKETNPAAVITEIGGTVGDIESLPFLEAIRQLRKEVGKQNVLYMHVTLLPWIASAGEMKTKPTQHSVKELRSIGI QPDILVCRCDRPIPVGLKQKLSEFCDVPVECVITCQDASSIYEVPLILEKEGLAQQTLDLLQMEQREPDLTHWETMVERMSHPQS PVEIAIVGKYVRLGDAYLSVVESLRHAAIATYGDLRLRWVNSEILEVEPPDNYLLGVDGIIVPGGFGIRGVDGKISAIEYARNROI PFLGLCLGMQCSIIEWARNVEGLVGANSAEFDPKTDYPVINLLPEQQDVIDMGGTMRLGLYPCHVQPNTLAFDLYQEEVIYERH RHRYEFNNLYRNHLLNSGYVISGTSPDGRLVEIVEYPQHPFFIACQFHPEFQSRPSHPHPLFKGFMEAAISHTHQGKKQLPQGFP QFPMVKKVSRRLQALQAKVEERDYAPLEALALLKETATAKFPEAAEAHIRLGIDPKYTDQQLRTTVVLPKGTGQIVRVAVIAR GEKVTEATNAGADIAGSEELIDEIQKGMMDFDKLIATPDVMPQVAKLGKLLGPRGLMPSPKGGTVTFDIASAISEFKAGKLEFR ADRTGIVHVMFGKASFSSEDLLVNLKALQETIDRNRPSGAKGRYWRTFYISSTMGPSIKVDINALRDLKTTDAAMGTRSYRPYT PSTRQVTISDFAEITKTEPEKSLTESVHRPKGRNNQGRITSRRRGGGHKQLYRIIDFKRDKRDITATVIAVEYDPNRNARIALLEY EDGEKRYILHPNGLKVGAKVTAGPQAPFEDGNALPLSNIPLGTNVHNVEMTPGKGGQIVRAAGATAQLMAKEGNYVTLKLPS GEVRMVRRECYATIGQVGNTDARNLSAGKAGRNRWKGRRPKVRGSVMNPVDHPHGGGEGRAPIGRSGPVTPWGKPALGAK TRKRKKASSKLIVRRRRKSSKRGRGGRQSMSVGILGTKLGMTQIFDEAGVSIPVTVIKAGPCTVTQVKTQPTDGYCAIQVGYGE VKPKALNKPKLGHLAKSSAVPVRYLNEYRTDAAGDYALGQEIKADIFSVGQIVDVIGTSIGRGFAGNQKRNNFGRGPMSHGSK NHRAPGSIGAGTTPGRVYPGKRMAGRLGGSRVTVRKLTVVKVDAERNLILIKGAIPGKPGGLVNVVPTTKVGNKMVESIVKN WQGEEVGQTSFELRVAKEETASHIVHRALVRQMTNSRQGTASTKTRAEVRGGGRKPWRQKGTGRARAGSIRSPLWRGGGVIF GPKPREFNIKLNRKERRLALRTAFVSRREDLIVVEEFTDQLQRPKSKELVAALARWGATADQKTLLILSEIGQSTETISLSARNVE NIKVIAADQLNVFDLLHADKIVVTSSALTKIQEVYSAMATTRLKTLYGQTIVPKLTQQFQYTNVHQVPKVLKVTVNRGLGEAA QNAKALEASLSEIALITGQKPVVTRAKKAIAGFKIRQGMPVGIMVTLRGERMYAFLDRLISLALPRIRDFRGVSAKSFDGRGNYT LGVREQLIFPEIEYDRIDQIRGLDISIITTAKTDEEGRALLKEMGMPFRDQMSRIGKRPITIPAKVQVAIDGTKVVVKGPKGELSRD LPTHVTVSQSGETLLVTRRDDTRTSRQMHGLSRTLVANMVEGVSQGFQRRLEIQGVGYRAQVQGANLVLNIGYSHQVQIEPPA GVOFAVENNTNVIVSGYDKEVVGNTAAKIRAVRPPEPYKGKGIRYAGEVVRRKAGKTGGKGKKMAKKVVAVIKLALNAGKA NPAPPVGPALGQHGVNIMMFCKEYNAKTADQAGMVIPVEISVFEDRSFTFVLKTPPASVLIRKAAKIERGSDQPNKKKVGSITR TOLREIAOTKLPDLNANDIEAAMNIVEGTAKNMGVTVKDMSTATDQILEQLKVLTLLEAAELVKQIEEAFGVSAAAPAGGMM VMAAPGAAAAEPVEEQTEFNVVLEEVPADRKIAVLKIVREITGLGLKEAKELVESTPKAVKEGVNKESAEEISKKIADAGGKVV IKMSSKTYLPPEEEIKRDWYVVDAADKRLGRLASEIAMVLRGKRKAEYTPHLDTGDFVVVINAEKKVVVTGKKPSQKLYRRH MIQPQTYLNVADNSGARKLMCIRVLGAGNRRYGGVGDRIIAVVKDAQPNMAVKKSDVVEAVIVRTKKSINRDSGMSIRFDDN AAVIINKEGNPKGTRVFGPVARELRDKNFTKIVSLAPEVLMLSPRRTKFRKQQRGRMEGLAHRGSTLNFGDFALQAQEPCWITS RQIEASRRAMTRYIRRGGKIWIRIFPDKPVTMRPAETRMGSGKGNPEFWVAVVKPGRILFEIAGVSEEIAREAMRLAAYKLPIKT KFIVRSOPQEQEMNAQEIIRSIEAEQLKSDLPQIYVGDTVRVGVKIKEGDKYRVQPYEGVVIGKRNGGINETITVRRVFQGVGVE RVFLLHSPRIDNIKIMRRGKVRRAKLYYLRQLSGKATRIKQRFDRALMTRVKRGNVARNRRNKILKLAKGFRGSHSTLFRTAN QQVMKALRSAYRDRKKKKRDFRRLWITRINAASRQQGLSYSQLIGNLKKANVELNRKMLAQLAVLDPATFAKVAELASSVKG MAHKKGTGSTRNGRDSNAQRLGVKRFGGQVVRAGNILVRQRGTKFHPGNNVGIGNDDTLFALIDGVVTFERKGKSRKKVSV

YPSVTEEAVASMYVPTRLLNKETGDIKEQEVFIGDLPLMTDRGTFIINGAERVIVNQIVRSPGVYYKSEIDKNGRRTYSASLIPNR GAWLKFETDRNDLVWVRIDKTRKLSIQVLLKALGLSDNEILDALRHPEYFQKTIEKEGQFSEEEALLELYRKLRPGEPPTVMGG QQLLESRFFDPKRYDLGRVGRYKLNKKLRLSVPDTTRVLTPGDILSAVDYLINLEYDIGSIDDIDHLGNRRVRSVGELLQNQVR VGLNRLERIIRERMTVSDAEVLTPASLVNPKPLVAAIKEFFGSSQLSQFMDQTNPLAELTHKRRLSALGPGGLTRERAGFAVRDI HPSHYGRICPIETPEGPNAGLIGSLATHARVNQYGFLETPFRPVENGRVCYEKPAVYMTADEEDDLRVAPGDIPVDDNGQILGIQ VPVRYRQEFSTTTPEQVDYVAVSPVQIVSVATSMIPFLEHDDANRALMGSNMQRQAVPLLKPERPLVGTGLEAQGARDSGMVI VSRTDGDVVYVDATEIRVRVKEKAALTNRESETIPHKPQEIKYVLSKYQRSNQDTCLNQKPLVRIGEKVIAGQVLADGSSTEGG ELALGQNVIVAYMPWEGYNYEDAILISERLVQEDVYTSIHIEKFEIEARQTKLGPEEITREIPNVGEDALRQLDEQGIIRVGAWVE SGDILVGKVTPKGESDQPPEEKLLRAIFGEKARDVRDNSLRVPNGEKGRVVDVRLFTREQGDELPPGANMVVRVYVAQKRKIQ VGDKMAGRHGNKGIISRILPLEDMPYLPDGTPVDIVLNPLGVPSRMNVGQVFECLLGWAGHNLGVRFKITPFDEMYGEESSRRI VHGKLWEAREETSRDWVYNPENPGKIMVYDGRTGEPFDRAVTVGIAYMLKLVHLVDDKIHARSTGPYSLVTQQPLGGKAQQ GGQRFGEMEVWALEAFGAAYTLQELLTVKSDDMQGRNEALNAIVKGKAIPRPGTPESFKVLMRELQSLGLDIAVHKVETQTD GSSLDVEVDLMADQVSRRTPPRPTYESFSRDSLDEDEMPVVSLAQMMESGVHFGHQTRRWNPKMSPYIYTARNGVHIIDLVQT AQLMDDAYNYMRSQAEQGKKFLFVGTKRQAAGIIAQEANRCGSHYINQRWLGGMLTNWATIKTRADRLKDLERREENGALD LLPKKEASMLRREMSKLQKYLGGIKNMRKVPDVVIIVDQRREYNAVQECQKLSIPIVSMLDTNCDPDTVDVPIPANDDAIRSIK LIVGKLADAIYEGRHGQLEVEPDDEDYDIPEEDYEYNESEMGQKIHPVGFRLGITQEHQSLWFAVPGRYPELLQEDHKLRQYIE QKLGRNAQNNAGLSEIHIERKADQVDLELRTARPGVVVGRGGQGIEALRTGLQQLLGSHRQVRINVVEVQKVDADAYLIAEYI AQQLERRVSFRRVVRQAIQRAQRAGVQGIKVQVSGRLNGAEIARTEWTREGRVPLHTLRADIDYSYCTAQTVYGILGIKVWVF KGEIIPGQEDIVSQPVTREREPRRRQQQRRRQQFEDRSNEAMATGRRKASKAKKEETNWQERVIQIRRVSKVVKGGKKLSFRAI VIVGNERGQVGVGVGKASDVIGAVKKGVADGKKHLIEIPITKSNSIPHPIDGVGGGAKVIMRPAAPGTGVIAGGAVRTVLELAG VRNVLAKQLGSNNPLNNARAAVNALSTLRTFAEVAEDRGIAVENLYIMATVAETNSGRALYWGTGRRKSAVAQVRLVPGEG KFVVNGKEGELYFQYNPNYLGVIKAPLETLGLENEYDILVKAKGGGLTGQADSIRLGVARALCQLDPDNRSPLKIEGYLTRDPR AKERKKYGLHKARKAPQYSKRMATLQQQKIRIRLQAFDRRLLDTSCEKIVDTANRTNATAIGPIPLPTKRKIYCVLRSPHVDKD SREHFETRTHRRIIDIHQPSSKTIDALMKLDLPSGVDIEVKLLRGQKKGTPFAAQTAAESAGRRAIDQGMRQIQVMVSGPGAGRE TAIRALQGAGLEITLIRDVTPIPHNGCRPPKRRRVMARIAGVDLPRDKRVEIGLTYIYGIGLRRSQDILAATDVNPDTRVKDLTDA DLAALRAEIESNYQVEGDLRRLEAMNIKRLVDIGCYRGRRHRMGLPVRGQRTRTNARTRRGRRQTVAGKKKAPGKMGRSLK KGPFVADHLLSKLEKLNANNEKQVIKTWSRASTILPLMVGHTIAVHNGKQHVPVFVNEQMVGHKLGEFAPTRTYRGHGKTDK KSGRMSDKNEGYKIISDNRQARYLYEILETYEAGIQLTGTEVKSIRAGKVNLQDGYALLRDGEAWLINAHISPYTASGQYFNHE PRRTRKLLLHGLEIRKLIGKVEQQGLTLIPLKMYFKRGWVKISIGLCRGKKVHDKREDLKRRQDQRDIQRAMKNYMDCKKAL NETQGNIDEAIDWLRKKGIASAGKKSDRVTAEGLVEIYTTPDRSGGVLIEVNCQTDFVARNDAFKLLVKNLAKQAVNADNVTS LLAQPYIENTDVTVDEYIKGTITTLGENIQVRRFVNFSLEGSPGAIDGYIHTGGRVGVLISIGVDTENAAKNEEVQSLAKNTAMQ VAACPNVEYVSVDKIPDQVVQKEKEIEMGKEDLGNKPENIKEKIVQGRIDKRLKEMTLLDQPYIRDQSISVAELIKQVESKVSEP

IKVHQFVRYILGEGIEKQESNFAQEVAAQIGAK

>Cylindrospermopsis_raciborskii_CYRF

MQIPRLHPDTVEEVKHRADIVDVISDYVVLRRRGKDFVGLCPFHEEKTPSFTVSPNKQIYYCFGCQASGNAIRFIMDLNKRKFAE VVLDLAKRYQVPVKTLAPEQRQELQRQLSLREQLFEVLASTSQFYQHVLRQDIGQQALQYLQKKRFLKTETVEKFALGYAPPG WETLYHYLVENKSYPAQLVEKAGLIKPRKEGGGYYDAFRNRLMIPIRDVQGRVIAFGGRTLTDEQPKYLNSPETELFDKSKTLF ALDVAKDAISKLDQAVVVEGYFDAIALHANGINNVVASLGTALSLEQVRLLLRYSESKQLVLNFDGDKAGINATERAIGEISNL AYKGEVRLKILHIPDGKDADEYLKNHSVTDYEQLLVEAPLWLDWQIAQVIQGRDLKQPTDFQLVSREFVKLLQKILNSDTLNY YISHCAEILSLGDTRLIPLRVENLITQVAPRRTPTPILRPPASPNTHQISHPQPSLLEQAEGLLLRIFLHCPQERQVIIETLGSSNLEFS VSHYRFLWEKKFAVPMKLAEAESTMNKTVEATQRAFNSIRTGRANASLLDKVQVDYYGSPTPLKSLTNITTPDASTILIQPYDR SSLNIVEKAISLSDVGLTPSNDGSVIRLNIPPLTSDRRKELVKLAAKYAEEGRVGIRNIRRDALDSIRKQEKAGEISEDESRDQQDK LQKITGKYTAKIDELLTEKEKDITTVMPVIEKKRTRDLPQINERIRFPKIRVIDSEGAQLGIMAPLEALRLAEEKELDLVLLSDKAD PPVCRIMDYGKYKFEQEKKKAREARKKQHTADVKEVKMRYKIEEHDYNVRVKQAERFLKDGDKVKATVMFRGREIQHSDLA ETLLNRMATDLEPFGEIQQAPKKEGRNMMMLISPKKMSMVTLPGLKDLIEKISLERNLPRLAVQSSIREALLKGYERYRRAQNL ERROFDENYFDNFEVELDIDGEGFRVLSTKTIVEEVTNGDHQISLDEVQQVAPEAQSGDSVVLDVTPDQGEFGRMAAMQTKQV LAQKLRDQQRQMVQEEFQDLEGTVLQARVLRFERQSVILAVSSSFGQPEVEAELPKREQLPNDTYRSNATFKVYLKKVSQGQQ RGPQLLVSRADAGLVVYLFANEVPEIEDEVVRIVAVAREANPPSRYVGPRTKIAVDTLDRDVDPVGACIGARGSRIQVVVNELR GEKIDVIRWSPDPATYIANALSPARVDEVRLMDPESRQTHVLVAEDQLSLAIGKEGQVKKKSLASLSATDISDKRALVRVDFNV PVDDQGNITDDTRIRAALPTIQDLISKGAKVILASHFGRPKGVDEKLRLTPVAKRLSELLGQEVIKTDDCIGDDVTAQVAALEKG QVLLLENVRFYKEEEKNDPDFARQLAANADFYVNDAFGTAHRAHASTEGVTKYLSPSVAGYLVEKELQYLQAAIEVPQRPLA AIIGGSKVSSKIGVIETLLEKCDKLIIGGGMIFTFYKARGLNVGKSLVEQDKLELASSLEKKAAERGVTLLLPTDIVAADKFAPDA DAVTVSIENIPDDRMGLDIGPKSVKLFQDALADCKTVIWNGPMGVFEFDKFAVGTEAIAQTLAEIGKTGATTIIGGGDSVAAVE KVGLADQMSHISTGGGASLELLEGTVLPGIAALDEAMTKFIFVTGGVVSSIGKGIVAASLGRLLKSRDYSVSILKLDPYINVDPG TMSPFQHGEVFVTQDGAETDLDLGHYERFTDTSMSRLNSVTTGLIYQSVINKERRGDYNGGTVQVIPHITNEIKERVIRVAKETN PAAVITEIGGTVGDIESLPFLEAIRQLRKEVGKQNVLYMHVTLLPWIASAGEMKTKPTQHSVKELRSIGIQPDILVCRCDRPIPVG LKQKLSEFCDVPVECVITCQDASSIYEVPLILEKEGLAQQTLDLLQMEQREPDLTHWETMVERMSHPQSPVEIAIVGKYVRLGD AYLSVVESLRHAAIATYGDLRLRWVNSEILEVEPPDNYLLGVDGIIVPGGFGIRGVDGKISAIEYARNROIPFLGLCLGMOCSIIE WARNVEGLVGANSAEFDPKTDYPVINLLPEQQDVIDIGGTMRLGLYPCHVQPNTLAFDLYQEEVIYERHRHRYEFNNLYRNHL LNSGYVISGTSPDGRLVEIVEYPQHPFFIACQFHPEFQSRPSHPHPLFKGFMEAAISHTHQGKKQLPHGFPQFPMVKKVSRRLQA LQAKVEERDYAPLEALALLKETATAKFPEAAEAHIRLGIDPKYTDQQLRTTVVLPKGTGQIVRVAVIARGEKVTEATNSGADIA GSEELIDEIQKGMMDFDKLIATPDVMPQVAKLGKLLGPRGLMPSPKGGTVTFDIASAISEFKAGKLEFRADRTGIVHVMFGKAS FSSEDLLVNLKALQETIDRNRMGTRSYRPYTPSTRQVTISDFAEITKTEPEKSLTESVHRPKGRNNQGRITSRRRGGGHKQLYRII DFKRDKRDITATVIAVEYDPNRNARIALLEYEDGEKRYILHPNGLKVGAKVTAGPQAPFEDGNALPLSNIPLGTNVHNVEMTPG

KGGQIVRAAGATAQLMAKEGNYVTLKLPSGEVRMVRRECYATIGQVGNTDARNLSAGKAGRNRWKGRRPKVRGSVMNPVD HPHGGGEGRAPIGRSGPVTPWGKPALGAKTRKRKKASSKLIVRRRRKSSKRGRGGRQSMSVGILGTKLGMTQIFDEAGVSIPVT VIKAGPCTVTQVKTQPTDGYCAIQVGYGEVKPKALNKPKLGHLAKSSAVPVRYLNEYRTDAAGDYALGQEIKADIFSVGQIVD VIGTSIGRGFAGNOKRNNFGRGPMSHGSKNHRAPGSIGAGTTPGRVYPGKRMAGRLGGSRVTVRKLTVVKVDAERNLILIKGA IPGKPGGLVNVVPTTKVGNKMVESIVKNWQGEEVGQTSFELRVAKEETASHIVHRALVRQMTNSRQGTASTKTRAEVRGGGR KPWRQKGTGRARAGSIRSPLWRGGGVIFGPKPREFNIKLNRKERRLALRTAFVSRREDLIVVEEFTDQLQRPKSKELVAALARW GATADQKTLLILSEIGQSTETISLSARNVENIKVIAADQLNVFDLLHADKIVVTSSALTKIQEVYSAMATTRLKTLYGQTIVPKLT QQFQYTNVHQVPKVLKVTVNRGLGEAAQNAKALEASLSEIALITGQKPVVTRAKKAIAGFKIRQGMPVGIMVTLRGERMYAF LDRLISLALPRIRDFRGVSAKSFDGRGNYTLGVREQLIFPEIEYDRIDQIRGLDISIITTAKTDEEGRALLKEMGMPFRDQMSRIGK RPITIPAKVQVAIDGTKVVVKGPKGELSRDLPTHVTVSQSGETLLVTRRDDTRTSRQMHGLSRTLVANMVEGVSQGFQRRLEIQ GVGYRAQVQGANLVLNIGYSHQVQIEPPAGVQFAVENNTNVIVSGYDKEVVGNTAAKIRAVRPPEPYKGKGIRYAGEVVRRK AGKTGGKGKKMAKKVVAVIKLALNAGKANPAPPVGPALGQHGVNIMMFCKEYNAKTADQAGMVIPVEISVFEDRSFTFVLK TPPASVLIRKAAKIERGSDQPNKKKVGSITRTQLREIAQTKLPDLNANDIEAAMNIVEGTAKNMGVTVKDMSTATDQILEQLKV LTLLEAAELVKQIEEAFGVSAAAPAGGMMVMAAPGAAAAEPVEEQTEFNVVLEEVPADKKIAVLKIVREITGLGLKEAKELVE STPKAVKEGVNKESAEEISKKIAEAGGKVVIKMVVTGKKPSQKLYRRHSGRPGGMKTETFAKLQQRLPERIVEHAVKGMLPKN SLGRQLFTKLKVYSGSTHPHTAQKPKELIINTIPGENMIQPQTYLNVADNSGARKLMCIRVLGAGNRRYGGVGDRIIAVVKDAQ PNMAVKKSDVVEAVIVRTKKSINRDSGMSIRFDDNAAVIINKEGNPKGTRVFGPVARELRDKNFTKIVSLAPEVLMLSPRRTKF RKQQRGRMEGLAHRGSTLNFGDFALQAQEPCWITSRQIEASRRAMTRYIRRGGKIWIRIFPDKPVTMRPAETRMGSGKGNPEF WVAVVKPGRILFEIAGVSEEIAREAMRLAAYKLPIKTKFIVRSQPQEQEMNAQEIIRSIEAEQLKSDLPQIYVGDTVRVGVKIKEG DKYRVQPYEGVVIGKRNGGINETITVRRVFQGVGVERVFLLHSPRIDNIKIMRRGKVRRAKLYYLRQLSGKATRIKQRFDRALM TRVKRGNVARNRRNKILKLAKGFRGSHSTLFRTANQQVMKALRSAYRDRKKKKRDFRRLWITRINAASRQQGLSYSQLIGNL KKANVELNRKMLAQLAVLDPATFAKVAELASSVKGMAHKKGTGSTRNGRDSNAQRLGVKRFGGQVVRAGNILVRQRGTKF HPGNNVGIGNDDTLFALIDGVVTFERKGKSRKKVSVYPPVTEESVASMNNENYTEPSFLLPDLIEIQRSSFRWFLEEGLIEELNSF SPITDYTGKLELHFLGHNYKLKEPKYSVEESKRRDSTYGVQMYVPTRLLNKETGDIKEQEVFIGDLPLMTDRGTFIINGAERVIV NQIVRSPGVYYKSEIDKNGRRTYSASLIPNRGAWLKFETDRNDLVWVRIDKTRKLSIQVLLKALGLSDNEILDALRHPEYFQKTI EKEGOFSEEEALLELYRKLRPGEPPTVMGGQQLLESRFFDPKRYDLGRVGRYKLNKKLRLSVPDTTRVLTPGDILSAVDYLINL EYDIGSIDDIDHLGNRRVRSVGELLQNQVRVGLNRLERIIRERMTVSDAEVLTPASLVNPKPLVAAIKEFFGSSQLSQFMDQTNP LAELTHKRRLSALGPGGLTRERAGFAVRDIHPSHYGRICPIETPEGPNAGLIGSLATHARVNQYGFLETPFRPVENGRVCYEKPA VYMTADEEDDLRVAPGDIPVDDNGQILGIQVPVRYRQEFSTTTPEQVDYVAVSPVQIVSVATSMIPFLEHDDANRALMGSNMQ RQAVPLLKPERPLVGTGLEAQGARDSGMVIVSRTDGDVVYVDATEIRVRVKEKAALTNRESETIPHKPQEIKYVLSKYQRSNQ DTCLNQKPLVRIGEKVIAGQVLADGSSTEGGELALGQNVIVAYMPWEGYNYEDAILISERLVQEDVYTSIHIEKFEIEARQTKLG PEEITREIPNVGEDALRQLDEQGIIRVGAWVESGDILVGKVTPKGESDQPPEEKLLRAIFGEKARDVRDNSLRVPNGEKGRVVDV

RLFTREQGDELPPGANMVVRVYVAQKRKIQVGDKMAGRHGNKGIISRILPLEDMPYLPDGTPVDIVLNPLGVPSRMNVGQVFE CLLGWAGHNLGVRFKITPFDEMYGEESSRRIVHGKLWEAREETSRDWVYNPENPGKIMVYDGRTGEPFDRAVTVGIAYMLKL VHLVDDKIHARSTGPYSLVTQQPLGGKAQQGGQRFGEMEVWALEAFGAAYTLQELLTVKSDDMQGRNEALNAIVKGKAIPRP GTPESFKVLMRELQSLGLDIAVHKVETQTDGSSLDVEVDLMADQVSRRTPPRPTYESFSRDSLDEDEMPVVSLAQMMESGVHF GHQTRRWNPKMSPYIYTARNGVHIIDLVQTAQLMDDAYNYMRSQAEQGKKFLFVGTKRQAAGIIAQEANRCGSHYINQRWL GGMLTNWATIKTRADRLKDLERREENGALDLLPKKEASMLRREMSKLQKYLGGIKNMRKVPDVVIIVDQRREYNAVQECQK LSIPIVSMLDTNCDPDTVDVPIPANDDAIRSIKLIVGKLADAIYEGRHGQLEVEPDDEDYDIPEEDYEYNESEMGQKIHPVGFRLG ITQEHQSLWFAVPGRYPELLQEDHKLRQYIEQKLGRNAQNNAGLSEIHIERKADQVDLELRTARPGVVVGRGGQGIEALRTGL QQLLGSHRQVRINVVEVQKVDADAYLIAEYIAQQLERRVSFRRVVRQAIQRAQRAGVQGIKVQVSGRLNGAEIARTEWTREGR VPLHTLRADIDYSYCTAQTVYGILGIKVWVFKGEIIPGQEDIVSQPVTREREPRRRQQQRRRQQFEDRSNEAMATGRRKASKAK KEETNWQERVIQIRRVSKVVKGGKKLSFRAIVIVGNERGQVGVGVGKASDVIGAVKKGVADGKKHLIEIPITKSNSIPHPIDGVG GGAKVIMRPAAPGTGVIAGGAVRTVLELAGVRNVLAKQLGSNNPLNNARAAVNALSTLRTFAEVAEDRGIAVENLYIMATVA ETNSGRALYWGTGRRKSAVAQVRLVPGEGKFVVNGKEGELYFQYNPNYLGVIKAPLETLGLENEYDILVKAKGGGLTGQADS IRLGVARALCQLDPDNRSPLKIEGYLTRDPRAKERKKYGLHKARKAPQYSKRMATLQQQKIRIRLQAFDRRLLDTSCEKIVDTA NRTNATAIGPIPLPTKRKIYCVLRSPHVDKDSREHFETRTHRRIIDIHQPSSKTIDALMKLDLPSGVDIEVKLMRQIQVMVSGPGA GRETAIRALQGAGLEITLIRDVTPIPHNGCRPPKRRRVMARIAGVDLPRDKRVEIGLTYIYGIGLRRSQDILAATDVNPDTRVKDL TDADLAALRAEIESNYQVEGDLRRLEAMNIKRLVDIGCYRGRRHRMGLPVRGQRTRTNARTRRGRRQTVAGKKKAPGKMGR SLKKGPFVADHLLSKLEKLNANNEKQVIKTWSRASTILPLMVGHTIAVHNGKQHVPVFVNEQMVGHKLGEFAPTRTYRGHGK TDKKSGRMSDKNEGYKIISDNRQARYLYEILETYEAGIQLTGTEVKSIRAGKVNLQDGYALLRDGEAWLINAHISPYTASGQYF NHEPRRTRKLLLHGLEIRKLIGKVEQQGLTLIPLKMYFKRGWVKISIGLCRGKKVHDKREDLKRRQDQRDIQRAMKNYMAEIS AKLVQDLRQKTGAGMMDCKKALNETQGNIDEAIDWLRKKGIASAGKKSDRVTAEGLVDIYTTPDRSGGVLIEVNCQTDFVAR NDAFKLLVKNLAKQAVNADNVTSLLAQPYIENTDVTVDEYIKETIATLGENIQVRRFVNFSLEGSPGAIDGYIHTGGRVGVLISI GVDTETAAKNEEVQSLAKNTAMQVAACPNVEYVSVDKIPDR

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MQIPRLHPDTVEEVKHRADIVDVISDYVVLRRRGKDFVGLCPFHEEKTPSFTVSPTKQIYYCFGCQASGNAIKFMMDLNKRQFA EVVLDLAKRYQVPVKTLAPEQRQELQRQLSLREQLFEVLASTSQFYQHVLRQDIGQQALQYLQKKRFLKTETVEKFALGYAPP GWETLYHYLVENKNYPAQLVEKAGLIKPRKEGGGYYDVFRNRLMIPIRDVQGRVIAFGGRTLTDEQPKYLNSPETELFDKSKT LFALDVSKDAISKLDQAVVVEGYFDAIALHANGINNVVASLGTALSLEQVRLLLRYSESKQLVLNFDGDKAGINATERAIGEIS NLAYKGEVQLKILHIPDGKDADEYLKNHSVTDYGQLLVDAPLWLDWQIAQVIQGRDLRQPTDFQLVSREFVKLLQKILNSDTL NYYISHCAEILSLGDTRLIPLRVENLITQVAPRRTPTPRPPQPDSTTSPNTHQISHPQPSLLEQAEGLLLRIFLHCPQERQVIIETLGS TNLEFSVSHHRFLWEKSLQFPSQTLDLISQLQNLYLETQNDLGPVQHIFQLNEKNKQEILLRTSQLVQAAIACMEKVFRENRYRH

FLELWQKTDPSTDPDQYSLYAQTIYADKMRIQELSKQRQLSIADLINMKLAEAESTMNKTVEATQRAFNSIRTGRANASLLDKV QVDYYGSPTSLKSLANITTPDATTILIQPYDRTSLNIVEKAISLSDVGLTPSNDGSVIRLNIPPLTSDRRKELVKLAAKYAEEGRVG IRNIRRDALDSIRKQEKAGEVSEDESRDQQDKLQKITSKYTAKIDELLAEKEKDITTVMPVIEKKRTRDLPQINERIRFPKIRVIDS EGAOLGIMAPLEALRLAEEKELDLVLLSDKADPPVCRIMDYGKYKFEQEKKAREARKKQHTADVKEVKMRYKIEEHDYNVR VKQAERFLKDGDKVKATVMFRGREIQHSDLAETLLNRMATDLEPFGEVQQAPKKEGRNMMMLISPKKMSMVTLPGLKDLIEK ISLERNLPRLAVQSSIREALLKGYERYRRAQNLERRQFDENYFDNFEVELDIDGEGFRVLSTKTIVEEVTNGDHQISLDEVQQVA PEAQSGDSVVLDVTPDQGEFGRMAAMQTKQVLAQKLRDQQRQMVQEEFQDLEGTVLQARVLRFERQSVILAVSSSFGQPEVE AELPKREQLPNDTYRSNATFKVYLKKVSQGQQRGPQLLVSRADAGLVVYLFANEVPEIEDEVVRIVAVAREANPPSRYVGPRT KIAVDTLDRDVDPVGACIGARGSRIQVVVNELRGEKIDVIRWSPDPATYIANALSPARVDEVRLMDPESRQTHVLVAEDQLSLA IGKEGQNVRLAARLTGWKIDIKDQAKYDYGAEDAKFAAVRANYQEESNQLDNQFEVMEEEYEDDPDAGEDDFNSMEEENMS KKSLASLSAADISDKRALVRVDFNVPVDNQGNITDDTRIRAALPTIQDLISKGAKVILASHFGRPKGVDEKLRLTPVAKRLSELL GQEVIKTDDCIGDDVTAQVAALEKGQVLLLENVRFYKEEEKNNPEFARQLAANADFYVNDAFGTAHRAHASTEGVTKYLSPS VAGYLVEKELQYLQGAIEVPQRPLVAIIGGSKVSSKITVIETLLEKCDKLIIGGGMIFTFYKARGLNVGKSLVEDDKLVLASSLEE KAAERGVTLLLPTDIVAADKFAPDADCRTVSIDHIPDDRMGLDIGPDSVKVFQAALADCKTVIWNGPMGVFEFDKFAVGTEAI AQTLAEISKTGATTIIGGGDSVAAVEKVGLADQMSHISTGGGASLELLEGKVLPGIAALDEAMTKFIFVTGGVVSSIGKGIVAAS LGRLLKSRDYSVSILKLDPYINVDPGTMSPFQHGEVFVTQDGAETDLDLGHYERFTDTSMSRLNSVTTGLIYQSVINKERRGDY NGGTVQVIPHITNEIKERVIRVAKETNPAAVITEIGGTVGDIESLPFLEAIRQLRKEVGKQNVLYMHVTLLPWIASAGEMKTKPT QHSVKELRSIGIQPDILVCRCDRPIPVGLKQKLSEFCDVPVECVITCQDASSIYEVPLILEKEGLAQQTLDLLQMEQREPDLTHWE TMVERMSHPQSPVEIAIVGKYVRLGDAYLSVVESLRHAAIATYGDLRLRWVNSEILEVEPPDNYLLGVDGIIVPGGFGIRGVDG KISAIEYARNQQIPFLGLCLGMQCSIIEWARNVEGLVGANSAEFDPQTDYPVINLLPEQQDVIDLGGTMRLGLYPCHVQPNTLAF DLYQEEVIYERHRHRYEFNNLYRNHLLNSGYVISGTSPDGRLVEIVEYPQHPFFIACQFHPEFQSRPSHPHPLFKGFMEAAISHTH QGSTPMVKKVSRRLQALQAKVEERDYTPLEALALLKETATAKFAEAAEAHIRLGIDPKYTDQQLRTTVVLPKGTGQIVRVAVI ARGEKVTEATNAGADIAGSEELIDEIQKGMMDFDKLIATPDVMPQVAKLGKLLGPRGLMPSPKGGTVTFDIASAISEFKAGKLE FRADRTGIVHVMFGKASFSSEDLLVNLKALQETIDRNRPSGAKGRYWRTFYISSTMGPSIKIDINALRDFKTTDVAMGTRSYRPY TPSTRQVTISDFAEITKTEPEKSLTESVHRPKGRNNQGRITSRRRGGGHKQLYRIIDFKRDKRDITATVIAVEYDPNRNARIALVE YEDGEKRYILHPNGLKVGAKITAGPQAPFEDGNALPLSNIPLGTNVHNVEMTPGKGGQIVRAAGATAQLMAKEGNYVTLKLPS GEVRMVRRECYATIGQVGNTDARNLSAGKAGRNRWKGRRPKVRGSVMNPVDHPHGGGEGRAPIGRSGPVTPWGKPALGAK TRKRKKASSKLIVRRRRKSSKRGRGGRQSMSVGILGTKLGMTQIFDEAGVSIPVTVIQAGPCTVTQVKTQPTDGYCAIQVGYGE VKPKALNKPKLGHLAKSSAGPVRYLNEYRTDAAGDYALGQEIKADIFSVGQIVDVIGTSIGRGFAGNQKRNNFGRGPMSHGSK NHRAPGSIGAGTTPGRVYPGKRMAGRLGGSRVTVRKLTVVKVDAERNLILIKGAIPGKPGGLVNVVPTTKVGNKMVESTVKN WQGEEVGQTSFELRVAKEETASHIVHRALVRQMTNSRQGTASTKTRAEVRGGGRKPWRQKGTGRARAGSIRSPLWRGGGVIF GPKPRDFNIKLNRKERRLALRTAFVSRREDLIVVEEFTDQLQRPKSKELVAALARWGATADQKTLLILSEIGQNTETISLSARNV

ENIKVIAADQLNVFDLLHADKIVVTSSALTKIQEVYSAMATTRLKTLYGQTIVPKLTQQFQYTNVHQVPKVLKVTVNRGLGEA AQNAKALEASLSEIALITGQKPVVTRAKKAIAGFKIRQGMPVGIMVTLRGERMYAFLDRLISLALPRIRDFRGVSAKSFDGRGN YTLGVREQLIFPEIEYDRIDQIRGLDISIITTAKTDEEGRALLKEMGMPFRDQMSRIGKRPITIPAKVQVAIDGTKVVVKGPKGELS RDLPAHVTVSQSGETLLVTRRDDTRTSRQMHGLSRTLVANMVEGVSQGFQRRLEIQGVGYRAQVQGANLVLNIGYSHQVQIE PPAGVOFVVENNTNVIVSGYDKEVVGNTAAKIRAVRPPEPYKGKGIRYAGEVVRRKAGKTGGKGKKMAKKVVAVIKLALNA GKANPAPPVGPALGQHGVNIMMFCKEYNAKTADQAGMVIPVEISVFEDRSFTFVLKTPPASVLIRKAAKIERGSDQPNKKKVGS ITRTQLKEIAQTKLPDLNANDIEAAMNIVEGTAKNMGVTIKDMSTATDQILEQLKSLTLLEAAELVKQIEEAFGVSAAAPAGGM MMMAAPGGAAAAEVVEEQTEFDVILQEVPADKKIAVLKIVREITGLGLKEAKELVESTPKAVKEGVNKEAAEDISKKITEAGG KVAIKMSSKTYLPPEEEIKRDWYVVDAADKRLGRLASEIAMVLRGKRKAEYTPHLDTGDFVVVINAEKVVVTGKKOSOKLYR RHSGRPGGMKTETFAKLQQRLPERIVEHAVKGMLPKNSLGRQLFTKLKVYSGATHPHTAQKPKELIINTIPGENMIQPQTYLNV ADNSGARKLMCIRVLGAGNRRYGGVGDRIIAVVKDAQPNMAVKKSDVVEAVIVRTKKSINRDSGMSIRFDDNAAVIINKEGNP KGTRVFGPVARELRDKNFTKIVSLAPEVLMLSPRRTKFRKQQRGRMEGLAHRGSTLNFGDFALQAQEPCWITSRQIEASRRAM TRYIRRGGKIWIRIFPDKPVTMRPAETRMGSGKGNPEFWVAVVKPGRILFEIAGVSEEIAREAMRLAAYKLPIKTKFIVRSQPQE QEMNAQEIIRSIEAEQLKSDLPQIYVGDTVRVGVKIKEGDKYRVQPYEGVVIGKRNGGINETITVRRVFQGVGVERVFLLHSPRI DNIKIMRRGKVRRAKLYYLRQLSGKATRIKQRFDRALMTRVKRGNVARNRRNKILKLAKGFRGSHSTLFRTANQQVMKALRS AYRDRKKKKRDFRRLWITRINAASRQQGLSYSQLIGNLKKANVELNRKMLAQLAVLDPTTFAKVAELASSVKGNMAHKKGT GSTRNGRDSNAQRLGVKRFGGQVVRAGNILVRQRGTKFHPGNNVGIGNDDTLFALIDGVVTFERKGKSRKKVSVYPRVTEEA VASMNNENYMEPSFLLPDLIEIQRSSFRWFLEEGLIEELNSFSPITDYTGKLELHFLGHNYKLKEPKYSVEESKRRDSTYGVQMY VPTRLLNKETGDIKEQEVFIGDLPLMTDRGTFIINGAERVIVNQIVRSPGVYYKSEIDKNGRRTYSASLIPNRGAWLKFETDRNDL VWVRIDKTRKLSIQVLLKALGLLDNEILDALRHPEYFQKTIEKEGQFSEEEALLELYRKLRPGEPPTVMGGQQLLESRFFDPKRY DLGRVGRYKLNKKLRLSVPDTTRVLTPGDILSAVDYLINLEYDIGSIDDIDHLGNRRVRSVGELLQNQVRVGLNRLERIIRERMT VSDAEVLTPASLVNPKPLVAAIKEFFGSSQLSQFMDQTNPLAELTHKRRLSALGPGGLTRERAGFAVRDIHPSHYGRICPIETPEG PNAGLIGSLATHARVNQYGFLETPFRPVENGRVCYEKPAVYMTADEEDDLRVAPGDIPVDDNGQILGIQVPVRYRQEFSTTTPE QVDYVAVSPVQIVSVATSMIPFLEHDDANRALMGSNMQRQAVPLLKPERPLVGTGLEAQGARDSGMVIVSRTDGDVVYVDAT EIRVRVKEKAALTNRESESIPHKPQEIKYVLSKYQRSNQDTCLNQKPLVRIGEKVIAGQVLADGSSTEGGELALGQNVIVAYMP WEGYNYEDAILISERLVQEDVYTSIHIEKFEIEARQTKLGPEEITREIPNVGEDALRQLDEQGIIRVGAWVESGDILVGKVTPKGE SDQPPEEKLLRAIFGEKARDVRDNSLRVPNGEKGRIVDVRLFTREQGDELPPGANMVVRVYVAQKRKIQVGDKMAGRHGNKG IISRILPLEDMPYLPDGTPVDIVLNPLGVPSRMNVGQVFECLLGWAGHNLGVRFKITPFDEMYGEESSRRIVHGKLWEAREETSK DWVYNPENPGKIMVYDGRTGEPFDRAVTVGIAYMLKLVHLVDDKIHARSTGPYSLVTQQPLGGKAQQGGQRFGEMEVWALE AFGAAYTLQELLTVKSDDMQGRNEALNAIVKGKAIPRPGTPESFKVLMRELQSLGLDIAVHKVETQTDGSSLDVEVDLMADQ VSRRTPPRPTYESFSRDSLDEDEMPVVSLAQMMESGVHFGHQTRRWNPKMSPYIYTARNGVHIIDLVQTAQLMDDAYNYMRS QAEQGKKFLFVGTKRQAAGIIAQEANRCGSHYINQRWLGGMLTNWATIKTRADRLKDLERREENGALDLLPKKEASMLRREM

SKLQKYLGGIKNMRKVPDVVIIVDQRREYNAVQECQKLSIPIVSMLDTNCDPDTVDIPIPANDDAIRSIKLIVGKLADAIYEGRHG QLEVESDYEEYESAEEDYEYDESEFVDSFSDDDDEEMGQKIHPVGFRLGITQEHQSLWFAVPGRYPELLQEDHKLRQYIEQKLG RNAQNNAGLSEIHIERKADQVDLELRTARPGVVVGRGGQGIEALRTGLQQLLGSHRQVRINVVEVQKVDADAYLIAEYIAQQL ERRVSFRRVVRQAIQRAQRAGVQGIKVQVSGRLNGAEIARTEWTREGRVPLHTLRADIDYSYCTAQTVYGILGIKVWVFKGEII PGQEDIVSQPVTREREPRRRQQQRRRQQFEDRSNEAMATGRRKASKAKKEETNWQERVIQIRRVSKVVKGGKKLSFRAIVIVG NERGQVGVGVGKASDVIGAVKKGVADGKKHLIEIPITKSNSIPHPIDGVGGGAKVIMRPAAPGTGVIAGGAVRTVLELAGVRN VLAKQLGSNNPLNNARAAVNALSTLRTFAEVAEDRGIAVENLYIMATVAETNSGRALYWGTGRRKSAVAQVRLVPGEGKFV VNGKEGELYFQYNPNYLGVIKAPLETLGLENEYDILVKAKGGGLTGQADSIRLGVARALCQLDPDNRSPLKIEGYLTRDPRAKE RKKYGLHKARKAPQYSKRMATLQQQKIRIRLQAFDRRLLDTSCEKIVDTANRTNATAIGPIPLPTKRKIYCVLRSPHVDKDSRE HFETRTHRRIIDIHQPSSKTIDALMKLDLPSGVDIEVKLMARQPTKKTGSKKQKKNVPNGVAYIQSTFNNSIVTITDQNGDVISW ASAGSSGFKGAKKGTPFAAQTAAESAGRRAIDQGMRQIQVMVSGPGAGRETAIRALQGAGLEITLIRDVTPIPHNGCRPPKRRR VMARIAGVDLPRDKRVEIGLTYIYGIGLRRSQDILAATDVNPDTRVKDLTDADLAALRAEIESNYQVEGDLRRLEAMNIKRLVD IGCYRGRRHRMGLPVRGQRTRTNARTRRGRRQTVAGKKKAPGKMGRSLKKGPFVADHLLSKIEKLNANNEKQVIKTWSRAST ILPLMVGHTIAVHNGKQHVPVFVNEQMVGHKLGEFAPTRSYRGHGKTDKKSGRMSDKNEGYKIISDNRQARYLYEILETYEAG IQLTGTEVKSIRAGKVNLQDGYALLRDGEAWLINAHISPYTASGQYFNHEPRRTRKLLLHGLEIRKLIGKVEQQGLTLIPLKMYF KRGWVKISIGLCRGKKVHDKREDLKRRQDQRDIQRAMKNYMAEISAKLVQDLRQKTGAGMMDCKKALNETQGNIDEAIDWL RKKGIASAGKKSDRVTAEGLVDIYTTPDKSGGVIIEVNCQTDFVARNDAFKLLVKNLAKQAVNADNVASLLDQPYIEKTDVTV DEYIKETIATLGENIQVRRFVNFSLEGAPGAIDGYIHTGGRVGVLVSIGVDTETAAKNEELQSLAKNTAMQVAACPNVEYVSVD KIPDQVVEKEKEIEMGKEDLGNKPANIKEKIVQGRIDKRLKEMTLLDQPYIRDQNISVAELIKQVESKVSEPIKVHQFVRYILGEG **IEKQESNFAEEVAAQIGAK**

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MQIPRLHPDTVEEVKHRADIVDVISDYVVLRRRGKDFVGLCPFHEEKTPSFTVSPTKQIYYCFGCQASGNAIKFMMDLNKRQFA EVVLDLAKRYQVPVKTLAPEQRQELQRQLSLREQLFEVLASTSQFYQHVLRQDIGQQALQYLQKKRFLKTETVEKFALGYAPP GWETLYHYLVENKNYPAQLVEKAGLIKPRKEGGGYYDVFRNRLMIPIRDVQGRVIAFGGRTLTDEQPKYLNSPETELFDKSKT LFALDVSKDAISKLDQAVVVEGYFDAIALHANGINNVVASLGTALSLEQVRLLLRYSESKQLVLNFDGDKAGINATERAIGEIS NLAYKGEVQLKILHIPDGKDADEYLKNHSVTDYGQLLVDAPLWLDWQIAQVIQGRDLRQPTDFQLVSREFVKLLQKILNSDTL NYYISHCAEILSLGDTRLIPLRVENLITQVAPRRTPTPRPPQPDSTTSPNTHQISHPQPSLLEQAEGLLLRIFLHCPQERQVIIETLGS TNLEFSVSHHRFLWEKSLQFPSQSLDLISQLQNLYLETQNDLGPVQHIFQLNEKNKQEILLRTSQLVQAAIACMEKVFRENRYRH

FLELWQKTDPSTDPDQYSLYAQTIYADKMRIQELSKQRQLSIADLINMKLAEAESTMNKTVEATQRAFNSIRTGRANASLLDKV QVDYYGSPTSLKSLANITTPDATTILIQPYDRTSLNIVEKAISLSDVGLTPSNDGSVIRLNIPPLTSDRRKELVKLAAKYAEEGRVG IRNIRRDALDSIRKQEKAGEVSEDESRDQQDKLQKITSKYTAKIDELLAEKEKDITTVMPVIEKKRTRDLPQINERIRFPKIRVIDS EGAOLGIMAPLEALRLAEEKELDLVLLSDKADPPVCRIMDYGKYKFEQEKKAREARKKQHTADVKEVKMRYKIEEHDYNVR VKQAERFLKDGDKVKATVMFRGREIQHSDLAETLLNRMATDLEPFGEVQQAPKKEGRNMMMLISPKKMSMVTLPGLKDLIEK ISLERNLPRLAVQSSIREALLKGYERYRRAQNLERRQFDENYFDNFEVELDIDGEGFRVLSTKTIVEEVTNGDHQISLDEVQQVA PEAQSGDSVVLDVTPDQGEFGRMAAMQTKQVLAQKLRDQQRQMVQEEFQDLEGTVLQARVLRFERQSVILAVSSSFGQPEVE AELPKREQLPNDTYRSNATFKVYLKKVSQGQQRGPQLLVSRADAGLVVYLFANEVPEIEDEVVRIVAVAREANPPSRYVGPRT KIAVDTLDRDVDPVGACIGARGSRIQVVVNELRGEKIDVIRWSPDPATYIANALSPARVDEVRLMDPESRQTHVLVAEDQLSLA IGKEGQNVRLAARLTGWKIDIKDQAKYDYGAEDAKFAAVRANYQEESNQLDNQFEVMEEEYEDDPDAGEDDFNSMEEENMS KKSLASLSAADISDKRALVRVDFNVPVDDQGNITDDTRIRAALPTIQDLISKGAKVILASHFGRPKGVDEKLRLTPVAKRLSELL GQEVIKTDDCIGDDVTAQVAALEKGQVLLLENVRFYKEEENNDPEFARQLAANADFYVNDAFGTAHRAHASTEGVTKYLSPS VAGYLVEKELQYLQGAIEVPQRPLVAIIGGSKVSSKIGVIETLLEKCDKLIIGGGMIFTFYKARGLNVGKSLVEQDKLGLASSLEK KAAERGVTLLLPTDIVAADKFGPDADAVTVSIDHIPDDRMGLDIGPDSVKVFQAALADCKTVIWNGPMGVFEFDKFAVGTEAI AQTLAEISKTGATTIIGGGDSVAAVEKVGLADQMSHISTGGGASLELLEGKVLPGIAALDEAMTKFIFVTGGVVSSIGKGIVAAS LGRLLKSRDYSVSILKLDPYINVDPGTMSPFQHGEVFVTQDGAETDLDLGHYERFTDTSMSRLNSVTTGLIYQSVINKERRGDY NGGTVQVIPHITNEIKERVIRVAKETNPAAVITEIGGTVGDIESLPFLEAIRQLRKEVGKQNVLYMHVTLLPWIASAGEMKTKPT QHSVKELRSIGIQPDILVCRCDRPIPVGLKQKLSEFCDVPVECVITCQDASSIYEVPLILEKEGLAQQTLDLLQMEQREPDLTHWE TMVERMSHPQSPVEIAIVGKYVRLGDAYLSVVESLRHAAIATYGDLRLRWVNSEILEVEPPDNYLLGVDGIIVPGGFGIRGVDG KISAIEYARNQQIPFLGLCLGMQCSIIEWARNVEGLVGANSAEFDPQTDYPVINLLPEQQDVIDLGGTMRLGLYPCHVQPNTLAF DLYQEEVIYERHRHRYEFNNLYRNHLLNSGYVISGTSPDGRLVEIVEYPQHPFFIACQFHPEFQSRPSHPHPLFKGFMEAAISHTH QGSTPMVKKVSRRLQALQAKVEERDYTPLEALALLKETATAKFAEAAEAHIRLGIDPKYTDQQLRTTVVLPKGTGQIVRVAVI ARGEKVTEATNAGADIAGSEELIDEIQKGMMDFDKLIATPDVMPQVAKLGKLLGPRGLMPSPKGGTVTFDIASAISEFKAGKLE FRADRTGIVHVMFGKASFSSEDLLVNLKALQETIDRNRPSGAKGRYWRTFYISSTMGPSIKIDINALRDFKTTDVAMGTRSYRPY TPSTRQVTISDFAEITKTEPEKSLTESVHRPKGRNNQGRITSRRRGGGHKQLYRIIDFKRDKRDITATVIAVEYDPNRNARIALVE YEDGEKRYILHPNGLKVGAKITAGPQAPFEDGNALPLSNIPLGTNVHNVEMTPGKGGQIVRAAGATAQLMAKEGNYVTLKLPS GEVRMVRRECYATIGQVGNTDARNLSAGKAGRNRWKGRRPKVRGSVMNPVDHPHGGGEGRAPIGRSGPVTPWGKPALGAK TRKRKKASSKLIVRRRRKSSKRGRGGRQSMSVGILGTKLGMTQIFDEAGVSIPVTVIQAGPCTVTQVKTQPTDGYCAIQVGYGE VKPKALNKPKLGHLAKSSAGPVRYLNEYRTDAAGDYALGQEIKADIFSVGQIVDVIGTSIGRGFAGNQKRNNFGRGPMSHGSK NHRAPGSIGAGTTPGRVYPGKRMAGRLGGSRVTVRKLTVVKVDAERNLILIKGAIPGKPGGLVNVVPTTKVGNKMVESTVKN WQGEEVGQTSFELRVAKEETASHIVHRALVRQMTNSRQGTASTKTRAEVRGGGRKPWRQKGTGRARAGSIRSPLWRGGGVIF GPKPRDFNIKLNRKERRLALRTAFVSRREDLIVVEEFTDQLQRPKSKELVAALARWGATADQKTLLILSEIGQNTETISLSARNV

ENIKVIAADQLNVFDLLHADKIVVTSSALTKIQEVYSAMATTRLKTLYGQTIVPKLTQQFQYTNVHQVPKVLKVTVNRGLGEA AQNAKALEASLSEIALITGQKPVVTRAKKAIAGFKIRQGMPVGIMVTLRGERMYAFLDRLISLALPRIRDFRGVSAKSFDGRGN YTLGVREQLIFPEIEYDRIDQIRGLDISIITTAKTDEEGRALLKEMGMPFRDQMSRIGKRPITIPAKVQVAIDGTKVVVKGPKGELS RDLPAHVTVSQSGETLLVTRRDDTRTSRQMHGLSRTLVANMVEGVSQGFQRRLEIQGVGYRAQVQGANLVLNIGYSHQVQIE PPAGVOFVVENNTNVIVSGYDKEVVGNTAAKIRAVRPPEPYKGKGIRYAGEVVRRKAGKTGGKGKKMAKKLVAVIKLALNA GKANPAPPVGPALGQHGVNIMMFCKEYNAKTADQAGMVIPVEISVFEDRSFTFVLKTPPASVLIRKAAKIERGSDQPNKKKVGS ITRTQLKEIAQTKLPDLNANDIEAAMNIVEGTAKNMGVTIKDMSTATDQILEQLKSLTLLEAAELVKQIEEAFGVSAAAPAGGM MMMAAPGGAAAAEVVEEQTEFDVILQEVPADKKIAVLKIVREITGLGLKEAKELVESTPKAVKEGVNKEAAEDISKKITEAGG KVAIKMSSKTYLPPEEEIKRDWYVVDAADKRLGRLASEIAMVLRGKRKAEYTPHLDTGDFVVVINAEKVVVTGKKOSOKLYR RHSGRPGGMKTETFAKLQQRLPERIVEHAVKGMLPKNSLGRQLFTKLKVYSGATHPHTAQKPKELIINTIPGENMIQPQTYLNV ADNSGARKLMCIRVLGAGNRRYGGVGDRIIAVVKDAQPNMAVKKSDVVEAVIVRTKKSINRDSGMSIRFDDNAAVIINKEGNP KGTRVFGPVARELRDKNFTKIVSLAPEVLMLSPRRTKFRKQQRGRMEGLAHRGSTLNFGDFALQAQEPCWITSRQIEASRRAM TRYIRRGGKIWIRIFPDKPVTMRPAETRMGSGKGNPEFWVAVVKPGRILFEIAGVSEEIAREAMRLAAYKLPIKTKFIVRSQPQE QEMNAQEIIRSIEAEQLKSDLPQIYVGDTVRVGVKIKEGDKYRVQPYEGVVIGKRNGGINETITVRRVFQGVGVERVFLLHSPRI DNIKIMRRGKVRRAKLYYLRQLSGKATRIKQRFDRALMTRVKRGNVARNRRNKILKLAKGFRGSHSTLFRTANQQVMKALRS AYRDRKKKKRDFRRLWITRINAASRQQGLSYSQLIGNLKKANVELNRKMLAQLAVLDPTTFAKVAELASSVKGNMAHKKGT GSTRNGRDSNAQRLGVKRFGGQVVRAGNILVRQRGTKFHPGNNVGIGNDDTLFALIDGVVTFERKGKSRKKVSVYPRVTEEA VASMNNENYMEPSFLLPDLIEIQRSSFRWFLEEGLIEELNSFSPITDYTGKLELHFLGHNYKLKEPKYSVEESKRRDSTYGVQMY VPTRLLNKETGDIKEQEVFIGDLPLMTDRGTFIINGAERVIVNQIVRSPGVYYKSEIDKNGRRTYSASLIPNRGAWLKFETDRNDL VWVRIDKTRKLSIQVLLKALGLLDNEILDALRHPEYFQKTIEKEGQFSEEEALLELYRKLRPGEPPTVMGGQQLLESRFFDPKRY DLGRVGRYKLNKKLRLSVPDTTRVLTPGDILSAVDYLINLEYDIGSIDDIDHLGNRRVRSVGELLQNQVRVGLNRLERIIRERMT VSDAEVLTPASLVNPKPLVAAIKEFFGSSQLSQFMDQTNPLAELTHKRRLSALGPGGLTRERAGFAVRDIHPSHYGRICPIETPEG PNAGLIGSLATHARVNQYGFLETPFRPVENGRVCYEKPAVYMTADEEDDLRVAPGDIPVDDNGQILGIQVPVRYRQEFSTTTPE QVDYVAVSPVQIVSVATSMIPFLEHDDANRALMGSNMQRQAVPLLKPERPLVGTGLEAQGARDSGMVIVSRTDGDVVYVDAT EIRVRVKEKAALTNRESESIPHKPQEIKYVLSKYQRSNQDTCLNQKPLVRIGEKVIAGQVLADGSSTEGGELALGQNVIVAYMP WEGYNYEDAILISERLVQEDVYTSIHIEKFEIEARQTKLGPEEITREIPNVGEDALRQLDEQGIIRVGAWVESGDILVGKVTPKGE SDQPPEEKLLRAIFGEKARDVRDNSLRVPNGEKGRIVDVRLFTREQGDELPPGANMVVRVYVAQKRKIQVGDKMAGRHGNKG IISRILPLEDMPYLPDGTPVDIVLNPLGVPSRMNVGQVFECLLGWAGHNLGVRFKITPFDEMYGEESSRRIVHGKLWEAREETSK DWVYNPENPGKIMVYDGRTGEPFDRAVTVGIAYMLKLVHLVDDKIHARSTGPYSLVTQQPLGGKAQQGGQRFGEMEVWALE AFGAAYTLQELLTVKSDDMQGRNEALNAIVKGKAIPRPGTPESFKVLMRELQSLGLDIAVHKVETQTDGSSLDVEVDLMADQ VSRRTPPRPTYESFSRDSLDEDEMPVVSLAQMMESGVHFGHQTRRWNPKMSPYIYTARNGVHIIDLVQTAQLMDDAYNYMRS QAEQGKKFLFVGTKRQAAGIIAQEANRCGSHYINQRWLGGMLTNWATIKTRADRLKDLERREENGALDLLPKKEASMLRREM

SKLQKYLGGIKNMRKVPDVVIIVDQRREYNAVQECQKLSIPIVSMLDTNCDPDTVDIPIPANDDAIRSIKLIVGKLADAIYEGRHG QLEVESDYEEYESAEEDYEYDESEFVDSFSDDDDEEMGQKIHPVGFRLGITQEHQSLWFAVPGRYPELLQEDHKLRQYIEQKLG RNAQNNAGLSEIHIERKADQVDLELRTARPGVVVGRGGQGIEALRTGLQQLLGSHRQVRINVVEVQKVDADAYLIAEYIAQQL ERRVSFRRVVRQAIQRAQRAGVQGIKVQVSGRLNGAEIARTEWTREGRVPLHTLRADIDYSYCTAQTVYGILGIKVWVFKGEII PGQEDIVSQPVTREREPRRRQQQRRRQQFEDRSNEAMATGRRKASKAKKEETNWQERVIQIRRVSKVVKGGKKLSFRAIVIVG NERGQVGVGVGKASDVIGAVKKGVADGKKHLIEIPITKSNSIPHPIDGVGGGAKVIMRPAAPGTGVIAGGAVRTVLELAGVRN VLAKQLGSNNPLNNARAAVNALSTLRTFAEVAEDRGIAVENLYIMATVAETNSGRALYWGTGRRKSAVAQVRLVPGEGKFV VNGKEGELYFQYNPNYLGVIKAPLETLGLENEYDILVKAKGGGLTGQADSIRLGVARALCQLDPDNRSPLKIEGYLTRDPRAKE RKKYGLHKARKAPQYSKRMATLQQQKIRIRLQAFDRRLLDTSCEKIVDTANRTNATAIGPIPLPTKRKIYCVLRSPHVDKDSRE HFETRTHRRIIDIHQPSSKTIDALMKLDLPSGVDIEVKLMARQPTKKTGSKKQKKNVPNGVAYIQSTFNNSIVTITDQNGDVISW ASAGSSGFKGAKKGTPFAAQTAAESAGRRAIDQGMRQIQVMVSGPGAGRETAIRALQGAGLEITLIRDVTPIPHNGCRPPKRRR VMARIAGVDLPRDKRVEIGLTYIYGIGLRRSQDILAATDVNPDTRVKDLTDADLAALRAEIESNYQVEGDLRRLEAMNIKRLVD IGCYRGRRHRMGLPVRGQRTRTNARTRRGRRQTVAGKKKAPGKMGRSLKKGPFVADHLLSKIEKLNANNEKQVIKTWSRAST ILPLMVGHTIAVHNGKQHVPVFVNEQMVGHKLGEFAPTRSYRGHGKTDKKSGRMSDKNEGYKIISDNRQARYLYEILETYEAG IQLTGTEVKSIRAGKVNLQDGYALLRDGEAWLINAHISPYTASGQYFNHEPRRTRKLLLHGLEIRKLIGKVEQQGLTLIPLKMYF KRGWVKISIGLCRGKKVHDKREDLKRRQDQRDIQRAMKNYMAEISAKLVQDLRQKTGAGMMDCKKALNETQGNIDEAIDWL RKKGIASAGKKSDRVTAEGLVDIYTTPDKSGGVIIEVNCQTDFVARNDAFKLLVKNLAKQAVNADNVASLLDQPYIEKTDVTV DEYIKETIATLGENIQVRRFVNFSLEGAPGAIDGYIHTGGRVGVLVSIGVDTETAAKNEELQSLAKNTAMQVAACPNVEYVSVD KIPDQVVEKEKEIEMGKEDLGNKPANIKEKIVQGRIDKRLKEMTLLDQPYIRDQNISVAELIKQVESKVSEPIKVHQFVRYILGEG **IEKQESNFAEEVAAQIGAK**

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MQIPRLHPDTVEEVKHRADIVDVISDYVVLRRRGKDFVGLCPFHEEKTPSFTVSPTKQIYYCFGCQASGNAIKFMMDLNKRQFA EVVLDLAKRYQVPVKTLAPEQRQELQRQLSLREQLFEVLASTSQFYQHVLRQDIGQQALQYLQKKRFLKTETVEKFALGYAPP GWETLYHYLVENKNYPAQLVEKAGLIKPRKEGGGYYDVFRNRLMIPIRDVQGRVIAFGGRTLTDEQPKYLNSPETELFDKSKT LFALDVSKDAISKLDQAVVVEGYFDAIALHANGINNVVASLGTALSLEQVRLLLRYSESKQLVLNFDGDKAGINATERAIGEIS NLAYKGEVQLKILHIPDGKDADEYLKNHSVTDYGQLLVDAPLWLDWQIAQVIQGRDLRQPTDFQLVSREFVKLLQKILNSDTL NYYISHCAEILSLGDTRLIPLRVENLITQVAPRRTPTPRPPQPDSTTSPNTHPISHPQPSLLEQAEGLLLRIFLHCPQERQVIIETLGSS NLEFSVSHHRFLWEKSLQFPSQTLDLISQLQNLYLETQNDLGPVQHIFQLNEKNKQEILLRTSQLVQAAIACMEKVFRENRYRHF

LELWOKTDPSTDPDQYSLYAQTIYADKMRIQELSKQRQLSIADLINMKLAEAESTMNKTVEATQRAFNSIRTGRANASLLDKV QVDYYGSPTSLKSLANITTPDATTILIQPYDRTSLNIVEKAISLSDVGLTPSNDGSVIRLNIPPLTSDRRKELVKLAAKYAEEGRVG IRNIRRDALDSIRKQEKAGEVSEDESRDQQDKLQKITSKYTAKIDELLAEKEKDITTVMPVIEKKRTRDLPQINERIRFPKIRVIDS EGAQLGIMAPLEALRLAEEKELDLVLLSDKADPPVCRIMDYGKYKFEQEKKAREARKKQHTADVKEVKMRYKIEEHDYNVR VKQAERFLKDGDKVKATVMFRGREIQHSDLAETLLNRMATDLEPFGEVQQAPKKEGRNMMMLISPKKMSMVTLPGLKDLIEK ISLERNLPRLAVQSSIREALLKGYERYRRAQNLERRQFDENYFDNFEVELDIDGEGFRVLSTKTIVEEVTNGDHOISLDEVOOVA PEAQSGDSVVLDVTPDQGEFGRMAAMQTKQVLAQKLRDQQRQMVQEEFQDLEGTVLQARVLRFERQSVILAVSSSFGQPEVE AELPKREQLPNDTYRSNATFKVYLKKVSQGQQRGPQLLVSRADAGLVVYLFANEVPEIEDEVVRIVAVAREANPPSRYVGPRT KIAVDTLDRDVDPVGACIGARGSRIQVVVNELRGEKIDVIRWSPDPATYIANALSPARVDEVRLMDPESRQTHVLVAEDQLSLA IGKEGQNVRLAARLTGWKIDIKDQAKYDYGAEDAKFAAVRANYQEESNQLDNQFEVIEEEYEDDPDAGEDDFNSMEEENMSK KSLASLSAADISGKRALVRVDFNVPVDDQGNITDDTRIRAALPTIQDLISKGAKVILASHFGRPKGVDEKLRLTPVAKRLSELLG QEVIKTDDCIGDDVTTQVAALEKGQVLLLENVRFYKEEEKNDPEFARQLAANADFYVNDAFGTAHRAHASTEGVTKYLSPSV AGYLVEKELQYLQGAIEVPQRPLVAIIGGSKVSSKITVIETLLEKCDKLIIGGGMIFTFYKARGLNVGKSLVEDDKLVLASSLEKK AAERGVALLLPTDIVAADRFAPDADAVTVSIDSIPDDRMGLDIGPDSVKVFQAALADCKTVIWNGPMGVFEFDKFAVGTEAIA QTLAEISKTGATTIIGGGDSVAAVEKVGLADQMSHISTGGGASLELLEGKVLPGIAALDEAMTKFIFVTGGVVSSIGKGIVAASL GRLLKSRDYSVSILKLDPYINVDPGTMSPFQHGEVFVTQDGAETDLDLGHYERFTDTSMSRLNSVTTGLIYQSVINKERRGDYN GGTVQVIPHITNEIKERVIRVAKETNPAAVITEIGGTVGDIESLPFLEAIRQLRKEVGKQNVLYMHVTLLPWIASAGEMKTKPTQ HSVKELRSIGIQPDILVCRCDRPIPVGLKQKLSEFCDVPVECVITCQDASSIYEVPLILEKEGLAQQTLDLLQMEQREPDLTHWET MVERMSHPQSPVEIAIVGKYVRLGDAYLSVVESLRHAAIATYGDLRLRWVNSEILEVEPPDNYLLGVDGIIVPGGFGIRGVDGKI SAIEYARNRQIPFLGLCLGMQCSIIEWARNVEGLVGANSAEFNPQTDYPVINLLPEQQDVIDLGGTMRLGLYPCHVQPNTLAFD LYQEEVIYERHRHRYEFNNLYRNHLLNSGYVISGTSPDGRLVEIVEYPQHPFFIACQFHPEFQSRPSHPHPLFKGFMEAAISHTHQ GKKPNYPLRVSSVPMVKKVSRRLQALQAKVEERDYTPLEALALLKETATAKFAEAAEAHIRLGIDPKYTDQQLRTTVVLPKGT GQIVRVAVIARGEKVTEATNAGADIAGSEELIDEIQKGMMDFDKLIATPDVMPQVAKLGKLLGPRGLMPSPKGGTVTFDIASAI SEFKAGKLEFRADRTGIVHVMFGKASFSSEDLLVNLKALQETIDRNRPSGAKGRYWRTFYISSTMGPSIKIDINALRDFKTTDVA MGTRSYRPYTPSTRQVTISDFAEITKTEPEKSLTESVHRPKGRNNQGRITSRRRGGGHKQLYRIIDFKRDKRDITATVIAVEYDPN RNARIALVEYEDGEKRYILHPNGLKVGAKITAGPQAPFEDGNALPLSNIPLGTNVHNVEMTPGKGGQIVRAAGATAQLMAKEG NYVTLKLPSGEVRMVRRECYATIGQVGNTDARNLSAGKAGRNRWKGRRPKVRGSVMNPVDHPHGGGEGRAPIGRSGPVTPW GKPALGAKTRKRKKASSKLIVRRRRKSSKRGRGGRQSMSVGILGTKLGMTQIFDEAGVSIPVTVIQAGPCTVTQVKTQPTDGYC AIQVGYGEVKPKALNKPKLGHLAKSSAGPVRYLNEYRTDAAGDYALGQEIKADIFSVGQIVDVIGTSIGRGFAGNQKRNNFGR GPMSHGSKNHRAPGSIGAGTTPGRVYPGKRMAGRLGGSRVTVRKLTVVKVDAERNLILIKGAIPGKPGGLVNVVPTTKVGNK MVESTVKNWQGEEVGQTSFELRVAKEETASHIVHRALVRQMTNSRQGTASTKTRAEVRGGGRKPWRQKGTGRARAGSIRSPL WRGGGVIFGPKPRDFNIKLNRKERRLALRTAFVSRREDLIVVEEFTDQLQRPKSKELVAALARWGATADQKTLLILSEIGQNTE

TISLSARNVENIKVIAADQLNVFDLLHADKIVVTSSALTKIQEVYSAMATTRLKTLYGQTIVPKLTQQFQYTNVHQVPKVLKVT VNRGLGEAAQNAKALEASLSEIALITGQKPVVTRAKKAIAGFKIRQGMPVGIMVTLRGERMYAFLDRLISLALPRIRDFRGVSA KSFDGRGNYTLGVREQLIFPEIEYDRIDQIRGLDISIITTAKTDEEGRALLKEMGMPFRDQMSRIGKRPITIPAKVQVAIDGTKVVV KGPKGELSRDLPAHVTVSQSGETLLVTRRDDTRTSRQMHGLSRTLVANMVEGVSQGFQRRLEIQGVGYRAQVQGANLVLNIG YSHQVQIEPPAGVQFVVENNTNVIVSGYDKEVVGNTAAKIRAVRPPEPYKGKGIRYAGEVVRRKAGKTGGKGKKMAKKVVA VIKLALNAGKANPAPPVGPALGQHGVNIMMFCKEYNAKTADQAGMVIPVEISVFEDRSFTFVLKTPPASVLIRKAAKIERGSDQ PNKKKVGSITRTQLKEIAQTKLPDLNANDIEAAMNIVEGTAKNMGVTIKDMSTATDQILEQLKSLTLLEAAELVKQIEEAFGVS AAAPAGGMMMMAAPGGAAAAEVVEEKTEFDVILEEVPADKKIAVLKIVREITGLGLKEAKELVESTPKAVKEGVNKEAAEDI SKKITEAGGKVAIKMSSKTYLPPEEEIKRDWYVVDAADKRLGRLASEIAMVLRGKRKAEYTPHLDTGDFVVVINAEKVVVTGK KQSQKLYRRHSGRPGGMKTETFAKLQQRLPERIVEHAVKGMLPKNSLGRQLFTKLKVYSGATHPHTAQKPKELIINTIPGENMI QPQTYLNVADNSGARKLMCIRVLGAGNRRYGGVGDRIIAVVKDAQPNMAVKKSDVVEAVIVRTKKSINRDSGMSIRFDDNAA VIINKEGNPKGTRVFGPVARELRDKNFTKIVSLAPEVLMLSPRRTKFRKQQRGRMEGLAHRGSTLNFGDFALQAQEPCWITSRQ IEASRRAMTRYIRRGGKIWIRIFPDKPVTMRPAETRMGSGKGNPEFWVAVVKPGRILFEIAGVSEEIAREAMRLAAYKLPIKTKFI VRSQPQEQEMNAQEIIRSIEAEQLKSDLPQIYVGDTVRVGVKIKEGDKYRVQPYEGVVIGKRNGGINETITVRRVFQGVGVERV FLLHSPRIDNIKIMRRGKVRRAKLYYLRQLSGKATRIKQRFDRALMTRVKRGNVARNRRNKILKLAKGFRGSHSTLFRTANQQ VMKALRSAYRDRKKKKRDFRRLWITRINAASRQQGLSYSQLIGNLKKANVELNRKMLAQLAVLDPTTFAKVAELASSVKGN MAHKKGTGSTRNGRDSNAQRLGVKRFGGQVVRAGNILVRQRGTKFHPGNNVGIGNDDTLFALIDGVVTFERKGKSRKKVSV YPRVTEEAVASMNNENYMEPSFLLPDLIEIQRSSFRWFLEEGLIEELNSFSPITDYTGKLELHFLGHNYKLKEPKYSVEESKRRDS TYGVQMYVPTRLLNKETGDIKEQEVFIGDLPLMTDRGTFIINGAERVIVNQIVRSPGVYYKSEIDKNGRRTYSASLIPNRGAWLK FETDRNDLVWVRIDKTRKLSIQVLLKALGLLDNEILDALRHPEYFQKTIEKEGQFSEEEALLELYRKLRPGEPPTVMGGQQLLES RFFDPKRYDLGRVGRYKLNKKLRLSVPDTTRVLTPGDILSAVDYLINLEYDIGSIDDIDHLGNRRVRSVGELLQNQVRVGLNRL ERIIRERMTVSDAEVLTPASLVNPKPLVAAIKEFFGSSQLSQFMDQTNPLAELTHKRRLSALGPGGLTRERAGFAVRDIHPSHYG RICPIETPEGPNAGLIGSLATHARVNQYGFLETPFRPVENGRVCYEKPAVYMTADEEDDLRVAPGDIPVDDNGQILGIQVPVRYR QEFSTTTPEQVDYVAVSPVQIVSVATSMIPFLEHDDANRALMGSNMQRQAVPLLKPERPLVGTGLEAQGARDSGMVIVSRTDG DVVYVDATEIRVRVKEKAALTNRESESIPHKPQEIKYVLSKYQRSNQDTCLNQKPLVRIGEKVIAGQVLADGSSTEGGELALGQ NVIVAYMPWEGYNYEDAILISERLVQEDVYTSIHIEKFEIEARQTKLGPEEITREIPNVGEDALRQLDEQGIIRVGAWVESGDILV GKVTPKGESDQPPEEKLLRAIFGEKARDVRDNSLRVPNGEKGRVVDVRLFTREQGDELPPGANMVVRVYVAQKRKIQVGDKM AGRHGNKGIISRILPLEDMPYLPDGTPVDIVLNPLGVPSRMNVGQVFECLLGWAGHNLGVRFKITPFDEMYGEESSRRIVHGKL WEAREETSKDWVYNPENPGKIMVYDGRTGEPFDRAVTVGIAYMLKLVHLVDDKIHARSTGPYSLVTQQPLGGKAQQGGQRF GEMEVWALEAFGAAYTLQELLTVKSDDMQGRNEALNAIVKGKAIPRPGTPESFKVLMRELQSLGLDIAVHKVETQTDGSSLD VEVDLMADQVSRRTPPRPTYESFSRDSLDEDEMPVVSLAQMMESGVHFGHQTRRWNPKMSPYIYTARNGVHIIDLVQTAQLM DDAYNYMRSQAEQGKKFLFVGTKRQAAGIIAQEANRCGSHYINQRWLGGMLTNWATIKTRADRLKDLERREENGALDLLPK

KEASMLRREMSKLQKYLGGIKNMRKVPDVVIIVDQRREYNAVQECQKLSIPIVSMLDTNCDPDTVDIPIPANDDAIRSIKLIVGK LADAIYEGRHGQLEVESDYEEYESAEEDYEYDESEFVDSFSDDDDEEMGQKIHPVGFRLGITQEHQSLWFAVPGRYPELLQEDH KLRQYIEQKLGRNAQNNAGLSEIHIERKADQVDLELRTARPGVVVGRGGQGIEALRTGLQQLLGSHRQVRINVVEVQKVDAD AYLIAEYIAQQLERRVSFRRVVRQAIQRAQRAGVQGIKVQVSGRLNGAEIARTEWTREGRVPLHTLRADIDYSYCTAQTVYGIL GIKVWVFKGEIIPGQEDIVSQPVTREREPRRRQQQRRRQQFEDRSNEAMATGRRKASKAKKEETNWQERVIQIRRVSKVVKGG KKLSFRAIVIVGNERGQVGVGVGKASDVIGAVKKGVADGKKHLIEIPITKSNSIPHPIDGVGGGAKVIMRPAAPGTGVIAGGAV RTVLELAGVRNVLAKQLGSNNPLNNARAAVNALSTLRTFAEVAEDRGIAVENLYIMATVAETNSGRALYWGTGRRKSAVAQ VRLVPGEGKFVVNGKEGELYFQYNPNYLGVIKAPLETLGLENEYDILVKAKGGGLTGQADSIRLGVARALCQLDPDNRSPLKIE GYLTRDPRAKERKKYGLHKARKAPQYSKRMATLQQQKIRIRLQAFDRRLLDTSCEKIVDTANRTNATAIGPIPLPTKRKIYCVL RSPHVDKDSREHFETRTHRRIIDIHQPSSKTIDALMKLDLPSGVDIEVKLMARQPTKKTGSKKQKKNVPNGVAYIQSTFNNSIVTI TDQNGDVISWASAGSSGFKGAKKGTPFAAQTAAESAGRRAIDQGMRQIQVMVSGPGAGRETAIRALQGAGLEITLIRDVTPIPH NGCRPPKRRRVMARIAGVDLPRDKRVEIGLTYIYGIGLRRSQDILAATDVNPDTRVKDLTDADLAALRAEIESNYQVEGDLRRL EAMNIKRLVDIGCYRGRRHRMGLPVRGQRTRTNARTRRGRRQTVAGKKKAPGKMGRSLKKGPFVADHLLSKIEKLNANNEK QVIKTWSRASTILPLMVGHTIAVHNGKQHVPVFVNEQMVGHKLGEFAPTRSYRGHGKTDKKSGRMSDKNEGYKIISDNRQAR YLYEILETYEAGIQLTGTEVKSIRAGKVNLQDGYALLRDGEAWLINAHISPYTASGQYFNHEPRRTRKLLLHGLEIRKLIGKVEQ QGLTLIPLKMYFKRGWVKISIGLCRGKKVHDKREDLKRRQDQRDIQRAMKNYMAEISAKLVQDLRQKTGAGMMDCKKALNE TQGNIDEAIDWLRKKGIASAGKKSDRVTAEGLVDIYTTPDKSGGVIIEVNCQTDFVARNDAFKLLVKNLAKQAVNADNVASLL AQPYIEKTDVTVDEYIKETIATLGENIQVRRFVNFSLEGAPGAIDGYIHTGGRVGVLVSIGVDTETAAKNEELQSLAKNTAMQV AACPNVEYVSVDKIPDQVVEKEKEIEMGKEDLGNKPANIKEKIVQGRIDKRLKEMTLLDQPYIRDQNISVAELIKQVESKVSEPI KVHQFVRYILGEGIEKQESNFAEEVAAQIGAK

>Cylindrospermopsis_raciborskii_ITEP_A1

MQIPRLHPDTVEEVKHRADIVDVISDYVVLRRRGKDFVGLCPFHEEKTPSFTVSPNKQIYYCFGCQASGNAIRFIMDLNKRKFAE VVLDLAKRYQVPVKTLAPEQRQELQRQLSLREQLFEVLASTSQFYQHVLRQDIGQQALQYLQKKRFLKTETVEKFALGYAPPG WETLYHYLVENKSYPAQLVEKAGLIKPRKEGGGYYDAFRNRLMIPIRDVQGRVIAFGGRTLTDEQPKYLNSPETELFDKSKTLF ALDVAKDAISKLDQAVVVEGYFDAIALHANGINNVVASLGTALSLEQVRLLLRYSESKQLVLNFDGDKAGINATERAIGEISNL AYKGEVRLKILHIPDGKDADEYLKNHSVTDYEQLLVEAPLWLDWQIAQVIQGRDLKQPTDFQLVSREFVKLLQKILNSDTLNY YISHCAEILSLGDTRLIPLRVENLITQVAPRRTPTPILRPPASPNTHQISHPQPSLLEQAEGLLLRIFLHCPQERQVIIETLGSSNLEFS VSHYRFLWEKSLQFPSQTLDLISQLQNLYLETQNDLGPVEHIFQLNEKNKQEILLRTNQLVQAAIACMEKVFRENRYRHFLELW

QKTDPSTDPDQYNLYAQTIYADKMRIQELSKQRQLSISDLINMKLAEAESTMNKTVEATQRAFNSIRTGRANASLLDKVQVDY YGSPTPLKSLTNITTPDASTILIQPYDRSSLNIVEKAISLSDVGLTPSNDGSVIRLNIPPLTSDRRKELVKLAAKYAEEGRVGIRNIR RDALDSIRKQEKAGEISEDESRDQQDKLQKITGKYTAKIDELLTEKEKDITTVMPVIEKKRTRDLPQINERIRFPKIRVIDSEGAQL GIMAPLEALRLAEEKELDLVLLSDKADPPVCRIMDYGKYKFEQEKKAREARKKQHTADVKEVKMRYKIEEHDYNVRVKQAE RFLKDGDKVKATVMFRGREIQHSDLAETLLNRMATDLEPFGEIQQAPKKEGRNMMMLISPKKMSMVTLPGLKDLIEKISLERN LPRLAVQSSIREALLKGYERYRRAQNLERRQFDENYFDNFEVELDIDGEGFRVLSTKTIVEEVTNGDHQISLDEVOOVAPEAOS GDSVVLDVTPDQGEFGRMAAMQTKQVLAQKLRDQQRQMVQEEFQDLEGTVLQARVLRFERQSVILAVSSSFGQPEVEAELPK REQLPNDTYRSNATFKVYLKKVSQGQQRGPQLLVSRADAGLVVYLFANEVPEIEDEVVRIVAVAREANPPSRYVGPRTKIAVD TLDRDVDPVGACIGARGSRIQVVVNELRGEKIDVIRWSPDPATYIANALSPARVDEVRLMDPESRQTHVLVAEDQLSLAIGKEG QNVRLAARLTGWKIDIKDQAKYDYGAEDAKFAAVRANYQEESNQPDNQFEIIEEGYEDDPDEGEDDFNSMEEENMSKKSLAS LSATDISDKRALVRVDFNVPVDDQGNITDDTRIRAALPTIQDLISKGAKVILASHFGRPKGVDEKLRLTPVAKRLSELLGQEVIKT DDCIGDDVTAQVAALEKGQVLLLENVRFYKEEEKNDPDFARQLAANADFYVNDAFGTAHRAHASTEGVTKYLSPSVAGYLV EKELQYLQAAIEVPQRPLAAIIGGSKVSSKIGVIETLLKKCDKLIIGGGMIFTFYKARGLNVGKSLVEQDKLELASSLEKKAAERG VTLLLPTDIVAADKFAPDADAVTVSIENIPDDRMGLDIGPDSVKLFQDALADCKTVIWNGPMGVFEFDKFAVGTEAIAQTLAEI GKTGATTIIGGGDSVAAVEKVGLADQMSHISTGGGASLELLEGTVLPGIAALDEAMTKFIFVTGGVVSSIGKGIVAASLGRLLKS RDYSVSILKLDPYINVDPGTMSPFQHGEVFVTQDGAETDLDLGHYERFTDTSMSRLNSVTTGLIYQSVINKERRGDYNGGTVQV IPHITNEIKERVIRVAKETNPAAVITEIGGTVGDIESLPFLEAIRQLRKEVGKQNVLYMHVTLLPWIASAGEMKTKPTQHSVKELR SIGIQPDILVCRCDRPIPVGLKQKLSEFCDVPVECVITCQDASSIYEVPLILEKEGLAQQTLDLLQMEQREPDLTHWETMVERMSH POSPVEIAIVGKYVRLGDAYLSVVESLRHAAIATYGDLRLRWVNSEILEVEPPDNYLLGVDGIIVPGGFGIRGVDGKISAIEYARN RQIPFLGLCLGMQCSIIEWARNVEGLVGANSAEFDPKTDYPVINLLPEQQDVIDIGGTMRLGLYPCHVQPNTLAFDLYQEEVIYE RHRHRYEFNNLYRNHLLNSGYVISGTSPDGRLVEIVEYPQHPFFIACQFHPEFQSRPSHPHPLFKGFMEAAISHTHQGKKQLPHG FPQFPMVKKVSRRLQALQAKVEERDYAPLEALALLKETATAKFPEAAEAHIRLGIDPKYTDQQLRTTVVLPKGTGQIVRVAVIA RGEKVTEATNSGADIAGSEELIDEIQKGMMDFDKLIATPDVMPQVAKLGKLLGPRGLMPSPKGGTVTFDIASAISEFKAGKLEF RADRTGIVHVMFGKASFSSEDLLVNLKALQETIDRNRPSGAKGRYWRTFYISSTMGPSIKVDINALRDLKTTDAAMGTRSYRPY TPSTRQVTISDFAEITKTEPEKSLTESVHRPKGRNNQGRITSRRRGGGHKQLYRIIDFKRDKRDITATVIAVEYDPNRNARIALLE YEDGEKRYILHPNGLKVGAKVTAGPQAPFEDGNALPLSNIPLGTNVHNVEMTPGKGGQIVRAAGATAQLMAKEGNYVTLKLP SGEVRMVRRECYATIGQVGNTDARNLSAGKAGRNRWKGRRPKVRGSVMNPVDHPHGGGEGRAPIGRSGPVTPWGKPALGA KTRKRKKASSKLIVRRRRKSSKRGRGGRQSMSVGILGTKLGMTQIFDEAGVSIPVTVIKAGPCTVTQVKTQPTDGYCAIQVGYG EVKPKALNKPKLGHLAKSSAVPVRYLNEYRTDAAGDYALGQEIKADIFSVGQIVDVIGTSIGRGFAGNQKRNNFGRGPMSHGS KNHRAPGSIGAGTTPGRVYPGKRMAGRLGGSRVTVRKLTVVKVDAERNLILIKGAIPGKPGGLVNVVPTTKVGNKMVESIVKN WQGEEVGQTSFELRVAKEETASHIVHRALVRQMTNSRQGTASTKTRAEVRGGGRKPWRQKGTGRARAGSIRSPLWRGGGVIF GPKPREFNIKLNRKERRLALRTAFVSRREDLIVVEEFTDQLQRPKSKELVAALARWGATADQKTLLILSEIGQSTETISLSARNVE

NIKVIAADQLNVFDLLHADKIVVTSSALTKIQEVYSAMATTRLKTLYGQTIVPKLTQQFQYTNVHQVPKVLKVTVNRGLGEAA QNAKALEASLSEIALITGQKPVVTRAKKAIAGFKIRQGMPVGIMVTLRGERMYAFLDRLISLALPRIRDFRGVSAKSFDGRGNYT LGVREQLIFPEIEYDRIDQIRGLDISIITTAKTDEEGRALLKEMGMPFRDQMSRIGKRPITIPAKVQVAIDGTKVVVKGPKGELSRD LPTHVTVSQSGETLLVTRRDDTRTSRQMHGLSRTLVANMVEGVSQGFQRRLEIQGVGYRAQVQGANLVLNIGYSHQVQIEPPA GVOFAVENNTNVIVSGYDKEVVGNTAAKIRAVRPPEPYKGKGIRYAGEVVRRKAGKTGGKGKKMAKKVVAVIKLALNAGKA NPAPPVGPALGQHGVNIMMFCKEYNAKTADQAGMVIPVEISVFEDRSFTFVLKTPPASVLIRKAAKIERGSDQPNKKKVGSITR TQLREIAQTKLPDLNANDIEAAMNIVEGTAKNMGVTVKMSTATDQILEQLKVLTLLEAAELVKQIEEAFGVSAAAPAGGMMV MAAPGAAAAEPVEEQTEFNVVLEEVPADKKIAVLKIVREITGLGLKEAKELVESTPKAVKEGVNKESAEEISKKIAEAGGKVVI KMSSKTYLPPEEEIKRDWYVVDAADKRLGRLASEIAMVLRGKRKAEYTPHLDTGDFVVVINAEKVVVTGKKPSQKLYRRHSG RPGGMKTETFAKLQQRLPERIVEHAVKGMLPKNSLGRQLFTKLKVYSGSTHPHTAQKPKELIINTIPGENMIQPQTYLNVADNS GARKLMCIRVLGAGNRRYGGVGDRIIAVVKDAQPNMAVKKSDVVEAVIVRTKKSINRDSGMSIRFDDNAAVIINKEGNPKGTR VFGPVARELRDKNFTKIVSLAPEVLMLSPRRTKFRKQQRGRMEGLAHRGSTLNFGDFALQAQEPCWITSRQIEASRRAMTRYIR RGGKIWIRIFPDKPVTMRPAETRMGSGKGNPEFWVAVVKPGRILFEIAGVSEEIAREAMRLAAYKLPIKTKFIVRSQPQEQEMNA QEIIRSIEAEQLKSDLPQIYVGDTVRVGVKIKEGDKYRVQPYEGVVIGKRNGGINETITVRRVFQGVGVERVFLLHSPRIDNIKIM RRGKVRRAKLYYLRQLSGKATRIKQRFDRALMTRVKRGNVARNRRNKILKLAKGFRGSHSTLFRTANQQVMKALRSAYRDR KKKKRDFRRLWITRINAASRQQGLSYSQLIGNLKKANVELNRKMLAQLAVLDPATFAKVAELASSVKGMAHKKGTGSTRNGR DSNAQRLGVKRFGGQVVRAGNILVRQRGTKFHPGNNVGIGNDDTLFALIDGVVTFERKGKSRKKVSVYPPVTEESVASMNNE NYTEPSFLLPDLIEIQRSSFRWFLEEGLIEELNSFSPITDYTGKLELHFLGHNYKLKEPKYSVEESKRRDSTYGVQMYVPTRLLNK ETGDIKEQEVFIGDLPLMTDRGTFIINGAERVIVNQIVRSPGVYYKSEIDKNGRRTYSASLIPNRGAWLKFETDRNDLVWVRIDK TRKLSIQVLLKALGLSDNEILDALRHPEYFQKTIEKEGQFSEEEALLELYRKLRPGEPPTVMGGQQLLESRFFDPKRYDLGRVGR YKLNKKLRLSVPDTTRVLTPGDILSAVDYLINLEYDIGSIDDIDHLGNRRVRSVGELLQNQVRVGLNRLERIIRERMTVSDAEVL TPASLVNPKPLVAAIKEFFGSSQLSQFMDQTNPLAELTHKRRLSALGPGGLTRERAGFAVRDIHPSHYGRICPIETPEGPNAGLIG SLATHARVNQYGFLETPFRPVENGRVCYEKPAVYMTADEEDDLRVAPGDIPVDDNGQILGIQVPVRYRQEFSTTTPEQVDYVA VSPVQIVSVATSMIPFLEHDDANRALMGSNMQRQAVPLLKPERPLVGTGLEAQGARDSGMVIVSRTDGDVVYVDATEIRVRV KEKAALTNRESETIPHKPQEIKYVLSKYQRSNQDTCLNQKPLVRIGEKVIAGQVLADGSSTEGGELALGQNVIVAYMPWEGYN YEDAILISERLVQEDVYTSIHIEKFEIEARQTKLGPEEITREIPNVGEDALRQLDEQGIIRVGAWVESGDILVGKVTPKGESDQPPE EKLLRAIFGEKARDVRDNSLRVPNGEKGRVVDVRLFTREQGDELPPGANMVVRVYVAQKRKIQVGDKMAGRHGNKGIISRILP LEDMPYLPDGTPVDIVLNPLGVPSRMNVGQVFECLLGWAGHNLGVRFKITPFDEMYGEESSRRIVHGKLWEAREETSRDWVY NPENPGKIMVYDGRTGEPFDRAVTVGIAYMLKLVHLVDDKIHARSTGPYSLVTQQPLGGKAQQGGQRFGEMEVWALEAFGA AYTLQELLTVKSDDMQGRNEALNAIVKGKAIPRPGTPESFKVLMRELQSLGLDIAVHKVETQTDGSSLDVEVDLMADQVSRRT PPRPTYESFSRDSLDEDEMPVVSLAQMMESGVHFGHQTRRWNPKMSPYIYTARNGVHIIDLVQTAQLMDDAYNYMRSQAEQG KKFLFVGTKRQAAGIIAQEANRCGSHYINQRWLGGMLTNWATIKTRADRLKDLERREENGALDLLPKKEASMLRREMSKLQK

YLGGIKNMRKVPDVVIIVDQRREYNAVQECQKLSIPIVSMLDTNCDPDTVDVPIPANDDAIRSIKLIVGKLADAIYEGRHGQLEV EPDDEDYDIPEEDYEYNESEMGQKIHPVGFRLGITQEHQSLWFAVPGRYPELLQEDHKLRQYIEQKLGRNAQNNAGLSEIHIER KADQVDLELRTARPGVVVGRGGQGIEALRTGLQQLLGSHRQVRINVVEVQKVDADAYLIAEYIAQQLERRVSFRRVVRQAIQR AQRAGVQGIKVQVSGRLNGAEIARTEWTREGRVPLHTLRADIDYSYCTAQTVYGILGIKVWVFKGEIIPGQEDIVSQPVTREREP RRRQQQRRRQQFEDRSNEAMATGRRKASKAKKEETNWQERVIQIRRVSKVVKGGKKLSFRAIVIVGNERGQVGVGVGKASD VIGAVKKGVADGKKHLIEIPITKSNSIPHPIDGVGGGAKVIMRPAAPGTGVIAGGAVRTVLELAGVRNVLAKQLGSNNPLNNAR AAVNALSTLRTFAEVAEDRGIAVENLYIMATVAETNSGRALYWGTGRRKSAVAQVRLVPGEGKFVVNGKEGELYFQYNPNYL GVIKAPLETLGLENEYDILVKAKGGGLTGQADSIRLGVARALCQLDPDNRSPLKIEGYLTRDPRAKERKKYGLHKARKAPQYS KRMATLQQQKIRIRLQAFDRRLLDTSCEKIVDTANRTNATAIGPIPLPTKRKIYCVLRSPHVDKDSREHFETRTHRRIIDIHOPSSK TIDALMKLDLPSGVDIEVKLMARQPTKKTGSKKQKKNVPNGVAYIQSTFNNSIVTITDQNGDVISWASAGSSGFKGAKKGTPFA AQTAAESAGRRAIDQGMRQIQVMVSGPGAGRETAIRALQGAGLEITLIRDVTPIPHNGCRPPKRRRVMARIAGVDLPRDKRVEI GLTYIYGIGLRRSQDILAATDVNPDTRVKDLTDADLAALRAEIESNYQVEGDLRRLEAMNIKRLVDIGCYRGRRHRMGLPVRG QRTRTNARTRRGRRQTVAGKKKAPGKMGRSLKKGPFVADHLLSKLEKLNANNEKQVIKTWSRASTILPLMVGHTIAVHNGKQ HVPVFVNEQMVGHKLGEFAPTRTYRGHGKTDKKSGRMSDKNEGYKIISDNRQARYLYEILETYEAGIQLTGTEVKSIRAGKVN LQDGYALLRDGEAWLINAHISPYTASGQYFNHEPRRTRKLLLHGLEIRKLIGKVEQQGLTLIPLKMYFKRGWVKISIGLCRGKK VHDKREDLKRRQDQRDIQRAMKNYMAEISAKLVQDLRQKTGAGMMDCKKALNETQGNIDEAIDWLRKKGIASAGKKSDRV TAEGLVDIYTTPDRSGGVLIEVNCQTDFVARNDAFKLLVKNLAKQAVNADNVTSLLAQPYIENTDVTVDEYIKETIATLGENIQ VRRFVNFSLEGSPGAIDGYIHTGGRVGVLISIGVDTETAAKNEEVQSLAKNTAMQVAACPNVEYVSVDKIPDQVVQKEKEIEM GKEDLGNKPENIKEKIVQGRIDKRLKEMTLLDQPYIRDQSISVAELIKQVESKVSEPIKVHQFVRYILGEGIEKQESNFAQEVAAQ **IGAK**

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MQIPRLHPDTVEEVKHRADIVDVISDYVVLRRRGKDFVGLCPFHEEKTPSFTVSPNKQIYYCFGCQASGNAIKFIMDLNKRKFAE VVLDLAKRYQVPVKTLAPEQRQELQRQLSLREQLFEVLASTSQFYQHVLRQDIGQQALQYLQRKRFLKTETVEKFALGYAPPG WETLYHYLVESKNYPAQLLEKAGLIKPRKEGGGYYDVFRNRLMIPIRDVQGRVIAFGGRTLTDEQPKYLNSPETELFDKSKTLF ALDVAKDAISKLDQAVVVEGYFDAITLHANGINNVVASLGTALSLEQVRLLLRYSESKQLVLNFDGDKAGINATERAIGEISNL AYKGEVRLKILHIPDGKDADEYLKNHSVTDYEQLLVDAPLWLDWQIAQVIQGRDLKQPTDFQLVSREFVKLLQKILNSDTLNY

YISHCAEILSLGDTRLIPLRVENLITQVAPRHSTTSPKTHQISHPQPSLLEQAEGLLLRIFLHCPQERQVIIETLQSSNLEFSVSHHRF LWEKSLOFPSQTLDLISQLQNLYLETQNDLGPVEHIFQLNEKNKQEILLRTNQLVQAAIACMEKVFRENRYRHFLELWQKTDPS TDPDQYNLYAQTIYADKMRIQELSKQRQLSISDLINMKLAEAESTMNKTVEATQRAFNSIRTGRANASLLDKVQVDYYGSPTPL KSLANITTPDATTIYIQPYDRSSLNIVEKAISLSDVGLTPSNDGSVIRLNIPPLTSDRRKELVKLAAKYAEEGRVGIRNIRRDALDSI RKQEKAGEISEDESRDQQDKLQKITGKYTAKIDELLAEKEKDITTVMPVIEKKRTRDLPQINERIRFPKIRVIDSEGAQLGIMAPL EALRLAEEKELDLVLLSDKADPPVCRIMDYGKYKFEQEKKAREARKKQHTADVKEVKMRYKIEEHDYNVRVKQAERFLKDG DKVKATVMFRGREIQHSDLAETLLNRMATDLEPFGEIQQAPKKEGRNMMMLISPKKMSMVTLPGLKDLIEKISLERNLPRLAV QSSIREALLKGYERYRRAQNLERRQFDENYFDNFEVELDIDGEGFRVLSTKTIVEEVTNGDHQISLDEVQQVAPEAQSGDSVVL DVTPDQGEFGRMAAMQTKQVLAQKLRDQQRQMVQEEFQDLEGTVLQARVLRFERQSVILAVSSSFGQPEVEAELPKREQLPN DTYRSNATFKVYLKKVSQGQQRGPQLLVSRADAGLVVYLFANEVPEIEDEVVRIVAVAREANPPSRYVGPRTKIAVDTLDRDV DPVGACIGARGSRIQVVVNELRGEKIDVIRWSPDPATYIANALSPARVDEVRLMDPESRQTHVLVAEDQLSLAIGKEGQNVRLA ARLTGWKIDIKDQAKYDYGAEDAKFAAVRANYQEESNQPDNQFEVIEEEYEDDPDEGGDDFNSMEEKNMSKKSLASLSATDIS DKRALVRVDFNVPVDDQGNITDDTRIRAALPTIQDLISKGAKVILASHFGRPKGVDEKLRLTPVAKRLSELLGQEVIKTDDCIGD DVTTQVAALEKGQVLLLENVRFYKEEEKNDPDFARQLAANADFYVNDAFGTAHRAHASTEGVTKYLSPSVAGYLVEKELQY LQAAIEDPQRPLAAIIGGSKVSSKIGVIETLLEKCDKLIIGGGMIFTFYKARGLNVGKSLVEQDKLELASSLEKKAAERGVTLLLP TDIVAADKFAPDANAVTVSIDNIPDDRMGLDIGPDSVKVFQAALADCKTVIWNGPMGVFEFDKFAVGTEAIAQTLAEISKTGAT TIIGGGDSVAAVEKVGLADQMSHISTGGGASLELLEGKVLPGIAALDEAMTKFIFVTGGVVSSIGKGIVAASLGRLLKSRDYSVS ILKLDPYINVDPGTMSPFQHGEVFVTQDGAETDLDLGHYERFTDTSMSRLNSVTTGLIYQSVINKERRGDYNGGTVQVIPHITNE IKERVIRVAKETNPAAVITEIGGTVGDIESLPFLEAIRQLRKEVGKQNVLYMHVTLLPWIASAGEMKTKPTQHSVKELRSIGIQPD ILVCRCDRPIPVGLKQKLSEFCDVPVECVITCQDASSIYEVPLILEKEGLAQQTLDLLQMEQREPDLTHWETMVERMSHPQSPVE IAIVGKYVRLGDAYLSVVESLRHAAIATYGDLRLRWVNSEILEVEPPDNYLLGVDGIIVPGGFGIRGVDGKISAIEYARNQQIPFL GLCLGMQCSIIEWARNVEGLVGANSAEFDPKTDYPVINLLPEQQDVIDLGGTMRLGLYPCHVQPNTLAFDLYQEEVIYERHRH RYEFNNLYRNHLLNSGYVISGTSPDGRLVEIVEYPQHPFFIACQFHPEFQSRPSHPHPLFKGFMEAAISHTHQGKKQVPHGFPQFP MVKKVSRRLQALQAKVEERDYAPLEALALLKETATAKFPEAAEAHIRLGIDPKYTDQQLRTTVVLPKGTGQIVRVAVIARGEK VTEATNAGADIAGSEELIDEIQKGMMDFDKLIATPDVMPQVAKLGKLLGPRGLMPSPKGGTVTFDIASAISEFKAGKLEFRADR TGIVHVMFGKASFSSEDLLVNLKALQETIDRNRPSGAKGRYWRTFYISSTMGPSIKVDINALRDLKTTDAAMGTRSYRPYTPSTARFINAL STARFINAL STRQVTISDFAEITKTEPEKSLTESVHRPKGRNNQGRITSRRRGGGHKQLYRIIDFKRDKRDITATVIAVEYDPNRNARIALVEYEDG EKRYILHPNGLKVGAKVTAGPQAPFEDGNALPLSNIPLGTNVHNVEMTPGKGGQIVRAAGATAQLMAKEGNYVTLKLPSGEV RMVRRECYATIGQVGNTDARNLSAGKAGRNRWKGRRPKVRGSVMNPVDHPHGGGEGRAPIGRSGPVTPWGKPALGAKTRK RKKASSKLIVRRRRKSSKRGRGGRQSMSVGILGTKLGMTQIFDEAGVSIPVTVIKAGPCTVTQVKTQPTDGYCAIQVGYGEVKP KALNKPKLGHLAKSSAGPVRYLNEYRTDAAGDYALGQEIKADIFSVGQIVDVIGTSIGRGFAGNQKRNNFGRGPMSHGSKNHR APGSIGAGTTPGRVYPGKRMAGRLGGSRVTVRKLTVVKVDAERNLILIKGAIPGKPGGLVNVVPTTKVGNKMVESIVKNWQG

EEVGQTSFELRVAKEETASHIVHRALVRQMTNSRQGTASTKTRAEVRGGGRKPWRQKGTGRARAGSIRSPLWRGGGVIFGPKP RDFNIKLNRKERRLALRTAFVSRREDLIVVEEFTDQLQRPKSKELVAALARWGATAEQKTLLILSEIGQSTETISLSARNVENIKV IAADQLNVFDLLHADKIIVTSSALTKIQEVYSAMATTRLKTLYGQTIVPKLTQQFQYTNVHQVPKVLKVTVNRGLGEAAQNAK ALEASLSEIALITGQKPVVTRAKKAIAGFKIRQGMPVGIMVTLRGERMYAFLDRLISLALPRIRDFRGVSAKSFDGRGNYTLGVR EOLIFPEIEYDRIDOIRGLDISIITTAKTDEEGRALLKEMGMPFRDOMSRIGKRPITIPAKVOVAIDGTKVVVKGPKGELSRDLPAH VTVSQSGETLLVTRRDDTRTSRQMHGLSRTLVANMVEGVSQGFQRRLEIQGVGYRAQVQGANLVLNIGYSHQVQIEPPAGVQ FAVENNTNVIVSGYDKEVVGNTAAKIRAVRPPEPYKGKGIRYAGEVVRRKAGKTGGKGKKMAKKVVAVIKLALNAGKANPA PPVGPALGQHGVNIMMFCKEYNAKTADQAGMVIPVEISVFEDRSFTFVLKTPPASVLIRKAAKIERGSDQPNKKKVGSITRTQL REIAQTKLPDLNANDIEAAMNIVEGTAKNMGVTVKDMSTATDQILEQLKVLTLLEAAELVKQIEEAFGVSAAAPAGGMMVMA APGGAAAAEVVEEQTEFNVILEEVPADKKIAVLKIVREITGLGLKEAKELVESTPKAVKEGVNKESAEEISKKIAEAGGKVAIKM SSKTYLPPEEEIKRDWYVVDAADKRLGRLASEIAMVLRGKRKAEYTPHLDTGDFVVVINAEKVVVTGKKPSQKLYRRHSGRP GGMKTETFAKLQQRLPERIVEHAVKGMLPKNSLGRQLFTKLKVYSGSTHPHTAQKPKELIINTIPGENMIQPQTYLNVADNSGA RKLMCIRVLGAGNRRYGGVGDRIIAVVKDAQPNMAVKKSDVVEAVIVRTKKSINRDSGMSIRFDDNAAVIINKEGNPKGTRVF GPVARELRDKNFTKIVSLAPEVLMLSPRRTKFRKQQRGRMEGLAHRGSTLNFGDFALQAQEPCWITSRQIEASRRAMTRYIRRG GKIWIRIFPDKPVTMRPAETRMGSGKGNPEFWVAVVKPGRILFEIAGVSEEIAREAMRLAAYKLPIKTKFIVRSQPQEQEMNAQE IIRSIEAEQLKSDLPQIYVGDTVRVGVKIKEGDKYRVQPYEGVVIGKRNGGINETITVRRVFQGVGVERVFLLHSPRIDNIKIMRR GKVRRAKLYYLRQLSGKATRIKQRFDRALMTRVKRGNVARNRRNKILKLAKGFRGSHSTLFRTANQQVMKALRSAYRDRKK KKRDFRRLWITRINAASRQQGLSYSQLIGNLKKSNVELNRKMLAQLAVLDPATFAKVAELASSVKGMAHKKGTGSTRNGRDS NAQRLGVKRFGGQVVRAGNILVRQRGTKFHPGNNVGIGNDDTLFALIDGVVTFERKGKSRKKVSVYPRVTEEAVASMNNENY TEPSFLLPDLIEIQRSSFRWFLEEGLIEELNSFSPITDYTGKLELHFLGHNYKLKEPKYSVEESKRRDSTYGVQMYVPTRLLNKET GDIKEQEVFIGDLPLMTDRGTFIINGAERVIVNQIVRSPGVYYKSEIDKNGRRTYSASLIPNRGAWLKFETDRNDLVWVRIDKTR KLSIQVLLKALGLSDNEILDALRHPEYFQKTIEKEGQFSEEEALLELYRKLRPGEPPTVMGGQQLLESRFFDPKRYDLGRVGRYK LNKKLRLSVPDTTRVLTPGDILSAVDYLINLEYDIGSIDDIDHLGNRRVRSVGELLQNQVRVGLNRLERIIRERMTVSDAEVLTP ASLVNPKPLVAAIKEFFGSSQLSQFMDQTNPLAELTHKRRLSALGPGGLTRERAGFAVRDIHPSHYGRICPIETPEGPNAGLIGSL ATHARVNQYGFLETPFRPVENGRVCYEKPAVYMTADEEDDLRVAPGDIPVDDNGQILGIQVPVRYRQEFSTTTPEQVDYVAVS PVQIVSVATSMIPFLEHDDANRALMGSNMQRQAVPLLKPERPLVGTGLEAQGARDSGMVIVSRTDGDVVYVDATEIRVRVKE KAALTNRESETIPHKPQEVKYVLSKYQRSNQDTCLNQKPLVRIGEKVIAGQVLADGSSTEGGELALGQNVIVAYMPWEGYNYE DAILISERLVQEDVYTSIHIEKFEIEARQTKLGPEEITREIPNVGEDALRQLDEQGIIRVGAWVESGDILVGKVTPKGESDQPPEEK LLRAIFGEKARDVRDNSLRVPNGEKGRVVDVRLFTREQGDELPPGANMVVRVYVAQKRKIQVGDKMAGRHGNKGIISRILPLE DMPYLPDGTPVDIVLNPLGVPSRMNVGQVFECLLGWAGHNLGVRFKITPFDEMYGEESSRRIVHGKLWEAREETSRDWVYNP ENPGKIMVYDGRTGEPFDRAVTVGIAYMLKLVHLVDDKIHARSTGPYSLVTQQPLGGKAQQGGQRFGEMEVWALEAFGAAY TLQELLTVKSDDMQGRNEALNAIVKGKAIPRPGTPESFKVLMRELQSLGLDIAVHKVETQTDGSSLDVEVDLMADQVSRRTPP

RPTYESFSRDSLDEDEMPVVSLAQMMESGVHFGHQTRRWNPKMSPYIYTARNGVHIIDLVQTAQLMDDAYNYMRSQAEQGK KFLFVGTKRQAAGIIAQEANRCGSHYINQRWLGGMLTNWATIKTRADRLKDLERREENGALDLLPKKEASMLRREMSKLQKY LGGIKNMRKVPDVVIIVDQRREYNAVQECQKLSIPIVSMLDTNCDPDTVDIPIPANDDAIRSIKLIVGKLADAIYEGRHGQLEVEP DHEDYDIPEEDYEYDESEFVDSFSDDDDEEMGQKIHPVGFRLGITQEHQSLWFAVPGRYPELLQEDHKLRQYIEQKLGRNAQN NAGLSEIHIERKADQVDLELRTARPGVVVGRGGQGIEALRTGLQQLLGSHRQVRINVVEVQKVDADAYLIAEYIAQQLERRVSF RRVVRQAIQRAQRAGVQGIKVQVSGRLNGAEIARTEWTREGRVPLHTLRADIDYSYCTAQTVYGILGIKVWVFKGEIIPGQEDI VSQPVTREREPRRRQQQRRRQQFEDRSNEAMATGRRKASKAKKEETNWQERVIQIRRVSKVVKGGKKLSFRAIVIVGNERGQV GVGVGKASDVIGAVKKGVADGKKHLIEIPITKSNSIPHPIDGVGGGAKVIMRPAAPGTGVIAGGAVRTVLELAGVRNVLAKQL GSNNPLNNARAAVNALSTLRTFAEVAEDRGIAVENLYIMATVAETNSGRALYWGTGRRKSAVAQVRLVPGEGKFVVNGKEG ELYFQYNPNYLGVIKAPLETLGLENEYDILVKAKGGGLTGQADSIRLGVARALCQLDPDNRSPLKIEGYLTRDPRAKERKKYGL HKARKAPQYSKRMATLQQQKIRIRLQAFDRRLLDTSCEKIVDTANRTNATAIGPIPLPTKRKIYCVLRSPHVDKDSREHFETRTH RRIIDIHOPSSKTIDALMKLDLPSGVDIEVKLMAROPTKKTGSKKOKKNVPNGVAYIOSTFNNSIVTITDONGDVISWASAGSSG FKGAKKGTPFAAQTAAESAGRRAIDQGMRQIQVMVSGPGAGRETAIRALQGAGLEITLIRDVTPIPHNGCRPPKRRRVMARIAG VDLPRDKRVEIGLTYIYGIGLRRSQDILAATDVNPDTRVKDLTDADLAALRAEIESNYQVEGDLRRLEAMNIKRLVDIGCYRGR RHRMGLPVRGQRTRTNARTRRGRRQTVAGKKKAPGKMGRSLKKGPFVADHLLSKLEKLNANNEKQVIKTWSRASTILPLMV GHTIAVHNGKQHVPVFVNEQMVGHKLGEFAPTRTYRGHGKTDKKSGRMSDKNEGYKIISDNRQARYLYEILETYEAGIQLTGT EVKSIRAGKVNLQDGYALLRDGEAWLINAHISPYTASGQYFNHEPRRTRKLLLHGLEIRKLIGKVEQQGLTLIPLKMYFKRGWV KISIGLCRGKKVHDKREDLKRRQDQRDIQRAMKNYMAEISAKLVQDLRQKTGAGIMDCKKALNETQGNIDEAIDWLRKKGIA SAGKKSDRVTAEGLVDIYTTPDRSGGVLIEVNCQTDFVARNDAFKLLVKNLAKQAVNADNVTSLLAQPYIENTDVTVDDYIKE TIATLGENIQVRRFVNFSLEGAPGAIDGYIHTGGRVGVLVSIGVDTETAAKNEEVQSLARNAAMQVAACPNVEYVSVDKIPDQV VQKEKEIEMGKEDLGNKPDNIKEKIVQGRIDKRLKEMTLLDQPYIRDQNISVAELINQVQSKVSEPIKVHQFVRYILGEGIEKQES NFAEEVAAQIGTK

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MQIPRLHPDTVEEVKHRADIVDVISDYVVLRRRGKDFVGLCPFHEEKTPSFTVSPTKQIYYCFGCQASGNAIKFMMDLNKRQFA EVVLDLAKRYQVPVKTLAPEQRQELQRQLSLREQLFEVLASTSQFYQHVLRQDIGQQALQYLQKKRFLKTETVEKFALGYAPP GWETLYHYLVENKNYPAQLVEKAGLIKPRKEGGGYYDVFRNRLMIPIRDVQGRVIAFGGRTLTDEQPKYLNSPETELFDKSKT LFALDVSKDAISKLDQAVVVEGYFDAIALHANGINNVVASLGTALSLEQVRLLLRYSESKQLVLNFDGDKAGINATERAIGEIS NLAYKGEVQLKILHIPDGKDADEYLKNHSVTDYGQLLVDAPLWLDWQIAQVIQGRDLRQPTDFQLVSREFVKLLQKILNSDTL NYYISHCAEILSLGDTRLIPLRVENLITQVAPRRTPTPRPPQPDSTTSPNTHQISHPQPSLLEQAEGLLLRIFLHCPQERQVIIETLGF SNLEFSVSHHRFLWEKSLQFPSQTLDLISQLQNLYLETQNDLGPVQHIFQLNEKNKQEILLRTSQLVQAAIACMEKVFRENRYRH

FLELWQKTDPSTDPDQYSLYAQTIYADKMRIQELSKQRQLSIADLINMKLAEAESTMNKTVEATQRAFNSIRTGRANASLLDKV QVDYYGSPTSLKSLANITTPDATTILIQPYDRTSLNIVEKAISLSDVGLTPSNDGSVIRLNIPPLTSDRRKELVKLAAKYAEEGRVG IRNIRRDALDSIRKQEKAGEVSEDESRDQQDKLQKITSKYTAKIDELLAEKEKDITTVMPVIEKKRTRDLPQINERIRFPKIRVIDS EGAOLGIMAPLEALRLAEEKELDLVLLSDKADPPVCRIMDYGKYKFEQEKKAREARKKQHTADVKEVKMRYKIEEHDYNVR VKQAERFLKDGDKVKATVMFRGREIQHSDLAETLLNRMATDLEPFGEVQQAPKKEGRNMMMLISPKKMSMVTLPGLKDLIEK ISLERNLPRLAVQSSIREALLKGYERYRRAQNLERRQFDENYFDNFEVELDIDGEGFRVLSTKTIVEEVTNGDHOISLDEVOOVA PEAQSGDSVVLDVTPDQGEFGRMAAMQTKQVLAQKLRDQQRQMVQEEFQDLEGTVLQARVLRFERQSVILAVSSSFGQPEVE AELPKREQLPNDTYRSNATFKVYLKKVSQGQQRGPQLLVSRADAGLVVYLFANEVPEIEDEVVRIVAVAREANPPSRYVGPRT KIAVDTLDRDVDPVGACIGARGSRIQVVVNELRGEKIDVIRWSPDPATYIANALSPARVDEVRLMDPESRQTHVLVAEDQLSLA IGKEGQNVRLAARLTGWKIDIKDQAKYDYGAEDAKFAAVRANYQEESNQLDHQFEVMEEEYEDDPDAGEDDFNSMEEENMS KKSLASLSAADISDKRALVRVDFNVPVDDQGNITDDTRIRAALPTIQDLISKGAKVILASHFGRPKGVDEKLRLTPVAKRLSELL GQEVIKTDDCIGDDVTAQVAALEKGQVLLLENVRFYKEEENNDPEFARQLAANADFYVNDAFGTAHRAHASTEGVTKYLSPS VAGYLVEKELQYLQGAIEVPQRPLVAIIGGSKVSSKIGVIETLLEKCDKLIIGGGMIFTFYKARGLNVGKSLVEQDKLGLASSLEK KAAERGVTLLLPTDIVAADKFGPDADAVTVSIDHIPDDRMGLDIGPDSVKVFQAALADCKTVIWNGPMGVFEFDKFAVGTEAI AQTLAEISKTGATTIIGGGDSVAAVEKVGLADQMSHISTGGGASLELLEGKVLPGIAALDEAMTKFIFVTGGVVSSIGKGIVAAS LGRLLKSRDYSVSILKLDPYINVDPGTMSPFQHGEVFVTQDGAETDLDLGHYERFTDTSMSRLNSVTTGLIYQSVINKERRGDY NGGTVQVIPHITNEIKERVIRVAKETNPAAVITEIGGTVGDIESLPFLEAIRQLRKEVGKQNVLYMHVTLLPWIASAGEMKTKPT QHSVKELRSIGIQPDILVCRCDRPIPVGLKQKLSEFCDVPVECVITCQDASSIYEVPLILEKEGLAQQTLDLLQMEQREPDLTHWE TMVERMSHPQSPVEIAIVGKYVRLGDAYLSVVESLRHAAIATYGDLRLRWVNSEILEVEPPDNYLLGVDGIIVPGGFGIRGVDG KISAIEYARNQQIPFLGLCLGMQCSIIEWARNVEGLVGANSAEFNPQTDYPVINLLPEQQDVIDLGGTMRLGLYPCHVQPNTLAF DLYQEEVIYERHRHRYEFNNLYRNHLLNSGYVISGTSPDGRLVEIVEYPQHPFFIACQFHPEFQSRPSHPHPLFKGFMEAAISHTH QGSTPMVKKVSRRLQALQAKVEERDYTPLEALALLKETATAKFAEAAEAHIRLGIDPKYTDQQLRTTVVLPKGTGQIVRVAVI ARGEKVTEATNAGADIAGSEELIDEIQKGMMDFDKLIATPDVMPQVAKLGKLLGPRGLMPSPKGGTVTFDIASAISEFKAGKLE FRADRTGIVHVMFGKASFSSEDLLVNLKALQETIDRNRPSGAKGRYWRTFYISSTMGPSIKIDINALRDFKTTDVAMGTRSYRPY TPSTRQVTISDFAEITKTEPEKSLTESVHRPKGRNNQGRITSRRRGGGHKQLYRIIDFKRDKRDITATVIAVEYDPNRNARIALVE YEDGEKRYILHPNGLKVGAKITAGPQAPFEDGNALPLSNIPLGTNVHNVEMTPGKGGQIVRAAGATAQLMAKEGNYVTLKLPS GEVRMVRRECYATIGQVGNTDARNLSAGKAGRNRWKGRRPKVRGSVMNPVDHPHGGGEGRAPIGRSGPVTPWGKPALGAK TRKRKKASSKLIVRRRRKSSKRGRGGRQSMSVGILGTKLGMTQIFDEAGVSIPVTVIQAGPCTVTQVKTQPTDGYCAIQVGYGE VKPKALNKPKLGHLAKSSAGPVRYLNEYRTDAAGDYALGQEIKADIFSVGQIVDVIGTSIGRGFAGNQKRNNFGRGPMSHGSK NHRAPGSIGAGTTPGRVYPGKRMAGRLGGSRVTVRKLTVVKVDAERNLILIKGAIPGKPGGLVNVVPTTKVGNKMVESTVKN WQGEEVGQTSFELRVAKEETASHIVHRALVRQMTNSRQGTASTKTRAEVRGGGRKPWRQKGTGRARAGSIRSPLWRGGGVIF GPKPRDFNIKLNRKERRLALRTAFVSRREDLIVVEEFTDQLQRPKSKELVAALARWGATADQKTLLILSEIGQNTETISLSARNV

ENIKVIAADQLNVFDLLHADKIVVTSSALTKIQEVYSAMATTRLKTLYGQTIVPKLTQQFQYTNVHQVPKVLKVTVNRGLGEA AQNAKALEASLSEIALITGQKPVVTRAKKAIAGFKIRQGMPVGIMVTLRGERMYAFLDRLISLALPRIRDFRGVSAKSFDGRGN YTLGVREQLIFPEIEYDRIDQIRGLDISIITTAKTDEEGRALLKEMGMPFRDQMSRIGKRPITIPAKVQVAIDGTKVVVKGPKGELS RDLPAHVTVSQSGETLLVTRRDDTRTSRQMHGLSRTLVANMVEGVSQGFQRRLEIQGVGYRAQVQGANLVLNIGYSHQVQIE PPAGVOFVVENNTNVIVSGYDKEVVGNTAAKIRAVRPPEPYKGKGIRYAGEVVRRKAGKTGGKGKKMAKKLVAVIKLALNA GKANPAPPVGPALGQHGVNIMMFCKEYNAKTADQAGMVIPVEISVFEDRSFTFVLKTPPASVLIRKAAKIERGSDQPNKKKVGS ITRTQLKEIAQTKLPDLNANDIEAAMNIVEGTAKNMGVTIKDMSTATDQILEQLKSLTLLEAAELVKQIEEAFGVSAAAPAGGM MMMAAPGGAAAAEVVEEQTEFDVILQEVPADKKIAVLKIVREITGLGLKEAKELVESTPKAVKEGVNKEAAEDISKKITEAGG KVAIKMSSKTYLPPEEEIKRDWYVVDAADKRLGRLASEIAMVLRGKRKAEYTPHLDTGDFVVVINAEKVVVTGKKOSOKLYR RHSGRPGGMKTETFAKLQQRLPERIVEHAVKGMLPKNSLGRQLFTKLKVYSGATHPHTAQKPKELIINTIPGENMIQPQTYLNV ADNSGARKLMCIRVLGAGNRRYGGVGDRIIAVVKDAQPNMAVKKSDVVEAVIVRTKKSINRDSGMSIRFDDNAAVIINKEGNP KGTRVFGPVARELRDKNFTKIVSLAPEVLMLSPRRTKFRKQQRGRMEGLAHRGSTLNFGDFALQAQEPCWITSRQIEASRRAM TRYIRRGGKIWIRIFPDKPVTMRPAETRMGSGKGNPEFWVAVVKPGRILFEIAGVSEEIAREAMRLAAYKLPIKTKFIVRSQPQE QEMNAQEIIRSIEAEQLKSDLPQIYVGDTVRVGVKIKEGDKYRVQPYEGVVIGKRNGGINETITVRRVFQGVGVERVFLLHSPRI DNIKIMRRGKVRRAKLYYLRQLSGKATRIKQRFDRALMTRVKRGNVARNRRNKILKLAKGFRGSHSTLFRTANQQVMKALRS AYRDRKKKKRDFRRLWITRINAASRQQGLSYSQLIGNLKKANVELNRKMLAQLAVLDPTTFAKVAELASSVKGNMAHKKGT GSTRNGRDSNAQRLGVKRFGGQVVRAGNILVRQRGTKFHPGNNVGIGNDDTLFALIDGVVTFERKGKSRKKVSVYPRVTEEA VASMNNENYMEPSFLLPDLIEIQRSSFRWFLEEGLIEELNSFSPITDYTGKLELHFLGHNYKLKEPKYSVEESKRRDSTYGVQMY VPTRLLNKETGDIKEQEVFIGDLPLMTDRGTFIINGAERVIVNQIVRSPGVYYKSEIDKNGRRTYSASLIPNRGAWLKFETDRNDL VWVRIDKTRKLSIQVLLKALGLLDNEILDALRHPEYFQKTIEKEGQFSEEEALLELYRKLRPGEPPTVMGGQQLLESRFFDPKRY DLGRVGRYKLNKKLRLSVPDTTRVLTPGDILSAVDYLINLEYDIGSIDDIDHLGNRRVRSVGELLQNQVRVGLNRLERIIRERMT VSDAEVLTPASLVNPKPLVAAIKEFFGSSQLSQFMDQTNPLAELTHKRRLSALGPGGLTRERAGFAVRDIHPSHYGRICPIETPEG PNAGLIGSLATHARVNQYGFLETPFRPVENGRVCYEKPAVYMTADEEDDLRVAPGDIPVDDNGQILGIQVPVRYRQEFSTTTPE QVDYVAVSPVQIVSVATSMIPFLEHDDANRALMGSNMQRQAVPLLKPERPLVGTGLEAQGARDSGMVIVSRTDGDVVYVDAT EIRVRVKEKAALTNRESESIPHKPQEIKYVLSKYQRSNQDTCLNQKPLVRIGEKVIAGQVLADGSSTEGGELALGQNVIVAYMP WEGYNYEDAILISERLVQEDVYTSIHIEKFEIEARQTKLGPEEITREIPNVGEDALRQLDEQGIIRVGAWVESGDILVGKVTPKGE SDQPPEEKLLRAIFGEKARDVRDNSLRVPNGEKGRIVDVRLFTREQGDELPPGANMVVRVYVAQKRKIQVGDKMAGRHGNKG IISRILPLEDMPYLPDGTPVDIVLNPLGVPSRMNVGQVFECLLGWAGHNLGVRFKITPFDEMYGEESSRRIVHGKLWEAREETSK DWVYNPENPGKIMVYDGRTGEPFDRAVTVGIAYMLKLVHLVDDKIHARSTGPYSLVTQQPLGGKAQQGGQRFGEMEVWALE AFGAAYTLQELLTVKSDDMQGRNEALNAIVKGKAIPRPGTPESFKVLMRELQSLGLDIAVHKVETQTDGSSLDVEVDLMADQ VSRRTPPRPTYESFSRDSLDEDEMPVVSLAQMMESGVHFGHQTRRWNPKMSPYIYTARNGVHIIDLVQTAQLMDDAYNYMRS QAEQGKKFLFVGTKRQAAGIIAQEANRCGSHYINQRWLGGMLTNWATIKTRADRLKDLERREENGALDLLPKKEASMLRREM

SKLQKYLGGIKNMRKVPDVVIIVDQRREYNAVQECQKLSIPIVSMLDTNCDPDTVDIPIPANDDAIRSIKLIVGKLADAIYEGRHG QLEVESDYEEYESAEEDYEYDESEFVDSFSDDDDEEMGQKIHPVGFRLGITQEHQSLWFAVPGRYPELLQEDHKLRQYIEQKLG RNAQNNAGLSEIHIERKADQVDLELRTARPGVVVGRGGQGIEALRTGLQQLLGSHRQVRINVVEVQKVDADAYLIAEYIAQQL ERRVSFRRVVRQAIQRAQRAGVQGIKVQVSGRLNGAEIARTEWTREGRVPLHTLRADIDYSYCTAQTVYGILGIKVWVFKGEII PGQEDIVSQPVTREREPRRRQQQRRRQQFEDRSNEAMATGRRKASKAKKEETNWQERVIQIRRVSKVVKGGKKLSFRAIVIVG NERGQVGVGVGKASDVIGAVKKGVADGKKHLIEIPITKSNSIPHPIDGVGGGAKVIMRPAAPGTGVIAGGAVRTVLELAGVRN VLAKQLGSNNPLNNARAAVNALSTLRTFAEVAEDRGIAVENLYIMATVAETNSGRALYWGTGRRKSAVAQVRLVPGEGKFV VNGKEGELYFQYNPNYLGVIKAPLETLGLENEYDILVKAKGGGLTGQADSIRLGVARALCQLDPDNRSPLKIEGYLTRDPRAKE RKKYGLHKARKAPQYSKRMATLQQQKIRIRLQAFDRRLLDTSCEKIVDTANRTNATAIGPIPLPTKRKIYCVLRSPHVDKDSRE HFETRTHRRIIDIHQPSSKTIDALMKLDLPSGVDIEVKLMARQPTKKTGSKKQKKNVPNGVAYIQSTFNNSIVTITDQNGDVISW ASAGSSGFKGAKKGTPFAAQTAAESAGRRAIDQGMRQIQVMVSGPGAGRETAIRALQGAGLEITLIRDVTPIPHNGCRPPKRRR VMARIAGVDLPRDKRVEIGLTYIYGIGLRRSQDILAATDVNPDTRVKDLTDADLAALRAEIESNYQVEGDLRRLEAMNIKRLVD IGCYRGRRHRMGLPVRGQRTRTNARTRRGRRQTVAGKKKAPGKMGRSLKKGPFVADHLLSKIEKLNANNEKQVIKTWSRAST ILPLMVGHTIAVHNGKQHVPVFVNEQMVGHKLGEFAPTRSYRGHGKTDKKSGRMSDKNEGYKIISDNRQARYLYEILETYEAG IQLTGTEVKSIRAGKVNLQDGYALLRDGEAWLINAHISPYTASGQYFNHEPRRTRKLLLHGLEIRKLIGKVEQQGLTLIPLKMYF KRGWVKISIGLCRGKKVHDKREDLKRRQDQRDIQRAMKNYMAEISAKLVQDLRQKTGAGMMDCKKALNETQGNIDEAIDWL RKKGIASAGKKSDRVTAEGLVDIYTTPDKSGGVIIEVNCQTDFVARNDAFKLLVKNLAKQAVNADNVASLLDQPYIEKTDVTV DEYIKETIATLGENIQVRRFVNFSLEGAPGAIDGYIHTGGRVGVLVSIGVDTETAAKNEELQSLAKNTAMQVAACPNVEYVSVD KIPDQVVEKEKEIEMGKEDLGNKPANIKEKIVQGRIDKRLKEMTLLDQPYIRDQNISVAELIKQVESKVSEPIKVHQFVRYILGEG **IEKQESNFAEEVAAQIGAK**

>Cylindrospermopsis raciborskii MVCC14

VLRRRGKDFVGLCPFHEEKTPSFTVSPNKQIYYCFGCQASGNAIRFIMDLNKRKFAEVVLDLAKRYQVPVKTLAPEQRQELQRQ LSLREQLFEVLASTSQFYQHVLRQDIGQQALQYLQKKRFLKTETVEKFALGYAPPGWETLYHYLVENKSYPAQLVEKAGLIKP RKEGGGYYDVFRNRLMIPIRDVQGRVIAFGGRTLTDEQPKYLNSPETELFDKSKTLFALDVAKDAISKLDQAVVVEGYFDAIAL HANGINNVVASLGTALSLEQVRLLLRYSESKQLVLNFDGDKAGINATERAIGEISNLAYKGEVRLKILHIPDGKDADEYLKNHS VTDYEQLLVEAPLWLDWQIAQVIQGRDLKQPTDFQLVSREFVKLLQKILNSDTLNYYISHCAEILSLGDTRLIPLRVENLITQVA PRRTPTPILRPPASPNTHQISHPQPSLLEQAEGLLRIFLHCPQERQVIIETLGSSNLEFSVSHYRFLWEKSLQFPSQTLDLISQLQNLYLETQNDLGPVEHIFQLNEKNKQEILLRTNQLVQAAIACMEKVFRENRYRHFLELWQKTDPSTDPDQYNLYAQTIYADKMRIQ

ELSKQRQLSISDLINMKLAEAESTMNKTVEATQRAFNSIRTGRANASLLDKVQVDYYGSPTPLKSLTNITTPDASTILIQPYDRSS LNIVEKAISLSDVGLTPSNDGSVIRLNIPPLTSDRRKELVKLAAKYAEEGRVGIRNIRRDALDSIRKQEKAGEISEDESRDQQDKL QKITGKYTAKIDELLTEKEKDITTVMPVIEKKRTRDLPQINERIRFPKIRVIDSEGAQLGIMAPLEALRLAEEKELDLVLLSDKADP PVCRIMDYGKYKFEQEKKAREARKKQHTADVKEVKMRYKIEEHDYNVRVKQAERFLKDGDKVKATVMFRGREIQHSDLAET LLNRMATDLEPFGEIOOAPKKEGRNMMMLISPKKMSMVTLPGLKDLIEKISLERNLPRLAVOSSIREALLKGYERYRRAONLER RQFDENYFDNFEVELDIDGEGFRVLSTKTIVEEVTNGDHQISLDEVQQVAPEAQSGDSVVLDVTPDQGEFGRMAAMQTKQVLA OKLRDOOROMVOEEFODLEGTVLOARVLRFEROSVILAVSSSFGOPEVEAELPKREOLPNDTYRSNATFKVYLKKVSOGOORG PQLLVSRADAGLVVYLFANEVPEIEDEVVRIVAVAREANPPSRYVGPRTKIAVDTLDRDVDPVGACIGARGSRIQVVVNELRGE KIDVIRWSPDPATYIANALSPARVDEVRLMDPESRQTHVLVAEDQLSLAIGKEGQNVRLAARLTGWKIDIKDQAKYDYGAEDA KFAAVRANYQEESNQPDNQFEIIEEGYEDDPDEGEDDFNSMEEENMSKKSLASLSATDISDKRALVRVDFNVPVDDQGNITDDT RIRAALPTIQDLISKGAKVILASHFGRPKGVDEKLRLTPVAKRLSELLGQEVIKTDDCIGDDVTAQVAALEKGQVLLLENVRFYK EEEKNDPNFARQLAANADFYVNDAFGTAHRAHASTEGVTKYLSPSVAGYLVEKELQYLQAAIEVPQRPLAAIIGGSKVSSKIGV IETLLEKCDKLIIGGGMIFTFYKARGLNVGKSLVEQDKLELASSLEKKAAERGVTLLLPTDIVAADKFAPDADAVTVSIENIPDD RMGLDIGPKSVKLFQDALADCKTVIWNGPMGVFEFDKFAVGTEAIAQTLAEIGKTGATTIIGGGDSVAAVEKVGLADQMSHIS TGGGASLELLEGTVLPGIAALDEAMTKFIFVTGGVVSSIGKGIVAASLGRLLKSRDYSVSILKLDPYINVDPGTMSPFQHGEVFV TQDGAETDLDLGHYERFTDTSMSRLNSVTTGLIYQSVINKERRGDYNGGTVQVIPHITNEIKERVIRVAKETNPAAVITEIGGTV GDIESLPFLEAIRQLRKEVGKQNVLYMHVTLLPWIASAGEMKTKPTQHSVKELRSIGIQPDILVCRCDRPIPVGLKQKLSEFCDVP VECVITCQDASSIYEVPLILEKEGLAQQTLDLLQMEQREPDLTHWETMVERMSHPQSPVEIAIVGKYVRLGDAYLSVVESLRHA AIATYGDLRLRWVNSEILEVEPPDNYLLGVDGIIVPGGFGIRGVDGKISAIEYARNRQIPFLGLCLGMQCSIIEWARNVEGLVGA NSAEFDPKTDYPVINLLPEQQDVIDMGGTMRLGLYPCHVQPNTLAFDLYQEEVIYERHRHRYEFNNLYRNHLLNSGYVISGTSP DGRLVEIVEYPOHPFFIACOFHPEFQSRPSHPHPLFKGFMEAAISHTHQGKKQLPQGFPQFPMVKKVSRRLQALQAKVEERDYA PLEALALLKETATAKFPEAAEAHIRLGIDPKYTDQQLRTTVVLPKGTGQIVRVAVIARGEKVTEATNAGADIAGSEELIDEIQKG MMDFDKLIATPDVMPQVAKLGKLLGPRGLMPSPKGGTVTFDIASAISEFKAGKLEFRADRTGIVHVMFGKASFSSEDLLVNLK ALQETIDRNRPSGAKGRYWRTFYISSTMGPSIKVDINALRDLKTTDAAMGTRSYRPYTPSTRQVTISDFAEITKTEPEKSLTESVH RPKGRNNQGRITSRRRGGGHKQLYRIIDFKRDKRDITATVIAVEYDPNRNARIALLEYEDGEKRYILHPNGLKVGAKVTAGPQA PFEDGNALPLSNIPLGTNVHNVEMTPGKGGQIVRAAGATAQLMAKEGNYVTLKLPSGEVRMVRRECYATIGQVGNTDARNLS AGKAGRNRWKGRRPKVRGSVMNPVDHPHGGGEGRAPIGRSGPVTPWGKPALGAKTRKRKKASSKLIVRRRRKSSKRGRGGR QSMSVGILGTKLGMTQIFDEAGVSIPVTVIKAGPCTVTQVKTQPTDGYCAIQVGYGEVKPKALNKPKLGHLAKSSAVPVRYLN EYRTDAAGDYALGQEIKADIFSVGQIVDVIGTSIGRGFAGNQKRNNFGRGPMSHGSKNHRAPGSIGAGTTPGRVYPGKRMAGR LGGSRVTVRKLTVVKVDAERNLILIKGAIPGKPGGLVNVVPTTKVGNKMVESIVKNWQGEEVGQTSFELRVAKEETASHIVHR ALVRQMTNSRQGTASTKTRAEVRGGGRKPWRQKGTGRARAGSIRSPLWRGGGVIFGPKPREFNIKLNRKERRLALRTAFVSRR EDLIVVEEFTDQLQRPKSKELVAALARWGATADQKTLLILSEIGQSTETISLSARNVENIKVIAADQLNVFDLLHADKIVVTSSAL

TKIQEVYSAMATTRLKTLYGQTIVPKLTQQFQYTNVHQVPKVLKVTVNRGLGEAAQNAKALEASLSEIALITGQKPVVTRAKK AIAGFKIRQGMPVGIMVTLRGERMYAFLDRLISLALPRIRDFRGVSAKSFDGRGNYTLGVREQLIFPEIEYDRIDQIRGLDISIITTA KTDEEGRALLKEMGMPFRDQMSRIGKRPITIPAKVQVAIDGTKVVVKGPKGELSRDLPTHVTVSQSGETLLVTRRDDTRTSRQ MHGLSRTLVANMVEGVSQGFQRRLEIQGVGYRAQVQGANLVLNIGYSHQVQIEPPAGVQFAVENNTNVIVSGYDKEVVGNTA AKIRAVRPPEPYKGKGIRYAGEVVRRKAGKTGGKGKKMAKKVVAVIKLALNAGKANPAPPVGPALGOHGVNIMMFCKEYNA KTADOAGMVIPVEISVFEDRSFTFVLKTPPASVLIRKAAKIERGSDQPNKKKVGSITRTQLREIAQTKLPDLNANDIEAAMNIVEG TAKNMGVTVKDMSTATDQILEQLKVLTLLEAAELVKQIEEAFGVSAAAPAGGMMVMAAPGAAAAEPVEEQTEFNVVLEEVP ADRKIAVLKIVREITGLGLKEAKELVESTPKAVKEGVNKESAEEISKKIADAGGKVVIKMSSKTYLPPEEEIKRDWYVVDAADK RLGRLASEIAMVLRGKRKAEYTPHLDTGDFVVVINAEKVVVTGKKPSQKLYRRHSGRPGGMKTETFAKLQQRLPERIVEHAV KGMLPKNSLGRQLFTKLKVYSGSTHPHTAQKPKELIINTIPGENMIQPQTYLNVADNSGARKLMCIRVLGAGNRRYGGVGDRII AVVKDAQPNMAVKKSDVVEAVIVRTKKSINRDSGMSIRFDDNAAVIINKEGNPKGTRVFGPVARELRDKNFTKIVSLAPEVLM LSPRRTKFRKQQRGRMEGLAHRGSTLNFGDFALQAQEPCWITSRQIEASRRAMTRYIRRGGKIWIRIFPDKPVTMRPAETRMGS GKGNPEFWVAVVKPGRILFEIAGVSEEIAREAMRLAAYKLPIKTKFIVRSQPQEQEMNAQEIIRSIEAEQLKSDLPQIYVGDTVRV GVKIKEGDKYRVQPYEGVVIGKRNGGINETITVRRVFQGVGVERVFLLHSPRIDNIKIMRRGKVRRAKLYYLRQLSGKATRIKQ RFDRALMTRVKRGNVARNRRNKILKLAKGFRGSHSTLFRTANQQVMKALRSAYRDRKKKKRDFRRLWITRINAASRQQGLSY SQLIGNLKKANVELNRKMLAQLAVLDPATFAKVAELASSVKGMAHKKGTGSTRNGRDSNAQRLGVKRFGGQVVRAGNILVR QRGTKFHPGNNVGIGNDDTLFALIDGVVTFERKGKSRKKVSVYPSVTEEAVASMNNENYTEPSFLLPDLIEIQRSSFRWFLEEGL IEELNSFSPITDYTGKLELHFLGHNYKLKEPKYSVEESKRRDSTYGVQMYVPTRLLNKETGDIKEQEVFIGDLPLMTDRGTFIING AERVIVNQIVRSPGVYYKSEIDKNGRRTYSASLIPNRGAWLKFETDRNDLVWVRIDKTRKLSIQVLLKALGLSDNEILDALRHPE YFQKTIEKEGQFSEEEALLELYRKLRPGEPPTVMGGQQLLESRFFDPKRYDLGRVGRYKLNKKLRLSVPDTTRVLTPGDILSAV DYLINLEYDIGSIDDIDHLGNRRVRSVGELLQNQVRVGLNRLERIIRERMTVSDAEVLTPASLVNPKPLVAAIKEFFGSSQLSQFM DOTNPLAELTHKRRLSALGPGGLTRERAGFAVRDIHPSHYGRICPIETPEGPNAGLIGSLATHARVNOYGFLETPFRPVENGRVC YEKPAVYMTADEEDDLRVAPGDIPVDDNGQILGIQVPVRYRQEFSTTTPEQVDYVAVSPVQIVSVATSMIPFLEHDDANRALM GSNMQRQAVPLLKPERPLVGTGLEAQGARDSGMVIVSRTDGDVVYVDATEIRVRVKEKAALTNRESETIPHKPQEIKYVLSKY QRSNQDTCLNQKPLVRIGEKVIAGQVLADGSSTEGGELALGQNVIVAYMPWEGYNYEDAILISERLVQEDVYTSIHIEKFEIEAR QTKLGPEEITREIPNVGEDALRQLDEQGIIRVGAWVESGDILVGKVTPKGESDQPPEEKLLRAIFGEKARDVRDNSLRVPNGEKG RVVDVRLFTREQGDELPPGANMVVRVYVAQKRKIQVGDKMAGRHGNKGIISRILPLEDMPYLPDGTPVDIVLNPLGVPSRMNV GQVFECLLGWAGHNLGVRFKITPFDEMYGEESSRRIVHGKLWEAREETSRDWVYNPENPGKIMVYDGRTGEPFDRAVTVGIA YMLKLVHLVDDKIHARSTGPYSLVTQQPLGGKAQQGGQRFGEMEVWALEAFGAAYTLQELLTVKSDDMQGRNEALNAIVKG KAIPRPGTPESFKVLMRELQSLGLDIAVHKVETQTDGSSLDVEVDLMADQVSRRTPPRPTYESFSRDSLDEDEMPVVSLAQMME SGVHFGHQTRRWNPKMSPYIYTARNGVHIIDLVQTAQLMDDAYNYMRSQAEQGKKFLFVGTKRQAAGIIAQEANRCGSHYIN QRWLGGMLTNWATIKTRADRLKDLERREENGALDLLPKKEASMLRREMSKLQKYLGGIKNMRKVPDVVIIVDQRREYNAVQ

ECQKLSIPIVSMLDTNCDPDTVDVPIPANDDAIRSIKLIVGKLADAIYEGRHGQLEVEPDDEDYDIPEEDYEYNESEMGQKIHPVG FRLGITQEHQSLWFAVPGRYPELLQEDHKLRQYIEQKLGRNAQNNAGLSEIHIERKADQVDLELRTARPGVVVGRGGQGIEALR TGLQQLLGSHRQVRINVVEVQKVDADAYLIAEYIAQQLERRVSFRRVVRQAIQRAQRAGVQGIKVQVSGRLNGAEIARTEWTR EGRVPLHTLRADIDYSYCTAQTVYGILGIKVWVFKGEIIPGQEDIVSQPVTREREPRRRQQQRRRQQFEDRSNEAMATGRRKAS KAKKEETNWQERVIQIRRVSKVVKGGKKLSFRAIVIVGNERGQVGVGVGKASDVIGAVKKGVADGKKHLIEIPITKSNSIPHPID GVGGGAKVIMRPAAPGTGVIAGGAVRTVLELAGVRNVLAKQLGSNNPLNNARAAVNALSTLRTFAEVAEDRGIAVENLYIMA TVAETNSGRALYWGTGRRKSAVAQVRLVPGEGKFVVNGKEGELYFQYNPNYLGVIKAPLETLGLENEYDILVKAKGGGLTGQ ADSIRLGVARALCQLDPDNRSPLKIEGYLTRDPRAKERKKYGLHKARKAPQYSKRMATLQQQKIRIRLQAFDRRLLDTSCEKIV DTANRTNATAIGPIPLPTKRKIYCVLRSPHVDKDSREHFETRTHRRIIDIHQPSSKTIDALMKLDLPSGVDIEVKLMARQPTKKTG SKKQKKNVPNGVAYIQSTFNNSIVTITDQNGDVISWASAGSSGFKGAKKGTPFAAQTAAESAGRRAIDQGMRQIQVMVSGPGA GRETAIRALQGAGLEITLIRDVTPIPHNGCRPPKRRRVMARIAGVDLPRDKRVEIGLTYIYGIGLRRSQDILAATDVNPDTRVKDL TDADLAALRAEIESNYQVEGDLRRLEAMNIKRLVDIGCYRGRRHRMGLPVRGQRTRTNARTRRGRRQTVAGKKKAPGKMGR SLKKGPFVADHLLSKLEKLNANNEKQVIKTWSRASTILPLMVGHTIAVHNGKQHVPVFVNEQMVGHKLGEFAPTRTYRGHGK TDKKSGRMSDKNEGYKIISDNRQARYLYEILETYEAGIQLTGTEVKSIRAGKVNLQDGYALLRDGEAWLINAHISPYTASGQYF NHEPRRTRKLLLHGLEIRKLIGKVEQQGLTLIPLKMYFKRGWVKISIGLCRGKKVHDKREDLKRRQDQRDIQRAMKNYMAEIS AKLVQDLRQKTGAGIMDCKKALNETQGNIDEAIDWLRKKGIASAGKKSDRVTAEGLVEIYTTPDRSGGVLIEVNCQTDFVARN DAFKLLVKNLAKQAVNADNVTSLLAQPYIENTDVTVDEYIKGTITTLGENIQVRRFVNFSLEGSPGAIDGYIHTGGRVGVLISIG VDTENAAKNEEVQSLAKNTAMQVAACPNVEYVSVDKIPDQVVQKEKEIEMGKEDLGNKPENIKEKIVQGRIDKRLKEMTLLD QPYIRDQSISVAELIKQVESKVSEPIKVHQFVRYILGEGIEKQESNFAQEVAAQIGAK

>Cylindrospermopsis raciborskii MVCC19

MQIPRLHPDTVEEVKHRADIVDVISDYVVLRRRGKDFVGLCPFHEEKTPSFTVSPNKQIYYCFGCQASGNAIRFIMDLNKRKFAE VVLDLAKRYQVPVKTLAPEQRQELQRQLSLREQLFEVLASTSQFYQHVLRQDIGQQALQYLQKKRFLKTETVEKFALGYAPPG WETLYHYLVENKSYPAQLVEKAGLIKPRKEGGGYYDVFRNRLMIPIRDVQGRVIAFGGRTLTDEQPKYLNSPETELFDKSKTLF ALDVAKDAISKLDQAVVVEGYFDAIALHANGINNVVASLGTALSLEQVRLLLRYSESKQLVLNFDGDKAGINATERAIGEISNL AYKGEVRLKILHIPDGKDADEYLKNHSVTDYEQLLVEAPLWLDWQIAQVIQGRDLKQPTDFQLVSREFVKLLQKILNSDTLNY YISHCAEILSLGDTRLIPLRVENLITQVAPRRTPTPILRPPASPNTHQISHPQPSLLEQAEGLLLRIFLHCPQERQVIIETLGSSNLEFS VSHYRFLWEKSLQFPSQTLDLISQLQNLYLETQNDLGPVEHIFQLNEKNKQEILLRTNQLVQAAIACMEKVFRENRYRHFLELW

QKTDPSTDPDQYNLYAQTIYADKMRIQELSKQRQLSISDLINMNKTVEATQRAFNSIRTGRANASLLDKVQVDYYGSPTPLKSL TNITTPDASTILIQPYDRSSLNIVEKAISLSDVGLTPSNDGSVIRLNIPPLTSDRRKELVKLAAKYAEEGRVGIRNIRRDALDSIRKQ EKAGEISEDESRDQQDKLQKITGKYTAKIDELLTEKEKDITTVMPVIEKKRTRDLPQINERIRFPKIRVIDSEGAQLGIMAPLEALR LAEEKELDLVLLSDKADPPVCRIMDYGKYKFEQEKKAREARKKQHTADVKEVKMRYKIEEHDYNVRVKQAERFLKDGDKVK ATVMFRGREIQHSDLAETLLNRMATDLEPFGEIQQAPKKEGRNMMMLISPKKMSMVTLPGLKDLIEKISLERNLPRLAVQSSIR EALLKGYERYRRAONLERROFDENYFDNFEVELDIDGEGFRVLSTKTIVEEVTNGDHQISLDEVQQVAPEAQSGDSVVLDVTPD QGEFGRMAAMQTKQVLAQKLRDQQRQMVQEEFQDLEGTVLQARVLRFERQSVILAVSSSFGQPEVEAELPKREQLPNDTYRS NATFKVYLKKVSQGQQRGPQLLVSRADAGLVVYLFANEVPEIEDEVVRIVAVAREANPPSRYVGPRTKIAVDTLDRDVDPVGA CIGARGSRIQVVVNELRGEKIDVIRWSPDPATYIANALSPARVDEVRLMDPESRQTHVLVAEDQLSLAIGKEGQNVRLAARLTG WKIDIKDQAKYDYGAEDAKFAAVRANYQEESNQPDNQFEIIEEGYEDDPDEGEDDFNSMEEENMSKKSLASLSATDISDKRAL VRVDFNVPVDDQGNITDDTRIRAALPTIQDLISKGAKVILASHFGRPKGVDEKLRLTPVAKRLSELLGQEVIKTDDCIGDDVTAQ VAALEKGQVLLLENVRFYKEEEKNDPNFARQLAANADFYVNDAFGTAHRAHASTEGVTKYLSPSVAGYLVEKELQYLQAAIE VPQRPLAAIIGGSKVSSKIGVIETLLEKCDKLIIGGGMIFTFYKARGLNVGKSLVEQDKLELASSLEKKAAERGVTLLLPTDIVAA DKFAPDADAVTVSIENIPDDRMGLDIGPKSVKLFQDALADCKTVIWNGPMGVFEFDKFAVGTEAIAQTLAEIGKTGATTIIGGG DSVAAVEKVGLADQMSHISTGGGASLELLEGTVLPGIAALDEAMTKFIFVTGGVVSSIGKGIVAASLGRLLKSRDYSVSILKLDP YINVDPGTMSPFQHGEVFVTQDGAETDLDLGHYERFTDTSMSRLNSVTTGLIYQSVINKERRGDYNGGTVQVIPHITNEIKERVI RVAKETNPAAVITEIGGTVGDIESLPFLEAIRQLRKEVGKQNVLYMHVTLLPWIASAGEMKTKPTQHSVKELRSIGIQPDILVCR CDRPIPVGLKQKLSEFCDVPVECVITCQDASSIYEVPLILEKEGLAQQTLDLLQMEQREPDLTHWETMVERMSHPQSPVEIAIVG KYVRLGDAYLSVVESLRHAAIATYGDLRLRWVNSEILEVEPPDNYLLGVDGIIVPGGFGIRGVDGKISAIEYARNRQIPFLGLCL GMQCSIIEWARNVEGLVGANSAEFDPKTDYPVINLLPEQQDVIDMGGTMRLGLYPCHVQPNTLAFDLYQEEVIYERHRHRYEF NNLYRNHLLNSGYVISGTSPDGRLVEIVEYPQHPFFIACQFHPEFQSRPSHPHPLFKGFMEAAISHTHQGKKQLPQGFPQFPMVK KVSRRLQALQAKVEERDYAPLEALALLKETATAKFPEAAEAHIRLGIDPKYTDQQLRTTVVLPKGTGQIVRVAVIARGEKVTEA TNAGADIAGSEELIDEIQKGMMDFDKLIATPDVMPQVAKLGKLLGPRGLMPSPKGGTVTFDIASAISEFKAGKLEFRADRTGIV HVMFGKASFSSEDLLVNLKALQETIDRNRPSGAKGRYWRTFYISSTMGPSIKVDINALRDLKTTDAAMGTRSYRPYTPSTRQVT ISDFAEITKTEPEKSLTESVHRPKGRNNQGRITSRRRGGGHKQLYRIIDFKRDKRDITATVIAVEYDPNRNARIALLEYEDGEKRY ILHPNGLKVGAKVTAGPQAPFEDGNALPLSNIPLGTNVHNVEMTPGKGGQIVRAAGATAQLMAKEGNYVTLKLPSGEVRMVR RECYATIGQVGNTDARNLSAGKAGRNRWKGRRPKVRGSVMNPVDHPHGGGEGRAPIGRSGPVTPWGKPALGAKTRKRKKAS SKLIVRRRRKSSKRGRGGRQSMSVGILGTKLGMTQIFDEAGVSIPVTVIKAGPCTVTQVKTQPTDGYCAIQVGYGEVKPKALNK PKLGHLAKSSAVPVRYLNEYRTDAAGDYALGQEIKADIFSVGQIVDVIGTSIGRGFAGNQKRNNFGRGPMSHGSKNHRAPGSIG AGTTPGRVYPGKRMAGRLGGSRVTVRKLTVVKVDAERNLILIKGAIPGKPGGLVNVVPTTKVGNKMVESIVKNWQGEEVGQT SFELRVAKEETASHIVHRALVRQMTNSRQGTASTKTRAEVRGGGRKPWRQKGTGRARAGSIRSPLWRGGGVIFGPKPREFNIK LNRKERRLALRTAFVSRREDLIVVEEFTDQLQRPKSKELVAALARWGATADQKTLLILSEIGQSTETISLSARNVENIKVIAADQ

LNVFDLLHADKIVVTSSALTKIQEVYSAMATTRLKTLYGQTIVPKLTQQFQYTNVHQVPKVLKVTVNRGLGEAAQNAKALEAS LSEIALITGOKPVVTRAKKAIAGFKIRQGMPVGIMVTLRGERMYAFLDRLISLALPRIRDFRGVSAKSFDGRGNYTLGVREQLIFP EIEYDRIDQIRGLDISIITTAKTDEEGRALLKEMGMPFRDQMSRIGKRPITIPAKVQVAIDGTKVVVKGPKGELSRDLPTHVTVSQ SGETLLVTRRDDTRTSRQMHGLSRTLVANMVEGVSQGFQRRLEIQGVGYRAQVQGANLVLNIGYSHQVQIEPPAGVQFAVEN NTNVIVSGYDKEVVGNTAAKIRAVRPPEPYKGKGIRYAGEVVRRKAGKTGGKGKKMAKKVVAVIKLALNAGKANPAPPVGP ALGOHGVNIMMFCKEYNAKTADOAGMVIPVEISVFEDRSFTFVLKTPPASVLIRKAAKIERGSDOPNKKKVGSITRTOLREIAOT KLPDLNANDIEAAMNIVEGTAKNMGVTVKDMSTATDQILEQLKVLTLLEAAELVKQIEEAFGVSAAAPAGGMMVMAAPGAA AAEPVEEQTEFNVVLEEVPADRKIAVLKIVREITGLGLKEAKELVESTPKAVKEGVNKESAEEISKKIADAGGKVVIKMSSKTYL PPEEEIKRDWYVVDAADKRLGRLASEIAMVLRGKRKAEYTPHLDTGDFVVVINAEKVVVTGKKPSQKLYRRHSGRPGGMKTE TFAKLQQRLPERIVEHAVKGMLPKNSLGRQLFTKLKVYSGSTHPHTAQKPKELIINTIPGENMIQPQTYLNVADNSGARKLMCI RVLGAGNRRYGGVGDRIIAVVKDAQPNMAVKKSDVVEAVIVRTKKSINRDSGMSIRFDDNAAVIINKEGNPKGTRVFGPVARE LRDKNFTKIVSLAPEVLMLSPRRTKFRKQQRGRMEGLAHRGSTLNFGDFALQAQEPCWITSRQIEASRRAMTRYIRRGGKIWIRI FPDKPVTMRPAETRMGSGKGNPEFWVAVVKPGRILFEIAGVSEEIAREAMRLAAYKLPIKTKFIVRSQPQEQEMNAQEIIRSIEA EQLKSDLPQIYVGDTVRVGVKIKEGDKYRVQPYEGVVIGKRNGGINETITVRRVFQGVGVERVFLLHSPRIDNIKIMRRGKVRR AKLYYLRQLSGKATRIKQRFDRALMTRVKRGNVARNRRNKILKLAKGFRGSHSTLFRTANQQVMKALRSAYRDRKKKKRDF RRLWITRINAASRQQGLSYSQLIGNLKKANVELNRKMLAQLAVLDPATFAKVAELASSVKGMAHKKGTGSTRNGRDSNAQRL GVKRFGGQVVRAGNILVRQRGTKFHPGNNVGIGNDDTLFALIDGVVTFERKGKSRKKVSVYPSVTEEAVASMNNENYTEPSFL LPDLIEIQRSSFRWFLEEGLIEELNSFSPITDYTGKLELHFLGHNYKLKEPKYSVEESKRRDSTYGVQMYVPTRLLNKETGDIKEQ EVFIGDLPLMTDRGTFIINGAERVIVNQIVRSPGVYYKSEIDKNGRRTYSASLIPNRGAWLKFETDRNDLVWVRIDKTRKLSIQV LLKALGLSDNEILDALRHPEYFQKTIEKEGQFSEEEALLELYRKLRPGEPPTVMGGQQLLESRFFDPKRYDLGRVGRYKLNKKL RLSVPDTTRVLTPGDILSAVDYLINLEYDIGSIDDIDHLGNRRVRSVGELLQNQVRVGLNRLERIIRERMTVSDAEVLTPASLVNP KPLVAAIKEFFGSSQLSQFMDQTNPLAELTHKRRLSALGPGGLTRERAGFAVRDIHPSHYGRICPIETPEGPNAGLIGSLATHARV NOYGFLETPFRPVENGRVCYEKPAVYMTADEEDDLRVAPGDIPVDDNGQILGIQVPVRYRQEFSTTTPEQVDYVAVSPVQIVSV ATSMIPFLEHDDANRALMGSNMQRQAVPLLKPERPLVGTGLEAQGARDSGMVIVSRTDGDVVYVDATEIRVRVKEKAALTNR ESETIPHKPQEIKYVLSKYQRSNQDTCLNQKPLVRIGEKVIAGQVLADGSSTEGGELALGQNVIVAYMPWEGYNYEDAILISERL VQEDVYTSIHIEKFEIEARQTKLGPEEITREIPNVGEDALRQLDEQGIIRVGAWVESGDILVGKVTPKGESDQPPEEKLLRAIFGEK ARDVRDNSLRVPNGEKGRVVDVRLFTREQGDELPPGANMVVRVYVAQKRKIQVGDKMAGRHGNKGIISRILPLEDMPYLPDG TPVDIVLNPLGVPSRMNVGQVFECLLGWAGHNLGVRFKITPFDEMYGEESSRRIVHGKLWEAREETSRDWVYNPENPGKIMV YDGRTGEPFDRAVTVGIAYMLKLVHLVDDKIHARSTGPYSLVTQQPLGGKAQQGGQRFGEMEVWALEAFGAAYTLQELLTV KSDDMQGRNEALNAIVKGKAIPRPGTPESFKVLMRELQSLGLDIAVHKVETQTDGSSLDVEVDLMADQVSRRTPPRPTYESFSR DSLDEDEMPVVSLAQMMESGVHFGHQTRRWNPKMSPYIYTARNGVHIIDLVQTAQLMDDAYNYMRSQAEQGKKFLFVGTKR QAAGIIAQEANRCGSHYINQRWLGGMLTNWATIKTRADRLKDLERREENGALDLLPKKEASMLRREMSKLQKYLGGIKNMRK

VPDVVIIVDQRREYNAVQECQKLSIPIVSMLDTNCDPDTVDVPIPANDDAIRSIKLIVGKLADAIYEGRHGQLEVEPDDEDYDIPE EDYEYNESEMGOKIHPVGFRLGITQEHQSLWFAVPGRYPELLQEDHKLRQYIEQKLGRNAQNNAGLSEIHIERKADQVDLELRT ARPGVVVGRGGQGIEALRTGLQQLLGSHRQVRINVVEVQKVDADAYLIAEYIAQQLERRVSFRRVVRQAIQRAQRAGVQGIKV QVSGRLNGAEIARTEWTREGRVPLHTLRADIDYSYCTAQTVYGILGIKVWVFKGEIIPGQEDIVSQPVTREREPRRRQQQRRRQ QFEDRSNEAMATGRRKASKAKKEETNWQERVIQIRRVSKVVKGGKKLSFRAIVIVGNERGQVGVGVGKASDVIGAVKKGVAD GKKHLIEIPITKSNSIPHPIDGVGGGAKVIMRPAAPGTGVIAGGAVRTVLELAGVRNVLAKQLGSNNPLNNARAAVNALSTLRTF AEVAEDRGIAVENLYIMATVAETNSGRALYWGTGRRKSAVAQVRLVPGEGKFVVNGKEGELYFQYNPNYLGVIKAPLETLGL ENEYDILVKAKGGGLTGQADSIRLGVARALCQLDPDNRSPLKIEGYLTRDPRAKERKKYGLHKARKAPQYSKRMATLQQQKIR IRLQAFDRRLLDTSCEKIVDTANRTNATAIGPIPLPTKRKIYCVLRSPHVDKDSREHFETRTHRRIIDIHQPSSKTIDALMKLDLPS GVDIEVKLMARQPTKKTGSKKQKKNVPNGVAYIQSTFNNSIVTITDQNGDVISWASAGSSGFKGAKKGTPFAAQTAAESAGRR AIDQGMRQIQVMVSGPGAGRETAIRALQGAGLEITLIRDVTPIPHNGCRPPKRRRVMARIAGVDLPRDKRVEIGLTYIYGIGLRR SQDILAATDVNPDTRVKDLTDADLAALRAEIESNYQVEGDLRRLEAMNIKRLVDIGCYRGRRHRMGLPVRGQRTRTNARTRR GRRQTVAGKKKAPGKMGRSLKKGPFVADHLLSKLEKLNANNEKQVIKTWSRASTILPLMVGHTIAVHNGKQHVPVFVNEQM VGHKLGEFAPTRTYRGHGKTDKKSGRMSDKNEGYKIISDNRQARYLYEILETYEAGIQLTGTEVKSIRAGKVNLQDGYALLRD GEAWLINAHISPYTASGQYFNHEPRRTRKLLLHGLEIRKLIGKVEQQGLTLIPLKMYFKRGWVKISIGLCRGKKVHDKREDLKR RQDQRDIQRAMKNYMAEISAKLVQDLRQKTGAGIMDCKKALNETQGNIDEAIDWLRKKGIASAGKKSDRVTAEGLVEIYTTP DRSGGVLIEVNCQTDFVARNDAFKLLVKNLAKQAVNADNVTSLLAQPYIENTDVTVDEYIKGTITTLGENIQVRRFVNFSLEGS PGAIDGYIHTGGRVGVLISIGVDTENAAKNEEVQSLAKNTAMQVAACPNVEYVSVDKIPDQVVQKEKEIEMGKEDLGNKPENI KEKIVQGRIDKRLKEMTLLDQPYIRDQSISVAELIKQVESKVSEPIKVHQFVRYILGEGIEKQESNFAQEVAAQIGAK

>Cylindrospermopsis raciborskii N8

MQIPRLHPDTVEEVKHRADIVDVISDYVVLRRRGKDFVGLCPFHEEKTPSFTVSPTKQIYYCFGCQASGNAIKFMMDLNKRQFA EVVLDLAKRYQVPVKTLAPEQRQELQRQLSLREQLFEVLASTSQFYQHVLRQDIGQQALQYLQKKRFLKTETVEKFALGYAPP GWETLYHYLVENKNYPAQLVEKAGLIKPRKEGGGYYDVFRNRLMIPIRDVQGRVIAFGGRTLTDEQPKYLNSPETELFDKSKT LFALDVSKDAISKLDQAVVVEGYFDAIALHANGINNVVASLGTALSLEQVRLLLRYSESKQLVLNFDGDKAGINATERAIGEIS NLAYKGEVQLKILHIPDGKDADEYLKNHSVTDYGQLLVDAPLWLDWQIAQVIQGRDLRQPTDFQLVSREFVKLLQKILNSDTL NYYISHCAEILSLGDTRLIPLRVENLITQVAPRRTPTPRPPQPDSTTSPNTHQISHPQPSLLEQAEGLLLRIFLHCPQERQVIIETLGS TNLEFSVSHHRFLWEKSLQFPSQTLDLISQLQNLYLETQNDLGPVQHIFQLNEKNKQEILLRTSQLVQAAIACMEKVFRENRYRH

FLELWQKTDPSTDPDQYSLYAQTIYADKMRIQELSKQRQLSIADLINMKLAEAESTMNKTVEATQRAFNSIRTGRANASLLDKV QVDYYGSPTSLKSLANITTPDATTILIQPYDRTSLNIVEKAISLSDVGLTPSNDGSVIRLNIPPLTSDRRKELVKLAAKYAEEGRVG IRNIRRDALDSIRKQEKAGEVSEDESRDQQDKLQKITSKYTAKIDELLAEKEKDITTVMPVIEKKRTRDLPQINERIRFPKIRVIDS EGAOLGIMAPLEALRLAEEKELDLVLLSDKADPPVCRIMDYGKYKFEQEKKAREARKKQHTADVKEVKMRYKIEEHDYNVR VKQAERFLKDGDKVKATVMFRGREIQHSDLAETLLNRMATDLEPFGEVQQAPKKEGRNMMMLISPKKMSMVTLPGLKDLIEK ISLERNLPRLAVQSSIREALLKGYERYRRAQNLERRQFDENYFDNFEVELDIDGEGFRVLSTKTIVEEVTNGDHOISLDEVOOVA PEAQSGDSVVLDVTPDQGEFGRMAAMQTKQVLAQKLRDQQRQMVQEEFQDLEGTVLQARVLRFERQSVILAVSSSFGQPEVE AELPKREQLPNDTYRSNATFKVYLKKVSQGQQRGPQLLVSRADAGLVVYLFANEVPEIEDEVVRIVAVAREANPPSRYVGPRT KIAVDTLDRDVDPVGACIGARGSRIQVVVNELRGEKIDVIRWSPDPATYIANALSPARVDEVRLMDPESRQTHVLVAEDQLSLA IGKEGQNVRLAARLTGWKIDIKDQAKYDYGAEDAKFAAVRANYQEESNQLDNQFEVMEEEYEDDPDAGEDDFNSMEEENMS KKSLASLSAADISDKRALVRVDFNVPVDDQGNITDDTRIRAALPTIQDLISKGAKVILASHFGRPKGVDEKLRLTPVAKRLSELL GQEVIKTDDCIGDDVTAQVAALEKGQVLLLENVRFYKEEENNDPEFARQLAANADFYVNDAFGTAHRAHASTEGVTKYLSPS VAGYLVEKELQYLQGAIEVPQRPLVAIIGGSKVSSKIGVIETLLEKCDKLIIGGGMIFTFYKARGLNVGKSLVEQDKLGLASSLEK KAAERGVTLLLPTDIVAADKFGPDADAVTVSIDHIPDDRMGLDIGPDSVKVFQAALADCKTVIWNGPMGVFEFDKFAVGTEAI AQTLAEISKTGATTIIGGGDSVAAVEKVGLADQMSHISTGGGASLELLEGKVLPGIAALDEAMTKFIFVTGGVVSSIGKGIVAAS LGRLLKSRDYSVSILKLDPYINVDPGTMSPFQHGEVFVTQDGAETDLDLGHYERFTDTSMSRLNSVTTGLIYQSVINKERRGDY NGGTVQVIPHITNEIKERVIRVAKETNPAAVITEIGGTVGDIESLPFLEAIRQLRKEVGKQNVLYMHVTLLPWIASAGEMKTKPT QHSVKELRSIGIQPDILVCRCDRPIPVGLKQKLSEFCDVPVECVITCQDASSIYEVPLILEKEGLAQQTLDLLQMEQREPDLTHWE TMVERMSHPQSPVEIAIVGKYVRLGDAYLSVVESLRHAAIATYGDLRLRWVNSEILEVEPPDNYLLGVDGIIVPGGFGIRGVDG KISAIEYARNQQIPFLGLCLGMQCSIIEWARNVEGLVGANSAEFDPKTDYPVINLLPEQQDVIDLGGTMRLGLYPCHVQPNTLAF DLYQEEVIYERHRHRYEFNNLYRNHLLNSGYVISGTSPDGRLVEIVEYPQHPFFIACQFHPEFQSRPSHPHPLFKGFMEAAISHTH QGKKPNYPLRVSSVPMVKKVSRRLQALQAKVEERDYTPLEALALLKETATAKFAEAAEAHIRLGIDPKYTDQQLRTTVVLPKG TGQIVRVAVIARGEKVTEATNAGADIAGSEELIDEIQKGMMDFDKLIATPDVMPQVAKLGKLLGPRGLMPSPKGGTVTFDIASA ISEFKAGKLEFRADRTGIVHVMFGKASFSSEDLLVNLKALQETIDRNRPSGAKGRYWRTFYISSTMGPSIKIDINALRDFKTTDV AMGTRSYRPYTPSTRQVTISDFAEITKTEPEKSLTESVHRPKGRNNQGRITSRRRGGGHKQLYRIIDFKRDKRDITATVIAVEYDP NRNARIALVEYEDGEKRYILHPNGLKVGAKITAGPQAPFEDGNALPLSNIPLGTNVHNVEMTPGKGGQIVRAAGATAQLMAKE GNYVTLKLPSGEVRMVRRECYATIGQVGNTDARNLSAGKAGRNRWKGRRPKVRGSVMNPVDHPHGGGEGRAPIGRSGPVTP WGKPALGAKTRKRKKASSKLIVRRRRKSSKRGRGGRQSMSVGILGTKLGMTQIFDEAGVSIPVTVIQAGPCTVTQVKTQPTDG YCAIQVGYGEVKPKALNKPKLGHLAKSSAGPVRYLNEYRTDAAGDYALGQEIKADIFSVGQIVDVIGTSIGRGFAGNQKRNNF GRGPMSHGSKNHRAPGSIGAGTTPGRVYPGKRMAGRLGGSRVTVRKLTVVKVDAERNLILIKGAIPGKPGGLVNVVPTTKVG NKMVESTVKNWQGEEVGQTSFELRVAKEETASHIVHRALVRQMTNSRQGTASTKTRAEVRGGGRKPWRQKGTGRARAGSIR SPLWRGGGVIFGPKPRDFNIKLNRKERRLALRTAFVSRREDLIVVEEFTDQLQRPKSKELVAALARWGATADQKTLLILSEIGQN

TETISLSARNVENIKVIAADQLNVFDLLHADKIVVTSSALTKIQEVYSAMATTRLKTLYGQTIVPKLTQQFQYTNVHQVPKVLK VTVNRGLGEAAQNAKALEASLSEIALITGQKPVVTRAKKAIAGFKIRQGMPVGIMVTLRGERMYAFLDRLISLALPRIRDFRGV SAKSFDGRGNYTLGVREQLIFPEIEYDRIDQIRGLDISIITTAKTDEEGRALLKEMGMPFRDQMSRIGKRPITIPAKVQVAIDGTKV VVKGPKGELSRDLPAHVTVSQSGETLLVTRRDDTRTSRQMHGLSRTLVANMVEGVSQGFQRRLEIQGVGYRAQVQGANLVLN IGYSHQVQIEPPAGVQFVVENNTNVIVSGYDKEVVGNTAAKIRAVRPPEPYKGKGIRYAGEVVRRKAGKTGGKGKKMAKKVV AVIKLALNAGKANPAPPVGPALGQHGVNIMMFCKEYNAKTADQAGMVIPVEISVFEDRSFTFVLKTPPASVLIRKAAKIERGSD QPNKKKVGSITRTQLKEIAQTKLPDLNANDIEAAMNIVEGTAKNMGVTIKDMSTATDQILEQLKSLTLLEAAELVKQIEEAFGV SAAAPAGGMMMMAAPGGAAAAEVVEEQTEFDVILQEVPADKKIAVLKIVREITGLGLKEAKELVESTPKAVKEGVNKESADD ISKKITEAGGKVTIKMSSKTYLPPEEEIKRDWYVVDAADKRLGRLASEIAMVLRGKRKAEYTPHLDTGDFVVVINAEKVVVTG KKQSQKLYRRHSGRPGGMKTETFAKLQQRLPERIVEHAVKGMLPKNSLGRQLFTKLKVYSGATHPHTAQKPKELIINTIPGEN MIQPQTYLNVADNSGARKLMCIRVLGAGNRRYGGVGDRIIAVVKDAQPNMAVKKSDVVEAVIVRTKKSINRDSGMSIRFDDN AAVIINKEGNPKGTRVFGPVARELRDKNFTKIVSLAPEVLMLSPRRTKFRKQQRGRMEGLAHRGSTLNFGDFALQAQEPCWITS RQIEASRRAMTRYIRRGGKIWIRIFPDKPVTMRPAETRMGSGKGNPEFWVAVVKPGRILFEIAGVSEEIAREAMRLAAYKLPIKT KFIVRSQPQEQEMNAQEIIRSIEAEQLKSDLPQIYVGDTVRVGVKIKEGDKYRVQPYEGVVIGKRNGGINETITVRRVFQGVGVE RVFLLHSPRIDNIKIMRRGKVRRAKLYYLRQLSGKATRIKQRFDRALMTRVKRGNVARNRRNKILKLAKGFRGSHSTLFRTAN QQVMKALRSAYRDRKKKKRDFRRLWITRINAASRQQGLSYSQLIGNLKKANVELNRKMLAQLAVLDPTTFAKVAELASSVKG NMAHKKGTGSTRNGRDSNAQRLGVKRFGGQVVRAGNILVRQRGTKFHPGNNVGIGNDDTLFALIDGVVTFERKGKSRKKVS VYPRVTEEAVASMNNENYMEPSFLLPDLIEIQRSSFRWFLEEGLIEELNSFSPITDYTGKLELHFLGHNYKLKEPKYSVEESKRRD STYGVQMYVPTRLLNKETGDIKEQEVFIGDLPLMTDRGTFIINGAERVIVNQIVRSPGVYYKSEIDKNGRRTYSASLIPNRGAWL KFETDRNDLVWVRIDKTRKLSIQVLLKALGLLDNEILDALRHPEYFQKTIEKEGQFSEEEALLELYRKLRPGEPPTVMGGQQLLE SRFFDPKRYDLGRVGRYKLNKKLRLSVPDTTRVLTPGDILSAVDYLINLEYDIGSIDDIDHLGNRRVRSVGELLONOVRVGLNR LERIIRERMTVSDAEVLTPASLVNPKPLVAAIKEFFGSSQLSQFMDQTNPLAELTHKRRLSALGPGGLTRERAGFAVRDIHPSHY GRICPIETPEGPNAGLIGSLATHARVNQYGFLETPFRPVENGRVCYEKPAVYMTADEEDDLRVAPGDIPVDDNGQILGIQVPVRY RQEFSTTTPEQVDYVAVSPVQIVSVATSMIPFLEHDDANRALMGSNMQRQAVPLLKPERPLVGTGLEAQGARDSGMVIVSRTD GDVVYVDATEIRVRVKEKAALTNRESESIPHKPQEIKYVLSKYQRSNQDTCLNQKPLVRIGEKVIAGQVLADGSSTEGGELALG ONVIVAYMPWEGYNYEDAILISERLVQEDVYTSIHIEKFEIEARQTKLGPEEITREIPNVGEDALRQLDEQGIIRVGAWVESGDIL VGKVTPKGESDQPPEEKLLRAIFGEKARDVRDNSLRVPNGEKGRIVDVRLFTREQGDELPPGANMVVRVYVAQKRKIQVGDK MAGRHGNKGIISRILPLEDMPYLPDGTPVDIVLNPLGVPSRMNVGQVFECLLGWAGHNLGVRFKITPFDEMYGEESSRRIVHGK LWEAREETSKDWVYNPENPGKIMVYDGRTGEPFDRAVTVGIAYMLKLVHLVDDKIHARSTGPYSLVTQQPLGGKAQQGGQR FGEMEVWALEAFGAAYTLQELLTVKSDDMQGRNEALNAIVKGKAIPRPGTPESFKVLMRELQSLGLDIAVHKVETQTDGSSLD VEVDLMADQVSRRTPPRPTYESFSRDSLDEDEMPVVSLAQMMESGVHFGHQTRRWNPKMSPYIYTARNGVHIIDLVQTAQLM DDAYNYMRSQAEQGKKFLFVGTKRQAAGIIAQEANRCGSHYINQRWLGGMLTNWATIKTRADRLKDLERREENGALDLLPK

KEASMLRREMSKLQKYLGGIKNMRKVPDVVIIVDQRREYNAVQECQKLSIPIVSMLDTNCDPDTVDIPIPANDDAIRSIKLIVGK LADAIYEGRHGQLEVESDYEEYESAEEDYEYDESEFVDSFSDDDDEEMGQKIHPVGFRLGITQEHQSLWFAVPGRYPELLQEDH KLRQYIEQKLGRNAQNNAGLSEIHIERKADQVDLELRTARPGVVVGRGGQGIEALRTGLQQLLGSHRQVRINVVEVQKVDAD AYLIAEYIAQQLERRVSFRRVVRQAIQRAQRAGVQGIKVQVSGRLNGAEIARTEWTREGRVPLHTLRADIDYSYCTAQTVYGIL GIKVWVFKGEIIPGQEDIVSQPVTREREPRRRQQQRRRQQFEDRSNEAMATGRRKASKAKKEETNWQERVIQIRRVSKVVKGG KKLSFRAIVIVGNERGQVGVGVGKASDVIGAVKKGVADGKKHLIEIPITKSNSIPHPIDGVGGGAKVIMRPAAPGTGVIAGGAV RTVLELAGVRNVLAKQLGSNNPLNNARAAVNALSTLRTFAEVAEDRGIAVENLYIMATVAETNSGRALYWGTGRRKSAVAQ VRLVPGEGKFVVNGKEGELYFQYNPNYLGVIKAPLETLGLENEYDILVKAKGGGLTGQADSIRLGVARALCQLDPDNRSPLKIE GYLTRDPRAKERKKYGLHKARKAPQYSKRMATLQQQKIRIRLQAFDRRLLDTSCEKIVDTANRTNATAIGPIPLPTKRKIYCVL RSPHVDKDSREHFETRTHRRIIDIHQPSSKTIDALMKLDLPSGVDIEVKLMARQPTKKTGSKKQKKNVPNGVAYIQSTFNNSIVTI TDQNGDVISWASAGSSGFKGAKKGTPFAAQTAAESAGRRAIDQGMRQIQVMVSGPGAGRETAIRALQGAGLEITLIRDVTPIPH NGCRPPKRRRVMARIAGVDLPRDKRVEIGLTYIYGIGLRRSQDILAATDVNPDTRVKDLTDADLAALRAEIESNYQVEGDLRRL EAMNIKRLVDIGCYRGRRHRMGLPVRGQRTRTNARTRRGRRQTVAGKKKAPGKMGRSLKKGPFVADHLLSKIEKLNANNEK QVIKTWSRASTILPLMVGHTIAVHNGKQHVPVFVNEQMVGHKLGEFAPTRSYRGHGKTDKKSGRMSDKNEGYKIISDNRQAR YLYEILETYEAGIQLTGTEVKSIRAGKVNLQDGYALLRDGEAWLINAHISPYTASGQYFNHEPRRTRKLLLHGLEIRKLIGKVEQ QGLTLIPLKMYFKRGWVKISIGLCRGKKVHDKREDLKRRQDQRDIQRAMKNYMAEISAKLVQDLRQKTGAGMMDCKKALNE TQGNIDEAIDWLRKKGIASAGKKSDRVTAEGLVDIYTTPDKSGGVIIEVNCQTDFVARNDAFKLLVKNLAKQAVNADNVASLL DQPYIEKTDVTVDEYIKETIATLGENIQVRRFVNFSLEGAPGAIDGYIHTGGRVGVLVSIGVDTETAAKNEELQSLAKNTAMQV AACPNVEYVSVDKIPDQVVEKEKEIEMGKEDLGNKPANIKEKIVQGRIDKRLKEMTLLDQPYIRDQNISVAELIKQVESKVSEPI KVHQFVRYILGEGIEKQESNFAEEVAAQIGAK

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MQIPRLHPDTVEEVKHRADIVDVISDYVVLRRRGKDFVGLCPFHEEKTPSFTVSPNKQIYYCFGCQASGNAIRFIMDLNKRKFAE VVLDLAKRYQVPVKTLAPEQRQELQRQLSLREQLFEVLASTSQFYQHVLRQDIGQQALQYLQKKRFLKTETVEKFALGYAPPG WETLYHYLVENKSYPAQLVEKAGLIKPRKEGGGYYDAFRNRLMIPIRDVQGRVIAFGGRTLTDEQPKYLNSPETELFDKSKTLF ALDVAKDAISKLDQAVVVEGYFDAIALHANGINNVVASLGTALSLEQVRLLLRYSESKQLVLNFDGDKAGINATERAIGEISNL AYKGEVRLKILHIPDGKDADEYLKNHSVTDYEQLLVEAPLWLDWQIAQVIQGRDLKQPTDFQLVSREFVKLLQKILNSDTLNY YISHCAEILSLGDTRLIPLRVENLITQVAPRRTPTPILRPPASPNTHQISHPQPSLLEQAEGLLLRIFLHCPQERQVIIETLGSSNLEFS VSHYRFLWEKSLQFPSQTLDLISQLQNLYLETQNDLGPVEHIFQLNEKNKQEILLRTNQLVQAAIACMEKVFRENRYRHFLELW

QKTDPSTDPDQYNLYAQTIYADKMRIQELSKQRQLSISDLINMKLAEAESTMNKTVEATQRAFNSIRTGRANASLLDKVQVDY YGSPTPLKSLTNITTPDASTILIQPYDRSSLNIVEKAISLSDVGLTPSNDGSVIRLNIPPLTSDRRKELVKLAAKYAEEGRVGIRNIR RDALDSIRKQEKAGEISEDESRDQQDKLQKITGKYTAKIDELLTEKEKDITTVMPVIEKKRTRDLPQINERIRFPKIRVIDSEGAQL GIMAPLEALRLAEEKELDLVLLSDKADPPVCRIMDYGKYKFEQEKKAREARKKQHTADVKEVKMRYKIEEHDYNVRVKQAE RFLKDGDKVKATVMFRGREIQHSDLAETLLNRMATDLEPFGEIQQAPKKEGRNMMMLISPKKMSMVTLPGLKDLIEKISLERN LPRLAVQSSIREALLKGYERYRRAQNLERRQFDENYFDNFEVELDIDGEGFRVLSTKTIVEEVTNGDHQISLDEVOOVAPEAOS GDSVVLDVTPDQGEFGRMAAMQTKQVLAQKLRDQQRQMVQEEFQDLEGTVLQARVLRFERQSVILAVSSSFGQPEVEAELPK REQLPNDTYRSNATFKVYLKKVSQGQQRGPQLLVSRADAGLVVYLFANEVPEIEDEVVRIVAVAREANPPSRYVGPRTKIAVD TLDRDVDPVGACIGARGSRIQVVVNELRGEKIDVIRWSPDPATYIANALSPARVDEVRLMDPESRQTHVLVAEDQLSLAIGKEG QNVRLAARLTGWKIDIKDQAKYDYGAEDAKFAAVRANYQEESNQPDNQFEIIEEGYEDDPDEGEDDFNSMEEENKCDKLIIGG GMIFTFYKARGLNVGKSLVEQDKLELASSLEKKAAERGVTLLLPTDIVAADKFAPDADAVTVSIENIPDDRMGLDIGPDSVKLF QDALADCKTVIWNGPMGVFEFDKFAVGTEAIAQTLAEIGKTGATTIIGGGDSVAAVEKVGLADQMSHISTGGGASLELLEGTV LPGIAALDEAMTKFIFVTGGVVSSIGKGIVAASLGRLLKSRDYSVSILKLDPYINVDPGTMSPFQHGEVFVTQDGAETDLDLGHY ERFTDTSMSRLNSVTTGLIYQSVINKERRGDYNGGTVQVIPHITNEIKERVIRVAKETNPAAVITEIGGTVGDIESLPFLEAIRQLR KEVGKQNVLYMHVTLLPWIASAGEMKTKPTQHSVKELRSIGIQPDILVCRCDRPIPVGLKQKLSEFCDVPVECVITCQDASSIYE VPLILEKEGLAQQTLDLLQMEQREPDLTHWETMVERMSHPQSPVEIAIVGKYVRLGDAYLSVVESLRHAAIATYGDLRLRWVN SEILEVEPPDNYLLGVDGIIVPGGFGIRGVDGKISAIEYARNRQIPFLGLCLGMQCSIIEWARNVEGLVGANSAEFDPKTDYPVINL LPEQQDVIDMGGTMRLGLYPCHVQPNTLAFDLYQEEVIYERHRHRYEFNNLYRNHLLNSGYVISGTSPDGRLVEIVEYPQHPFF IACOFHPEFOSRPSHPHPLFKGFMEAAISHTHOGKKQLPHGFPQFPMVKKVSRRLQALQAKVEERDYAPLEALALLKETATAKF PEAAEAHIRLGIDPKYTDQQLRTTVVLPKGTGQIVRVAVIARGEKVTEATNSGADIAGSEELIDEIQKGMMDFDKLIATPDVMP QVAKLGKLLGPRGLMPSPKGGTVTFDIASAISEFKAGKLEFRADRTGIVHVMFGKASFSSEDLLVNLKALQETIDRNRPSGAKG RYWRTFYISSTMGPSIKVDINALRDLKTTDAAMGTRSYRPYTPSTRQVTISDFAEITKTEPEKSLTESVHRPKGRNNQGRITSRRR GGGHKQLYRIIDFKRDKRDITATVIAVEYDPNRNARIALLEYEDGEKRYILHPNGLKVGAKVTAGPQAPFEDGNALPLSNIPLGT NVHNVEMTPGKGGQIVRAAGATAQLMAKEGNYVTLKLPSGEVRMVRRECYATIGQVGNTDARNLSAGKAGRNRWKGRRPK VRGSVMNPVDHPHGGGEGRAPIGRSGPVTPWGKPALGAKTRKRKKASSKLIVRRRRKSSKRGRGGRQSMSVGILGTKLGMTQ IFDEAGVSIPVTVIKAGPCTVTQVKTQPTDGYCAIQVGYGEVKPKALNKPKLGHLAKSSAVPVRYLNEYRTDAAGDYALGQEI KADIFSVGQIVDVIGTSIGRGFAGNQKRNNFGRGPMSHGSKNHRAPGSIGAGTTPGRVYPGKRMAGRLGGSRVTVRKLTVVKV DAERNLILIKGAIPGKPGGLVNVVPTTKVGNKMVESIVKNWQGEEVGQTSFELRVAKEETASHIVHRALVRQMTNSRQGTAST KTRAEVRGGGRKPWRQKGTGRARAGSIRSPLWRGGGVIFGPKPREFNIKLNRKERRLALRTAFVSRREDLIVVEEFTDQLQRPK SKELVAALARWGATADQKTLLILSEIGQSTETISLSARNVENIKVIAADQLNVFDLLHADKIVVTSSALTKIQEVYSAMATTRLK TLYGQTIVPKLTQQFQYTNVHQVPKVLKVTVNRGLGEAAQNAKALEASLSEIALITGQKPVVTRAKKAIAGFKIRQGMPVGIM VTLRGERMYAFLDRLISLALPRIRDFRGVSAKSFDGRGNYTLGVREQLIFPEIEYDRIDQIRGLDISIITTAKTDEEGRALLKEMG

MPFRDOMSRIGKRPITIPAKVQVAIDGTKVVVKGPKGELSRDLPTHVTVSQSGETLLVTRRDDTRTSRQMHGLSRTLVANMVEGVSQGFQRRLEIQGVGYRAQVQGANLVLNIGYSHQVQIEPPAGVQFAVENNTNVIVSGYDKEVVGNTAAKIRAVRPPEPYKGK GIRYAGEVVRRKAGKTGGKGKKMAKKVVAVIKLALNAGKANPAPPVGPALGQHGVNIMMFCKEYNAKTADQAGMVIPVEIS VFEDRSFTFVLKTPPASVLIRKAAKIERGSDQPNKKKVGSITRTQLREIAQTKLPDLNANDIEAAMNIVEGTAKNMGVTVKDMS TATDOILEOLKVLTLLEAAELVKOIEEAFGVSAAAPAGGMMVMAAPGAAAAEPVEEOTEFNVVLEEVPADKKIAVLKIVREIT GLGLKEAKELVESTPKAVKEGVNKESAEEISKKIAEAGGKVVIKMSSKTYLPPEEEIKRDWYVVDAADKRLGRLASEIAMVLR GKRKAEYTPHLDTGDFVVVINAEKVVVTGKKPSQKLYRRHSGRPGGMKTETFAKLQQRLPERIVEHAVKGMLPKNSLGRQLF TKLKVYSGSTHPHTAQKPKELIINTIPGENMIQPQTYLNVADNSGARKLMCIRVLGAGNRRYGGVGDRIIAVVKDAQPNMAVK KSDVVEAVIVRTKKSINRDSGMSIRFDDNAAVIINKEGNPKGTRVFGPVARELRDKNFTKIVSLAPEVLMLSPRRTKFRKOORG RMEGLAHRGSTLNFGDFALQAQEPCWITSRQIEASRRAMTRYIRRGGKIWIRIFPDKPVTMRPAETRMGSGKGNPEFWVAVVK PGRILFEIAGVSEEIAREAMRLAAYKLPIKTKFIVRSQPQEQEMNAQEIIRSIEAEQLKSDLPQIYVGDTVRVGVKIKEGDKYRVQ PYEGVVIGKRNGGINETITVRRVFQGVGVERVFLLHSPRIDNIKIMRRGKVRRAKLYYLRQLSGKATRIKQRFDRALMTRVKRG NVARNRRNKILKLAKGFRGSHSTLFRTANQQVMKALRSAYRDRKKKKRDFRRLWITRINAASRQQGLSYSQLIGNLKKANVE LNRKMLAQLAVLDPATFAKVAELASSVKGMAHKKGTGSTRNGRDSNAQRLGVKRFGGQVVRAGNILVRQRGTKFHPGNNV GIGNDDTLFALIDGVVTFERKGKSRKKVSVYPPVTEESVASMNNENYTEPSFLLPDLIEIQRSSFRWFLEEGLIEELNSFSPITDYT GKLELHFLGHNYKLKEPKYSVEESKRRDSTYGVQMYVPTRLLNKETGDIKEQEVFIGDLPLMTDRGTFIINGAERVIVNQIVRSP GVYYKSEIDKNGRRTYSASLIPNRGAWLKFETDRNDLVWVRIDKTRKLSIQVLLKALGLSDNEILDALRHPEYFQKTIEKEGQFS EEEALLELYRKLRPGEPPTVMGGQQLLESRFFDPKRYDLGRVGRYKLNKKLRLSVPDTTRVLTPGDILSAVDYLINLEYDIGSID DIDHLGNRRVRSVGELLQNQVRVGLNRLERIIRERMTVSDAEVLTPASLVNPKPLVAAIKEFFGSSQLSQFMDQTNPLAELTHK RRLSALGPGGLTRERAGFAVRDIHPSHYGRICPIETPEGPNAGLIGSLATHARVNQYGFLETPFRPVENGRVCYEKPAVYMTADE EDDLRVAPGDIPVDDNGQILGIQVPVRYRQEFSTTTPEQVDYVAVSPVQIVSVATSMIPFLEHDDANRALMGSNMQRQAVPLLK PERPLVGTGLEAQGARDSGMVIVSRTDGDVVYVDATEIRVRVKEKAALTNRESETIPHKPQEIKYVLSKYQRSNQDTCLNQKPL VRIGEKVIAGQVLADGSSTEGGELALGQNVIVAYMPWEGYNYEDAILISERLVQEDVYTSIHIEKFEIEARQTKLGPEEITREIPN VGEDALRQLDEQGIIRVGAWVESGDILVGKVTPKGESDQPPEEKLLRAIFGEKARDVRDNSLRVPNGEKGRVVDVRLFTREQG DELPPGANMVVRVYVAQKRKIQVGDKMAGRHGNKGIISRILPLEDMPYLPDGTPVDIVLNPLGVPSRMNVGQVFECLLGWAG HNLGVRFKITPFDEMYGEESSRRIVHGKLWEAREETSRDWVYNPENPGKIMVYDGRTGEPFDRAVTVGIAYMLKLVHLVDDKI HARSTGPYSLVTOOPLGGKAOOGGORFGEMEVWALEAFGAAYTLOELLTVKSDDMOGRNEALNAIVKGKAIPRPGTPESFKV LMRELQSLGLDIAVHKVETQTDGSSLDVEVDLMADQVSRRTPPRPTYESFSRDSLDEDEMPVVSLAQMMESGVHFGHQTRRW NPKMSPYIYTARNGVHIIDLVQTAQLMDDAYNYMRSQAEQGKKFLFVGTKRQAAGIIAQEANRCGSHYINQRWLGGMLTNW ATIKTRADRLKDLERREENGALDLLPKKEASMLRREMSKLQKYLGGIKNMRKVPDVVIIVDQRREYNAVQECQKLSIPIVSML DTNCDPDTVDVPIPANDDAIRSIKLIVGKLADAIYEGRHGQLEVEPDDEDYDIPEEDYEYNESEMGQKIHPVGFRLGITQEHQSL WFAVPGRYPELLQEDHKLRQYIEQKLGRNAQNNAGLSEIHIERKADQVDLELRTARPGVVVGRGGQGIEALRTGLQQLLGSHR

OVRINVVEVQKVDADAYLIAEYIAQQLERRVSFRRVVRQAIQRAQRAGVQGIKVQVSGRLNGAEIARTEWTREGRVPLHTLRA DIDYSYCTAOTVYGILGIKVWVFKGEIIPGQEDIVSQPVTREREPRRRQQQRRRQQFEDRSNEAMATGRRKASKAKKEETNWQ ERVIQIRRVSKVVKGGKKLSFRAIVIVGNERGQVGVGVGKASDVIGAVKKGVADGKKHLIEIPITKSNSIPHPIDGVGGGAKVIM RPAAPGTGVIAGGAVRTVLELAGVRNVLAKQLGSNNPLNNARAAVNALSTLRTFAEVAEDRGIAVENLYIMATVAETNSGRA LYWGTGRRKSAVAQVRLVPGEGKFVVNGKEGELYFQYNPNYLGVIKAPLETLGLENEYDILVKAKGGGLTGQADSIRLGVAR ALCQLDPDNRSPLKIEGYLTRDPRAKERKKYGLHKARKAPQYSKRMATLQQQKIRIRLQAFDRRLLDTSCEKIVDTANRTNAT AIGPIPLPTKRKIYCVLRSPHVDKDSREHFETRTHRRIIDIHQPSSKTIDALMKLDLPSGVDIEVKLMARQPTKKTGSKKQKKNVP NGVAYIQSTFNNSIVTITDQNGDVISWASAGSSGFKGAKKGTPFAAQTAAESAGRRAIDQGMRQIQVMVSGPGAGRETAIRALQ GAGLEITLIRDVTPIPHNGCRPPKRRRVMARIAGVDLPRDKRVEIGLTYIYGIGLRRSQDILAATDVNPDTRVKDLTDADLAALR AEIESNYQVEGDLRRLEAMNIKRLVDIGCYRGRRHRMGLPVRGQRTRTNARTRRGRRQTVAGKKKAPGKMGRSLKKGPFVA DHLLSKLEKLNANNEKQVIKTWSRASTILPLMVGHTIAVHNGKQHVPVFVNEQMVGHKLGEFAPTRTYRGHGKTDKKSGRMS DKNEGYKIISDNRQARYLYEILETYEAGIQLTGTEVKSIRAGKVNLQDGYALLRDGEAWLINAHISPYTASGQYFNHEPRRTRK LLLHGLEIRKLIGKVEQQGLTLIPLKMYFKRGWVKISIGLCRGKKVHDKREDLKRRQDQRDIQRAMKNYMAEISAKLVQDLRQ KTGAGMMDCKKALNETQGNIDEAIDWLRKKGIASAGKKSDRVTAEGLVDIYTTPDRSGGVLIEVNCQTDFVARNDAFKLLVK NLAKQAVNADNVTSLLAQPYIENTDVTVDEYIKETIATLGENIQVRRFVNFSLEGSPGAIDGYIHTGGRVGVLISIGVDTETAAK NEEVQSLAKNTAMQVAACPNVEYVSVDKIPDQVVQKEKEIEMGKEDLGNKPENIKEKIVQGRIDKRLKEMTLLDQPYIRDQSIS VAELIKQVESKVSEPIKVHQFVRYILGEGIEKQESNFAQEVAAQIGAK

>Cylindrospermopsis sp CR12

MQIPRLHPDTVEEVKHRADIVDVISDYVVLRRRGKDFVGLCPFHEEKTPSFTVSPTKQIYYCFGCQASGNAIKFMMDLNKRQFA EVVLDLAKRYQVPVKTLAPEQRQELQRQLSLREQLFEVLASTSQFYQHVLRQDIGQQALQYLQKKRFLKTETVEKFALGYAPP GWETLYHYLVENKNYPAQLVEKAGLIKPRKEGGGYKEGGGYYDVFRNRLMIPIRDVQGRVIAFGGRTLTDEQPKYLNSPETEL FDKSKTLFALDVSKDAISKLDQAVVVEGYFDAIALHANGINNVVASLGTALSLEQVRLLLRYSESKQLVLNFDGDKAGINATER AIGEISNLAYKGEVQLKILHIPDGKDADEYLKNHSVTDYGQLLVDAPLWLDWQIAQVIQGRDLRQPTDFQLVSREFVKLLQKIL NSDTLNYYISHCAEILSLGDTRLIPLRVENLITQVAPRRTPTPRPPQPDSTTSPNTHQISHPQPSLLEQAEGLLLRIFLHCPQERQVII ETLGSTNLEFSVSHHRFLWEKSLQFPSQTLDLISQLQNLYLETQNDLGPVQHIFQLNEKNKQEILLRTSQLVQAAIACMEKVFRE

NRYRHFLELWQKTDPSMDPDQYSLYAQTIYADKMRIQELSKQRQLSIADLINMKLAEAESTMNKTVEATQRAFNSIRTGRANA SLLDKVQVDYYGSPTSLKSLANITTPDATTILIQPYDRTSLNIVEKAISLSDVGLTPSNDGSVIRLNIPPLTSDRRKELVKLAAKYA EEGRVGIRNIRRDALDSIRKQEKAGEVSEDESRDQQDKLQKITSKYTAKIDELLAEKEKDITTVMPVIEKKRTRDLPQINERIRFP KIRVIDSEGAQLGIMAPLEALRLAEEKELDLVLLSDKADPPVCRIMDYGKYKFEQEKKAREARKKQHTADVKEVKMRYKIEEH DYNVRVKQAERFLKDGDKVKATVMFRGREIQHSDLAETLLNRMATDLEPFGEVQQAPKKEGRNMMMLISPKKMSMVTLPGL KDLIEKISLERNLPRLAVQSSIREALLKGYERYRRAQNLERRQFDENYFDNFEVELDIDGEGFRVLSTKTIVEEVTNGDHQISLDE VQQVAPEAQSGDSVVLDVTPDQGEFGRMAAMQTKQVLAQKLRDQQRQMVQEEFQDLEGTVLQARVLRFERQSVILAVSSSF GQPEVEAELPKREQLPNDTYRSNATFKVYLKKVSQGQQRGPQLLVSRADAGLVVYLFANEVPEIEDEVVRIVAVAREANPPSR YVGPRTKIAVDTLDRDVDPVGACIGARGSRIQVVVNELRGEKIDVIRWSPDPATYIANALSPARVDEVRLMDPESRQTHVLVAE DQLSLAIGKEGQNVRLAARLTGWKIDIKDQAKYDYGAEDAKFAAVRANYQEESNQLDNQFEVMEEEYEDDPDAGEDDFNSM EEENMSKKSLASLSAADISDKRALVRVDFNVPVDDQGNITDDTRIRAALPTIQDLISKGAKVILASHFGRPKGVDEKLRLTPVAK RLSELLGQEVIKTDDCIGDDVTAQVAALEKGQVLLLENVRFYKEEENNDPEFARQLAANADFYVNDAFGTAHRAHASTEGVT KYLSPSVAGYLVEKELQYLQGAIEVPQRPLVAIIGGSKVSSKIGVIETLLEKCDKLIIGGGMIFTFYKARGLNVGKSLVEQDKLGL ASSLEKKAAERGVTLLLPTDIVAADKFGPDADAVTVSIDHIPDDRMGLDIGPDSVKVFQAALADCKTVIWNGPMGVFEFDKFA VGTEAIAQTLAEISKTGATTIIGGGDSVAAVEKVGLADQMSHISTGGGASLELLEGKVLPGIAALDEAMTKFIFVTGGVVSSIGK GIVAASLGRLLKSRDYSVSILKLDPYINVDPGTMSPFQHGEVFVTQDGAETDLDLGHYERFTDTSMSRLNSVTTGLIYQSVINKE RRGDYNGGTVQVIPHITNEIKERVIRVAKETNPAAVITEIGGTVGDIESLPFLEAIRQLRKEVGKQNVLYMHVTLLPWIASAGEM KTKPTQHSVKELRSIGIQPDILVCRCDRPIPVGLKQKLSEFCDVPVECVITCQDASSIYEVPLILEKEGLAQQTLDLLQMEQREPDL THWETMVERMSHPQSPVEIAIVGKYVRLGDAYLSVVESLRHAAIATYGDLRLRWVNSEILEVEPPDNYLLGVDGIIVPGGFGIR GVDGKISAIEYARNQQIPFLGLCLGMQCSIIEWARNVEGLVGANSAEFDPKTDYPVINLLPEQQDVIDLGGTMRLGLYPCHVQP NTLAFDLYQEEVIYERHRHRYEFNNLYRNHLLNSGYVISGTSPDGRLVEIVEYPQHPFFIACQFHPEFQSRPSHPHPLFKGFMEA AISHTHQGSTPMVKKVSRRLQALQAKVEERDYTPLEALALLKETATAKFAEAAEAHIRLGIDPKYTDQQLRTTVVLPKGTGQIV RVAVIARGEKVTEATNAGADIAGSEELIDEIQKGMMDFDKLIATPDVMPQVAKLGKLLGPRGLMPSPKGGTVTFDIASAISEFKAGKLEFRADRTGIVHVMFGKASFSSEDLLVNLKALQETIDRNRPSGAKGRYWRTFYISSTMGPSIKIDINALRDFKTTDVAMGT RSYRPYTPSTRQVTISDFAEITKTEPEKSLTESVHRPKGRNNQGRITSRRRGGGHKQLYRIIDFKRDKRDITATVIAVEYDPNRNA RIALVEYEDGEKRYILHPNGLKVGAKITAGPQAPFEDGNALPLSNIPLGTNVHNVEMTPGKGGQIVRAAGATAQLMAKEGNYV TLKLPSGEVRMVRRECYATIGQVGNTDARNLSAGKAGRNRWKGRRPKVRGSVMNPVDHPHGGGEGRAPIGRSGPVTPWGKP ALGAKTRKRKKASSKLIVRRRRKSSKRGRGGRQSMSVGILGTKLGMTQIFDEAGVSIPVTVIQAGPCTVTQVKTQPTDGYCAIQ VGYGEVKPKALNKPKLGHLAKSSAGPVRYLNEYRTDAAGDYALGQEIKADIFSVGQIVDVIGTSIGRGFAGNQKRNNFGRGPM SHGSKNHRAPGSIGAGTTPGRVYPGKRMAGRLGGSRVTVRKLTVVKVDAERNLILIKGAIPGKPGGLVNVVPTTKVGNKMVES TVKNWQGEEVGQTSFELRVAKEETASHIVHRALVRQMTNSRQGTASTKTRAEVRGGGRKPWRQKGTGRARAGSIRSPLWRG GGVIFGPKPRDFNIKLNRKERRLALRTAFVSRREDLIVVEEFTDQLQRPKSKELVAALARWGATADQKTLLILSEIGQNTETISLS

ARNVENIKVIAADQLNVFDLLHADKIVVTSSALTKIQEVYSAMATTRLKTLYGQTIVPKLTQQFQYTNVHQVPKVLKVTVNRG LGEAAQNAKALEASLSEIALITGQKPVVTRAKKAIAGFKIRQGMPVGIMVTLRGERMYAFLDRLISLALPRIRDFRGVSAKSFDG RGNYTLGVREQLIFPEIEYDRIDQIRGLDISIITTAKTDEEGRALLKEMGMPFRDQMSRIGKRPITIPAKVQVAIDGTKVVVKGPK GELSRDLPAHVTVSQSGETLLVTRRDDTRTSRQMHGLSRTLVANMVEGVSQGFQRRLEIQGVGYRAQVQGANLVLNIGYSHQ VOIEPPAGVOFVVENNTNVIVSGYDKEVVGNTAAKIRAVRPPEPYKGKGIRYAGEVVRRKAGKTGGKGKKMAKKVVAVIKLA LNAGKANPAPPVGPALGQHGVNIMMFCKEYNAKTADQAGMVIPVEISVFEDRSFTFVLKTPPASVLIRKAAKIERGSDQPNKK KVGSITRTQLKEIAQTKLPDLNANDIEAAMNIVEGTAKNMGVTIKDMSTATDQILEQLKSLTLLEAAELVKQIEEAFGVSAAAP AGGMMMMAAPGGAAAAEVVEEQTEFDVILQEVPADKKIAVLKIVREITGLGLKEAKELVESTPKAVKEGVNKESADDISKKIT EAGGKVTIKMSSKTYLPPEEEIKRDWYVVDAADKRLGRLASEIAMVLRGKRKAEYTPHLDTGDFVVVINAEKVVVTGKKQSQ KLYRRHSGRPGGMKTETFAKLQQRLPERIVEHAVKGMLPKNSLGRQLFTKLKVYSGATHPHTAQKPKELIINTIPGENMIQPQT YLNVADNSGARKLMCIRVLGAGNRRYGGVGDRIIAVVKDAQPNMAVKKSDVVEAVIVRTKKSINRDSGMSIRFDDNAAVIIN KEGNPKGTRVFGPVARELRDKNFTKIVSLAPEVLMLSPRRTKFRKQQRGRMEGLAHRGSTLNFGDFALQAQEPCWITSRQIEAS RRAMTRYIRRGGKIWIRIFPDKPVTMRPAETRMGSGKGNPEFWVAVVKPGRILFEIAGVSEEIAREAMRLAAYKLPIKTKFIVRS QPQEQEMNAQEIIRSIEAEQLKSDLPQIYVGDTVRVGVKIKEGDKYRVQPYEGVVIGKRNGGINETITVRRVFQGVGVERVFLL HSPRIDNIKIMRRGKVRRAKLYYLRQLSGKATRIKQRFDRALMTRVKRGNVARNRRNKILKLAKGFRGSHSTLFRTANQQVMK ALRSAYRDRKKKKRDFRRLWITRINAASRQQGLSYSQLIGNLKKANVELNRKMLAQLAVLDPTTFAKVAELASSVKGNMAHK KGTGSTRNGRDSNAQRLGVKRFGGQVVRAGNILVRQRGTKFHPGNNVGIGNDDTLFALIDGVVTFERKGKSRKKVSVYPRVT EEAVASMNNENYMEPSFLLPDLIEIQRSSFRWFLEEGLIEELNSFSPITDYTGKLELHFLGHNYKLKEPKYSVEESKRRDSTYGVQ MYVPTRLLNKETGDIKEQEVFIGDLPLMTDRGTFIINGAERVIVNQIVRSPGVYYKSEIDKNGRRTYSASLIPNRGAWLKFETDR NDLVWVRIDKTRKLSIQVLLKALGLLDNEILDALRHPEYFQKTIEKEGQFSEEEALLELYRKLRPGEPPTVMGGQQLLESRFFDP KRYDLGRVGRYKLNKKLRLSVPDTTRVLTPGDILSAVDYLINLEYDIGSIDDIDHLGNRRVRSVGELLQNQVRVGLNRLERIIRE RMTVSDAEVLTPASLVNPKPLVAAIKEFFGSSQLSQFMDQTNPLAELTHKRRLSALGPGGLTRERAGFAVRDIHPSHYGRICPIE TPEGPNAGLIGSLATHARVNQYGFLETPFRPVENGRVCYEKPAVYMTADEEDDLRVAPGDIPVDDNGQILGIQVPVRYRQEFST TTPEQVDYVAVSPVQIVSVATSMIPFLEHDDANRALMGSNMQRQAVPLLKPERPLVGTGLEAQGARDSGMVIVSRTDGDVVY VDATEIRVRVKEKAALTNRESESIPHKPQEIKYVLSKYQRSNQDTCLNQKPLVRIGEKVIAGQVLADGSSTEGGELALGQNVIV AYMPWEGYNYEDAILISERLVQEDVYTSIHIEKFEIEARQTKLGPEEITREIPNVGEDALRQLDEQGIIRVGAWVESGDILVGKVT PKGESDQPPEEKLLRAIFGEKARDVRDNSLRVPNGEKGRIVDVRLFTREQGDELPPGANMVVRVYVAQKRKIQVGDKMAGRH GNKGIISRILPLEDMPYLPDGTPVDIVLNPLGVPSRMNVGQVFECLLGWAGHNLGVRFKITPFDEMYGEESSRRIVHGKLWEAR EETSKDWVYNPENPGKIMVYDGRTGEPFDRAVTVGIAYMLKLVHLVDDKIHARSTGPYSLVTQQPLGGKAQQGGQRFGEME VWALEAFGAAYTLQELLTVKSDDMQGRNEALNAIVKGKAIPRPGTPESFKVLMRELQSLGLDIAVHKVETQTDGSSLDVEVDL MADQVSRRTPPRPTYESFSRDSLDEDEMPVVSLAQMMESGVHFGHQTRRWNPKMSPYIYTARNGVHIIDLVQTAQLMDDAYN YMRSQAEQGKKFLFVGTKRQAAGIIAQEANRCGSHYINQRWLGGMLTNWATIKTRADRLKDLERREENGALDLLPKKEASML

RREMSKLQKYLGGIKNMRKVPDVVIIVDQRREYNAVQECQKLSIPIVSMLDTNCDPDTVDIPIPANDDAIRSIKLIVGKLADAIYE GRHGQLEVESDYEEYESAEEDYEYDESEFVDSFSDDDDEEMGQKIHPVGFRLGITQEHQSLWFAVPGRYPELLQEDHKLRQYIE QKLGRNAQNNAGLSEIHIERKADQVDLELRTARPGVVVGRGGQGIEALRTGLQQLLGSHRQVRINVVEVQKVDADAYLIAEYI AQQLERRVSFRRVVRQAIQRAQRAGVQGIKVQVSGRLNGAEIARTEWTREGRVPLHTLRADIDYSYCTAQTVYGILGIKVWVF KGEIIPGQEDIVSQPVTREREPRRRQQQRRRQQFEDRSNEAMATGRRKASKAKKEETNWQERVIQIRRVSKVVKGGKKLSFRAI VIVGNERGQVGVGVGKASDVIGAVKKGVADGKKHLIEIPITKSNSIPHPIDGVGGGAKVIMRPAAPGTGVIAGGAVRTVLELAG VRNVLAKQLGSNNPLNNARAAVNALSTLRTFAEVAEDRGIAVENLYIMATVAETNSGRALYWGTGRRKSAVAQVRLVPGEG KFVVNGKEGELYFQYNPNYLGVIKAPLETLGLENEYDILVKAKGGGLTGQADSIRLGVARALCQLDPDNRSPLKIEGYLTRDPR AKERKKYGLHKARKAPQYSKRMATLQQQKIRIRLQAFDRRLLDTSCEKIVDTANRTNATAIGPIPLPTKRKIYCVLRSPHVDKD SREHFETRTHRRIIDIHQPSSKTIDALMKLDLPSGVDIEVKLMARQPTKKTGSKKQKKNVPNGVAYIQSTFNNSIVTITDQNGDVI SWASAGSSGFKGAKKGTPFAAQTAAESAGRRAIDQGMRQIQVMVSGPGAGRETAIRALQGAGLEITLIRDVTPIPHNGCRPPKR RRVMARIAGVDLPRDKRVEIGLTYIYGIGLRRSQDILAATDVNPDTRVKDLTDADLAALRAEIESNYQVEGDLRRLEAMNIKRL VDIGCYRGRRHRMGLPVRGQRTRTNARTRRGRRQTVAGKKKAPGKMGRSLKKGPFVADHLLSKIEKLNANNEKQVIKTWSR ASTILPLMVGHTIAVHNGKQHVPVFVNEQMVGHKLGEFAPTRSYRGHGKTDKKSGRMSDKNEGYKIISDNRQARYLYEILETY EAGIQLTGTEVKSIRAGKVNLQDGYALLRDGEAWLINAHISPYTASGQYFNHEPRRTRKLLLHGLEIRKLIGKVEQQGLTLIPLK MYFKRGWVKISIGLCRGKKVHDKREDLKRRQDQRDIQRAMKNYMAEISAKLVQDLRQKTGAGMMDCKKALNETQGNIDEAI DWLRKKGIASAGKKSDRVTAEGLVDIYTTPDKSGGVIIEVNCQTDFVARNDAFKLLVKNLAKQAVNADNVASLLDQPYIEKTD VTVDEYIKETIATLGENIQVRRFVNFSLEGAPGAIDGYIHTGGRVGVLVSIGVDTETAAKNEELQSLAKNTAMQVAACPNVEYV SVDKIPDQVVEKEKEIEMGKEDLGNKPANIKEKIVQGRIDKRLKEMTLLDQPYIRDQNISVAELIKQVESKVSEPIKVHQFVRYIL **GEGIEKQESNFAEEVAAQIGAK**

>Raphidiopsis_brookii_D9

MQIPRLHPDTVEEVKHRADIVDVISDYVVLRRRGKDFVGLCPFHEEKTPSFTVSPNKQIYYCFGCQASGNAIRFIMDLNKRKFAE VVLDLAKRYQIPVKTLAPEQRQELQRQLSLRDQLFEVLASTSQFYQHVLRQDIGQQALQYLQKKRFLKTETVEKFALGYAPPG WETLYHYLVENKSYPAQLVEKAGLIKPRKEGGGYYDVFRNRLMIPIRDVQGRVIAFGGRTLTDEQPKYLNSPETELFDKSKTLF ALDVAKDAISKLDQAVVVEGYFDAIALHANGINNVVASLGTALSLEQVRLLLRYSESKQLVLNFDGDKAGINATERAIGEISNL AYKGEVRLKILHIPDGKDADEYLKNHSVTDYEQLLVEAPLWLDWQIAQVIQGRDLKQPTDFQLVSREFVKLLQKILNSDTLNY YISHCAEILSLGDTRLIPLRVENLITQVAPRRTPTPILRPPASPNTHQISHPQPSLLEQAEGLLLRIFLHCPQERQVIIETLGSSNLEFS VSHYRFLWEKSLQFPSQTLDLISQLQNLYLETQNDLGPVEHIFQLNEKNKQEILLRTNQLVQAAIACMEKVFRENRYRHFLELW

QKTDPSTDPDQYNLYAQTIYADKMRIQELSKQRQLSISDLINMKLAEAESTMNKTVEATQRAFNSIRTGRANASLLDKVQVDY YGSPTPLKSLSNITTPDASTILIQPYDRSSLNIVEKAISLSDVGLTPSNDGSVVRLNIPPLTSDRRKELVKLAAKYAEEGRVGIRNIR RDALDSIRKQEKAGEISEDESRDQQDKLQKITGKYTAKIDELLAEKEKDITTVMPVIEKKRTRDLPQINERIRFPKIRVIDNEGAQ LGIMAPLEALRLAEEKELDLVLLSDKADPPVCRIMDYGKYKFEQEKKAREARKKQHTADVKEVKMRYKIEEHDYNVRVKQA ERFLKDGDKVKATVMFRGREIQHSDLAETLLNRMATDLEPFGEIQQAPKKEGRNMMMLISPKKMSMVTLPGLKDLIEKISLER NLPRLAVQSSIREALLKGYERYRRAQNLERRQFDENYFDNFEVELDIDGEGFRVLSTKIIVEEVTNSDHQISLDEVOOVAPEAOS GDSVVLDVTPDQGEFGRMAAMQTKQVLAQKLRDQQRQMVQEEFQDLEGTVLQARVLRFERQSVILAVSSSFGQPEVEAELPK REQLPNDTYRSNATFKVYLKKVSQGQQRGPQLLVSRADAGLVVYLFANEVPEIEDEVVRIVAVAREANPPSRYVGPRTKIAVD TLDRDVDPVGACIGARGSRIQVVVNELRGEKIDVIRWSPDPATYIANALSPARVDEVRLMDPESRQTHVLVAEDQLSLAIGKEG QNVRLAARLTGWKIDIKDQAKYDYGAEDAKFAAVRANYQEESNQFEVIEEEYERDPDEGEDDFNSMEEENMSKKSLASLSAA DISDKRALVRVDFNVPVDDQGNITDDTRIRAALPTIQDLISKGAKVILASHFGRPKGVDEKFRLTPVAKRLSELLGQEVIKTNDCI GDDVTARVAALEQGQVLLLENVRFHKEEEKNDPEFARQLAANADFYVNDAFGTAHRAHASTEGVTKYLSPSVAGYLVEKEL QYLQAAIEFPQRPLAAIIGGSKVSSKIGVIETLLEKCDKLIIGGGMIFTFYKARGLNVGKSLVEQDKLELASSLEKKAAERGVTLL LPTDIVAADKFAPDADAVTVSIENIPDDRMGLDIGPKSVKLFQDALADCKTVIWNGPMGVFEFDKFAVGTEAIAQTLAEIGKTG ATTIIGGGDSVAAVEKVGLADQMSHISTGGGASLELLEGTVLPGIAALDEAMTKFIFVTGGVVSSIGKGIVAASLGRLLKSRDYS VSILKLDPYINVDPGTMSPFQHGEVFVTQDGAETDLDLGHYERFTDTYMSRLNSVTTGLIYQSVINKERRGDYNGGTVQVIPHIT NEIKERVIRVAKETNPAALITEIGGTVGDIESLPFLEAIRQLRKEVGKQNVLYMHVTLLPWIASAGEMKTKPTQHSVKELRSIGIQ PDILVCRCDRPIPVGLKQKLSEFCDVPVECVITCQDASSIYEVPLILEKEGLAQQTLDLLQMEQREPDLTHWETMVERMSHPQSP VEIAIVGKYVRLGDAYLSVVESLRHAAIATYGDLRLRWVNSEILEVEPPDNYLLGVDGIIVPGGFGIRGVDGKISAIEYARNRQIP FLGLCLGMQCSIIEWARNVEGLVGANSAEFDPKTDYPVINLLPDQQDVIDIGGTMRLGLYPCHVQPNTLAFDLYQEEVIYERHR HRYEFNNLYRNHLLNSGYVISGTSPDGRLVEIVEYPQHPFFIACQFHPEFQSRPSHPHPLFKGFMEAAISHTHQGKKQLPHGFPQF PMVKKVSRRLQALQAKVEERDYAPLEALSLLKETATAKFPEAAEAHIRLGIDPKYTDQQLRTTVVLPKGTGQIVRVAVIARGE KVTEATNAGADIAGSEELIDEIQRGMMDFDKLIATPDVMPQVAKLGKLLGPRGLMPSPKGGTVTFDIASAISEFKAGKLEFRAD RTGIVHVMFGKASFSSEDLLVNLKALQETIDRNRPSGAKGRYWRTFYISSTMGPSIKVDINALRDLKTTDAAMGTRSYRPYTPSTRQVTISDFAEITKTEPEKSLTESVHRPKGRNNQGRITSRRRGGGHKQLYRIIDFKRDKRDITATVIAVEYDPNRNARIALLEYED GEKRYILHPNGLKVGAKVTAGPQAPFEDGNALPLSNIPLGTNVHNVEMTPGKGGQIVRAAGATAQLMAKEGNYVTLKLPSGE VRMVRRECYATIGQVGNTDARNLSAGKAGRNRWKGRRPKVRGSVMNPVDHPHGGGEGRAPIGRSGPVTPWGKPALGAKTR KRKKASSKLIVRRRRKSSKRGRGGRQSMSVGILGTKLGMTQIFDEAGVSIPVTVIKAGPCTVTQVKTQPTDGYCAIQVGYGEVK PKALNQPKLGHLAKSSAGPVRYLNEYRTDAAGDYALGQEIKADIFSVGQIVDVIGTSIGRGFAGNQKRNNFGRGPMSHGSKNH RAPGSIGAGTTPGRVYPGKRMAGRLGGSRVTVRKLTVVKVDAERNLILIKGAIPGKPGGLVNVVPTTKVGNKMVESIVKNWQ GEEVGQTSFELRIAKEETASHIVHRALVRQMTNSRQGTASTKTRAEVRGGGRKPWRQKGTGRARAGSIRSPLWRGGGVIFGPK PRDFNIKLNRKERRLALRTAFVSRREDLIVVEEFTDQLQRPKSKELVAALARWGATAEQKTLLILSEIGQSTETISLSARNVENIK

VIAADQLNVFDLLHADKIVVTSSALNKIQEVYSAMATTRLKTLYGQTIVPKLTQQFQYTNVHQVPKVLKVTVNRGLGEAAQN AKALEASLSEIALITGOKPVVTRAKKAIAGFKIROGMPVGIMVTLRGERMYAFLDRLISLALPRIRDFRGVSAKSFDGRGNYTLG VREQLIFPEIEYDRIDQIRGLDISIITTAKTDEEGRALLKEMGMPFRDQMSRIGKRPITIPAKVQVAIDGTKVVVKGPKGELSRDLP THVTVSQSGETLLVTRRDDTRTSRQMHGLSRTLVANMVEGVSQGFQRRLEIQGVGYRAQVQGANLVLNIGYSHQVQIEPPAG VOFVVENNTNVIVSGYDKEVVGNTAAKIRAVRPPEPYKGKGIRYAGEVVRRKAGKTGGKGKKMAKKVVAVIKLALNAGKAN PAPPVGPALGQHGVNIMMFCKEYNAKTADQAGMVIPVEISVFEDRSFTFVLKTPPASVLIRKAAKIERGSDQPNKKKVGSITRT QLKEIAQTKLPDLNANDIEAAMNIVEGTAKNMGVTVKDMSTATDQILEQLKVLTLLEAAELVKQIEEAFGVSAAAPAGGMMV MAAPGAAAAEPVEEQTEFNVVLEEVPADKKIAVLKIVREITGLGLKEAKELVESTPKAVKEGVNKESAEEISKKIAEAGGKVVI KMSSKTYLPPEEEIKRDWYVVDAADKRLGRLASEIAMVLRGKRKAEYTPHLDTGDFVVVINAEKVVVTGKKPSQKLYRRHSG RPGGMKTETFAKLQQRLPERIVEHAVKGMLPKNSLGRQLFTKLKVYSGSTHPHTAQKPKELIINTIPGENMIQPQTYLNVADNS GARKLMCIRVLGAGNRRYGGVGDRIIAVVKDAQPNMAVKKSDVVEAVIVRTKKSINRDSGMSIRFDDNAAVIINKEGNPKGTR VFGPVARELRDKNFTKIVSLAPEVLMLSPRRTKFRKQQRGRMEGLAHRGSTLNFGDFALQAQEPCWITSRQIEASRRAMTRYIR RGGKIWIRIFPDKPVTMRPAETRMGSGKGNPEFWVAVVKPGRILFEIAGVSEEIAREAMRLAAYKLPIKTKFIVRSQPQEQEMNA QEIIRSIEAEQLKSDLPQIYVGDTVRVGVKIKEGDKYRVQPYEGVVIGKRNGGINETITVRRVFQGVGVERVFLLHSPRIDNIKIM RRGKVRRAKLYYLRQLSGKATRIKQRFDRALMTRVKRGNVARNRRNKILKLAKGFRGSHSTLFRTANQQVMKALRSAYRDR KKKKRDFRRLWITRINAASRQQGLSYSQLIGNLKKANVELNRKMLAQLAVLDPATFAKVAELASSVKGMAHKKGTGSTRNGR DSNAQRLGVKRFGGQVVRAGNILVRQRGTKFHPGNNVGIGNDDTLFALIDGVVTFERKGKSRKKVSVYPRVTEEAVASMNNE NYMEPSFLLPDLIEIQRSSFRWFLEEGLIEELNSFSPITDYTGKLELHFLGHNYKLKEPKYSVEESKRRDSTYGVQMYVPTRLLNK ETGDIKEQEVFIGDLPLMTDRGTFIINGAERVIVNQIVRSPGVYYKSEIDKNGRRTYSASLIPNRGAWLKFETDRNDLVWVRIDK TRKLSIQVLLKALGLSDNEILDALRHPEYFQKTIEKEGQFSEEEALLELYRKLRPGEPPTVMGGQQLLESRFFDPKRYDLGRVGR YKLNKKLRLSVPDTTRVLTPGDILSAVDYLINLEYDIGSIDDIDHLGNRRVRSVGELLQNQVRVGLNRLERIIRERMTVSDAEVL TPASLVNPKPLVAAIKEFFGSSQLSQFMDQTNPLAELTHKRRLSALGPGGLTRERAGFAVRDIHPSHYGRICPIETPEGPNAGLIG SLATHARVNQYGFLETPFRPVENGRVCYEKPAVYMTADEEDDLRVAPGDIPVDDNGQILGIQVPVRYRQEFSTTTPEQVDYVA VSPVQIVSVATSMIPFLEHDDANRALMGSNMQRQAVPLLKPERPLVGTGLEAQGARDSGMVIVSRTDGDVVYVDATEIRVRV KEKAALTNRESETIPHKPQEVKYVLSKYQRSNQDTCLNQKPLVRIGEKVIAGQVLADGSSTEGGELALGQNVIVAYMPWEGYN YEDAILISERLVQEDVYTSIHIEKFEIEARQTKLGPEEITREIPNVGEDALRQLDEQGIIRVGAWVESGDILVGKVTPKGESDQPPE EKLLRAIFGEKARDVRDNSLRVPNGEKGRVVDVRLFTREQGDELPPGANMVVRVYVAQKRKIQVGDKMAGRHGNKGIISRILP LEDMPYLPDGTPVDIVLNPLGVPSRMNVGQVFECLLGWAGHNLGVRFKITPFDEMYGEESSRRIVHGKLWEAREETSRDWVY NPENPGKIMVYDGRTGEPFDRAVTVGIAYMLKLVHLVDDKIHARSTGPYSLVTQQPLGGKAQQGGQRFGEMEVWALEAFGA AYTLQELLTVKSDDMQGRNEALNAIVKGKAIPRPGTPESFKVLMRELQSLGLDIAVHKVETQTDGSSLDVEVDLMADQVSRRT PPRPTYESFSRDSLDEDEMPVVSLAQMMESGVHFGHQTRRWNPKMSPYIYTARNGVHIIDLVQTAQLMDDAYNYMRSQAEQG KKFLFVGTKRQAAGIIAQEANRCGSHYINQRWLGGMLTNWATIKTRADRLKDLERREENGALDLLPKKEASMLRREMSKLQK

YLGGIKNMRKVPDVVIIVDQRREYNAVQECQKLSIPIVSMLDTNCDPDTVDIPIPANDDAIRSIKLIVGKLADAIYEGRHGQLEVE PDYEDYDIPEEDYEDEEPGYVDHFSDDDDEEMGQKIHPVGFRLGITQEHQSLWFAVPGRYPELLQEDHKLRQYIEQKLGRNAQ NNAGLSEIHIERKADQVDLELRTARPGVVVGRGGQGIEALRTGLQQLLGSHRQVRINVVEVQKVDADAYLIAEYIAQQLERRV SFRRVVRQAIQRAQRAGVQGIKVQVSGRLNGAEIARTEWTREGRVPLHTLRADIDYSYCTAQTVYGILGVKVWVFKGEIIPGQE DIVSQPVTREREPRRRQQQRRRQQFEDRSNEAMATGRRKASKAKKEETNWQERVIQIRRVSKVVKGGKKLSFRAIVIVGNERG QVGVGVGKASDVIGAVKKGVADGKKHLIEIPITKSNSIPHPIDGVGGGAKVIMRPAAPGTGVIAGGAVRTVLELAGVRNVLAK QLGSNNPLNNARAAVNALSTLRTFAEVAEDRGIAVENLYIMATVAETNSGRALYWGTGRRKSAVAQVRLVPGEGKFVVNGK EGELYFQYNPNYLGVIKAPLETLGLENEYDILVKAKGGGLTGQADSIRLGVARALCQLDPDNRSPLKIEGYLTRDPRAKERKKY GLHKARKAPQYSKRMATLQQQKIRIRLQAFDRRLLDTSCEKIVDTANRTNATAIGPIPLPTKRKIYCVLRSPHVDKDSREHFETR THRRIIDIHQPSSKTIDALMKLDLPSGVDIEVKLMARQPTKKTGSKKQKKNVPNGVAYIQSTFNNSIVTITDQNGDVISWASAGS SGFKGAKKGTPFAAQTAAESAGRRAIDQGMRQIQVMVSGPGAGRETAIRALQGAGLEITLIRDVTPIPHNGCRPPKRRRVMARI AGVDLPRDKRVEIGLTYIYGIGLRRSQDILAATDVNPDTRVKDLTDADLAALRAEIESNYQVEGDLRRLEAMNIKRLVDIGCYR GRRHRMGLPVRGQRTRTNARTRRGRRQTVAGKKKAPGKMGRSLKKGPFVADHLLSKLEKLNANNEKQVIKTWSRASTILPL MVGHTIAVHNGKQHVPVFVNEQMVGHKLGEFAPTRTYRGHGKTDKKSGRMSDKNEGYKIISDNRQARYLYEILETYEAGIQL TGTEVKSIRAGKVNLQDGYALLRDGEAWLINAHISPYTASGQYFNHEPRRTRKLLLHGLEIRKLIGKVEQQGLTLIPLKMYFKR GWVKISIGLCRGKKVHDKREDLKRRQDQRDIQRAMKNYMAEISAKLVQDLRQKTGAGMMDCKKALNETQGNIDEAIDWLRK KGIASAGKKSDRVTAEGLVDIYTTPDRSGGVLIEVNCQTDFVARNDAFKLLVKNLAKQAVNADNVTSLLAQPYIENTDVTVDD YIKETIATLGENIQVRRFVNFSLEGAPGVIDGYIHTGGRVGVLVSIGVYTETAAKNEEVQSLARNTAMQVAACPNVEYVSVDKI PDQVVQKEKEIEMGKEDLGNKPENIKEKIVQGRIDKRLKEMTLLDQPYIRDQNISVAELIKQVESKLSEPIIVHQFVRYILGEGIE KQESNFAQEVAAQIGAK

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MQIPRLHPDTIEEVKHRADIVDVVSDYVVLRRRGKDFVGLCPFHDEKTPSFTVSPSKQMYYCFGCQAAGNAIKFVMDLNKRHF AEVVLDLAKRYQVPVKTLAPEQRQELQRQISLREQLYEILASTAQFYQHALRQNLGQKAMQYLQENRQLKIETIQQFGLGYAP PGWETLHRYLVENKNYPVQLVEKAGLIKPRKEGGGYYDVFRDRLMIPIHDVQGRVIAFGGRTLTDEQPKYLNSPETELFSKGK TLFALDQAKDGISKSDQGVVVEGYFDAIALHAAGINNVVASLGTALSIEQVRLLLRYSDSKQLILNFDADNAGINAAERAIGEIA TLAYKGEVQLKILNIPDGKDADEYLQTHTAAEYQQLLTNAPLWLNWQIEEIIKDRDLKQATNFQIVTKEMVKILQKIVNSDTLN YYISYCAEILSLGDARLIPLRVENLLTQIAPASVQTPPLRLRKPESKTPKLSLVTTERSLLEQAEALLLRIFLHCPEQRQIIFEELEER NLEFSLSHHRFLWQKSLEFPLEEVDLISNLQNRYLELEEDLKIVSHVFHLNEKNKQEILRTPQVVQATLACMEIVLREKRYRHFM

ELWEKVDPQIEPEKNKSYYDNAIAEKRRIQELDKQRQFSIAELMKLAEAESTMQKTVEATQRAFNTIRTGRANASLLDKVQVD YYGSPTPLKSLANISTPDASTILIQPYDKKSLNMVEKAISLSDVGLTPSNDGSVIRLNIPPLTSDRRKEFAKLAAKYAEEGRVGIRN IRRDALDSIRKQEKNAEISEDESRDQQDKLQKLTNKYTAKIDDLLAEKEKDITTVMPVIEKKRTRDLPQINERIRFPKIRVIDTDG GQLGIMPPHEALKLAEEKELDLVLLSDKADPPVCRIMDYGKYKFEQEKKAREARKKQHTADVKEVKMRYKIEEHDYNVRVK QAERFLKDGDKVKATVMFRGREIQHSDLAEDLLKRMATDLEPFGEVQQAPKKEGRNMMMLISPKKMVTLPGLKDLIESISRER NLPRLAVQSSIREALLKGYERYRRAQNLERRQFDENYFDNFEVELDIEGEGFRVLSTKTIVEEVTNTDHQISLDEVOOVAPEAOS GDSVVLDVTPDQGEFGRMAAMQTKQVLAQKLRDQQRQMVQEEFQDLESTVLQARVLRFERQSVILAVSSGFGQPEVEAELPK REQLPNDTYRSNTTFKVYLKKVSQGQQRGPQLLVSRADAGLVVYLFANEVPEIEDEVVRIVAVAREANPPSRYVGPRTKIAVD TLDRDVDPVGACIGARGSRIQVVVNELRGEKIDVIRWSPDPATYIANALSPARVDEVRLMDPESRQTHVLVAEDQLSLAIGKEG QNVRLAARLTGWKIDIKDQAKYDYAAEDAKFAAVRAKYQAENDETEMEQLEDEYQDKLELENDNFETNEEETMSKKSLASL SAADISGKRALVRVDFNVPVDDQGNITDDTRIRAALPTIQDLTQKGAKVILTSHFGRPKGVDDKLRLTPVAKRLSELLGQEVVK TDDCIGDDVAAKVAALENGQVLLLENVRFYKEEEKNDPEFAQKLAANADFYVNDAFGTAHRAHASTEGVTKYLSPSVAGYL VEKELQYLQSAIEVPQRPLAAIIGGSKVSSKIGVIETLLEKCDKLIIGGGMIFTFYKARGLSVGKSLVEEDKLELAKSLEAKAKER GVTFLLPTDIVAADKFAPDANATTVSIENIPADGMGLDIGPDSVKVFQDALADCKTVIWNGPMGVFEFDQFAVGTEAIAHTLAE IGKTGTTTIIGGGDSVAAVEKVGLADQMSHISTGGGASLELLEGKVLPGIAALDEADLGHYERFTDTSMSRLNSVTTGLIYQSVI NKERRGDYNGGTVQVIPHITNEIKDRILRVAKETNPAAVITEIGGTVGDIESLPFLEAIRQLRKEVGRQNVLYMHVTLLPWIASA GEMKTKPTQHSVKELRSIGIQPDILVCRCDRPIGVGLKQKLSEFCDVPVECVITCQDASSIYEVPLILEKEGLAQQTLDLLQMEQR QPDLSQWETMVERMYSPKYSVEIAIVGKYVRLSDAYLSVVESLRHAAISTYGDLRIRWVNSETLETESAENYLAGVDGILVPGG FGSRGIDGKIAAIKFARDRQIPFLGLCLGMQCSVIEWARNVEGLADANSAEFDPYTTNPIINLLPEQQDVVDLGGTMRLGLYPCR VQPGTIAFDLYQEEVIYERHRHRYEFNNLYRNALLESGYVVSGTSPDGRLVEIVEYPKHPFFIACQFHPEFQSRPSTPHPLFKGFM EAAISRTHHSKNTSKPVQVSMGKKISRRLQALLEKVEDRDYAPLDALALLKETATAKFPEAAEAHIRLGIDPKYTDQQLRTTVA LPKGTGQVVRVAVIARGEKVTEATNAGADIAGSEELIDEIQKGMMDFDKLIATPDVMPQVAKLGKLLGPRGLMPSPKGGTVTF DVASAIAEFKAGKLEFRADRTGIVHVMFGKASFTPEDLLVNLKALQETIDRNRPSGAKGRYWRTFYVSATMGPSIKVDINALRD LKVTDAAMGTRSYRPYTPSTRQVTISDFAEITKTEPEKSLTESVHRAKGRNNQGRITSRRRGGGHKKLYRIIDFKRDKRNIAATV TAIEYDPNRNARIALVQYEDGEKRYILHPNGLKVGAKIIAGSEAPFEDGNALPLSNIPLGTNVHNVELTAGKGGQIVRAAGATA QVVAKEGNYVTLKLPSGEVRMIRKECYATIGQVGNTDARNLSAGKAGRNRWKGRRPKVRGSVMNPVDHPHGGGEGRAPIGR SGPVTPWGKPALGAKTRKRKKASTKLIVMSVGILGTKLGMTQIFDEAGVAIPVTVIKAGPCTVTQVKTKQTDGYSAIQVGYGE VKPKALNQPKLGHLAKSSAPALRHLNEYRTDTASEYALGQEIKADIFSEGQIVDVIGTSIGRGFAGNQKRNNFGRGPMSHGSKN HRAPGSIGAGTTPGRVYPGKRMAGRLGGTRVTIRKLTVVKVDAERNLILVKGAIPGKPGGLVNVVPTNKVGNKMVESVVKNW QGEEVGQTSFELRVAKEETAAHIVHRALVRQMTNSRQGTVSTKTRSEVRGGGRKPWRQKGTGRARAGSIRSPLWRGGGVIFG PKPRDFNIKLNRKERRLALRTAFVSRAEDLIVVEEFSNELQRPKTKELVAALARWGAVPEQKTLLILSEIAENVNLSARNVENLK VIAADQLNVFDLLHAGKIVVTSSALTKIQEVYSAMATTRLKTVYQETIVPKLTQQFQYTNVHQVPKVVKITVNRGLGEAAQNA

KALEASLNEIALITGQKPVVTRAKKAIAGFKIRQGMPVGIMVTLRGERMYAFLDRLISLALPRIRDFRGVSPKSFDGRGNYTLGV REQLIFPEVEYDSIDQIRGLDISIITTAKNDEEGRALLKEMGMPFRDQMSRIGKRPITVPAKVQVAIDGTKVVVKGPKGELSRDLP ANVIVSQEGETLLVTRRDETRTSRQMHGLSRTLVANMVEGVSQGFQRRLEIQGVGYRAQVQGRNLVLNIGYSHQVQIEPPDGI QFAVENNTNVIVSGYDKEVVGNTAAKIRAVRPPEPYKGKGIRYAGEVVRRMAKKVVAVIKLALNAGKANPAPPVGPALGQHG VNIMMFCKEYNAKTADQAGMVIPVEISVFEDRSFTFVLKTPPASVLIRKAAKIERGSEQPNKKKVGSITKAQLREIAQTKLPDLN ANDIDAAMNIVAGTAKNMGVTITDMSTATDQILEQLKSLTLLEAAELVKQIEEAFGVSAAAPAGGMMMMAAPGAAAPAEAV EEKTEFDAILESVPADKKIAVLKIVREITGLGLKEAKDLVEAAPKPVKEGVNKEAAEDIKKRIAEAGGTVTIKMSSKTYLPPQEK LEREWYVVDATDKRLGRLASEIAMVLRGKRKAEYTPHLDTGDFVVVINAEKVAVTGKKRTQKVYRRHSGRPGGMKTETFAK LQQRLPERIVEHAVKGMLPKNSLGKQLFTKLKVYAGPTHPHAAQKPKELIVNTIPGENMIQPQTYLNVADNSGAKKLMCIRVL GAGNRRYGGVGDKIIAVVKESNPNMAVKKSDVVEAVIVRTKKSINRDSGMSIRFDDNAAVIINKDGNPRGTRVFGPVARELRD KNFTKIVSLAPEVLMLSPKRTKFRKQQRGRMEGLAHRGSTLNFGDFALQAQEPCWITSRQIEASRRAMTRYIRRGGKIWIRIFPD KPVTMRPAETRMGSGKGNPEFWVAVVKPGRILFEIAGVSEEIAREAMRLAAYKLPIKTKFIVRSQPQEQEMNVQEVIRSIEAEHL KSDLPEIYVGDTVRVGVKIKEGDKYRVQPYEGVVIGKRNGGINETITVRRVFQGVGVERVFLLHSPRIDNIKVVRRGKVRRAKL YYLRQLSGKATRIKQRFDRALMTRVKRGNVARKRRNKILKLAKGFRGSHSTLFRTANQQVMKALRSAYRDRKKKKRDFRRL WITRINAASRQHGLSYSQLIGNLKKANVDLNRKMLAQLAVLDPASFAKVAELANSAKGMAHKKGTGSTRNGRDSNAQRLGV KRFGGQTVLAGNILVRQRGTKFHPGNNVGIGSDDTLFALVDGVVTFERKGKSRKKVSVYPAIAAEAVASMTNETYMEPAFLLP DLIEIQRSSFRWFLEEGLIEELNSFSPITDYTGKLELHFIGQNYKLKEPKYSVEESKRRDSTYAVQMYVPTRLLNKETGDIKEQEV FIGDLPLMTDRGTFIINGAERVIVNQIVRSPGVYYKSEIDKNGRRTYSASLIPNRGAWLKFETDRNDLVWVRIDKTRKLSAQVLL KALGLSDNEIFDALRHPEYFQKTIEKEGQFSEEEALMELYRKLRPGEPPTVLGGQQLLDSRFFDPKRYDLGRVGRYKLNKKLRL SVPDTMRVLTPGDILAAVDYLINLEYDIGSIDDIDHLGNRRVRSVGELLQNQVRVGLNRLERIIRERMTVSDAEVLTPASLVNPK PLVAAIKEFFGSSQLSQFMDQTNPLAELTHKRRLSALGPGGLTRERAGFAVRDIHPSHYGRICPIETPEGPNAGLIGSLATHARVN QYGFLETPFRPVENGRVCYEKAAVYMTADEEDDLRVAPGDIPVDENGHIIGPQVPVRYRQEFSTTTPEQVDYVAVSPVQIVSVA TSMIPFLEHDDANRALMGSNMQRQAVPLLKPERPLVGTGLEAQAARDSGMVIVSRTDGDVVYADANEIRVRVRERTGDRLQV TGDSEETSSFPVSKPQEIKYVLSKYQRSNQDTCLNQKPLVRIGEKVVAGQVLADGSSTEGGELALGQNIVVAYMPWEGYNYED AILISERLVQDDVYTSIHIEKYEIEARQTKLGPEEITREIPNVGEDALRQLDEQGIIRIGAWVESGDILVGKVTPKGESDQPPEEKLL RAIFGEKARDVRDNSLRVPNGEKGRVVDVRLFTREQGDELPPGANMVVRVYVAQKRKIQVGDKMAGRHGNKGIISRILPAED MPYLPDGSPVDIVLNPLGVPSRMNVGQVFECLLGWAGQNLGVRFKITPFDEMYGEESSRRIVHGKLQEARDETGKTWVYNPD DSGKIMVYDGRTGEPFDRPVTVGVAYMLKLVHLVDDKIHARSTGPYSLVTQQPLGGKAQQGGQRFGEMEVWALEAFGAAYT LQELLTVKSDDMQGRNEALNAIVKGKAIPRPGTPESFKVLMRELQSLGLDIAVHKVETQADGSSLDVEVDLMADQGSRRTPPR PTYESLSRESLEEDEMPVVSLAQMMESGVHFGHQTRRWNPKMSPYIYTARNGVHIIDLVQTAQLMDDAYNYMRTQAEQGKK FLFVGTKRQAAGIIAQEANRCGSHYINQRWLGGMLTNWATIKTRAERLKDLERREENGALDLLPKKEASMLRREMAKLQKYL GGIKNMRKVPDIVVIVDQRREYNAVQECQKLGIPIVSMLDTNCDPDVVDIPIPANDDAIRSIKLIVGKLADAIYEGRHGQLEVEE

DYEDYEGAEEEYDYDESEYTDSMMSDDDEEMGQKIHPVGFRLGITQEHQSRWFAVPDRYPALLQEDHKLRQYIEKKLGRTAQ NNAGISEIRIERKADQIDLELRTARPGVVVGRGGQGIESLRTGLQDLLGGQRQIRINVVEVQKVDADAYLIAEYIAQQLERRVSF RRVVRQAIQRAQRAGVQGIKVQVGGRLNGAEIARTEWTREGRVPLHTLRADIDYSYCTAQTIYGILGIKVWVFKGEIIPGQEEA POPSGREREPRRRDOKRRROOFEDRSNEAMATGRRKASKAKKEETNWOERVIQIRRVSKVVKGGKKLSFRAIVIVGNERGOVG VGVGKASDVIGAVKKGVADGKKHLIEIPITKSNSIPHPIDGIGGGAKVIMRPAAPGTGVIAGGAVRTVLELAGVRNVLAKOLGS SNPLNNARAAVNALSTLRTFAEVAEDRGIAVENLYIMATVAEANSGRAVYWGTGRRKSAVAQVRLVPGEGKFTVNGKDGEL YFQFNANYLGAIKAPLETLGLESEYDILVKAEGGGLTGQADSIRLGVARALCQLDPDNRSPLKIEGYLTRDPRAKERKKYGLHK ARKAPQYSKRMATLQQQKIRIRLQAFDRRLLDTSCEKIVDTANRTNATAIGPIPLPTKRKIYCVLRSPHVDKDSREHFETRTHRRI IDIYQPSSKTIDALMKLDLPSGVDIEVKLMARQPTKKTGSKKQKRNVPNGIAYIQSTFNNSIVTITDQNGDVISWASAGSSGFKG AKKGTPFAAQTAAESAGRRAMDQGMRQIEVMVSGPGAGRETAIRALQGAGLEITLIRDITPIPHNGCRPPKRRRVMARISGVDL PRDKRVEIGLTYIYGIGLTRSQEILAATGVNPDTRVKDLSDADVAALRAEIESNYQVEGDLRRLEAMSIKRLVDIGCYRGRRHR MGLPVRGQRTRTNARTRRGRRQTVAGKKKAPGKMGRSLKKGPFVADHLLSKIEKLNEKNEKQVIKTWSRASTIIPVMVGHTIA VHNGKQHVPVFVNEQMVGHKLGEFAPTRTYRGHGKSDKKSGRMSDKNEGYKVISDNRQARYLYEILETYEAGIQLAGTEVKS IRAGKANLQDGYALIRNGEAWLINVHISPYTSSGQYFNHEPRRTRKLLLHRQELRKLIGKVEQQGLTLVPLKMYLKRGWVKVSI GLCKGKKIHDKRESLKRRQDQRDIQRAMKNYMAEISAKLVQELRQKTGAGMMDCKKALKENDGNIDAAIDWLRKKGIASAG KKSDRVAAEGLVDTYIQPDGKVGVLIEVNCQTDFVARNDAFKTLVKNLAQQAATADSVESLLAQPYIEKAEVTVDEFIKESIAT LGENIQVRRFVNFSLGDTPGVVDSYIHTGGRVGVLLQVIAKTDDAAGNEEFKKFAKNAAMQVAACPNVEYVSVDQIPAETVQ KEKDIEMGKEDLANKPENIREKIVQGRIEKRLKELTLLDQPYIRDQSISVADLVKQVQSKVGEDITVHGFVRYVLGEGIEKQESN **FAEEVAAQMGAK**

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MQIPRLHPDTIEEVKHRADIVDVVSDYVVLRRRGKDFVGLCPFHDEKTPSFTVSPSKQMYYCFGCQAAGNAIKFVMDLNKRHF AEVVLDLAKRYQVPVKTLAPEQRQELQRQISLREQLYEILASTAQFYQHALRQNLGQKAMQYLQENRQLKIETIQQFGLGYAP PGWETLHRYLVENKNYPVQLVEKAGLIKPRKEGGGYYDVFRDRLMIPIHDVQGRVIAFGGRTLTDEQPKYLNSPETELFSKGK TLFALDQAKDGISKSDQGVVVEGYFDAIALHAAGINNVVASLGTALSIEQVRLLLRYSDSKQLILNFDADNAGINAAERAIGEIA TLAYKGEVQLKILNIPDGKDADEYLQTHTAAEYQQLLTNAPLWLNWQIEEIIKDRDLKQATNFQIVTKEMVKILQKIVNSDTLN YYISYCAEILSLGDARLIPLRVENLLTQIAPASVQTPPLRLRKPESKTPKLSLVTTERSLLEQAEALLLRIFLHCPEQRQIIFEELEER NLEFSLSHHRFLWQKSLEFPLEEVDLISNLQNRYLELEEDLKIVSHVFHLNEKNKQEILRTPQVVQATLACMEIVLREKRYRHFM

ELWEKVDPQIEPEKNKSYYDNAIAEKRRIQELDKQRQFSIAELMQKTVEATQRAFNTIRTGRANASLLDKVQVEYYGNPTPLKS LANISTPDATTILIQPYDKKSLNMVEKAISLSDVGLTPSNDGSVIRLNIPPLTSDRRKEFAKLAAKYAEEGRVGIRNIRRDALDSIR KQEKNAEISEDESRDQQDKLQKLTNKYTAKIDDLLAEKEKDITTVMPVIEKKRTRDLPQINERIRFPKIRVIDTDGGQLGIMPPHE ALKLAEEKELDLVLLSDKADPPVCRIMDYGKYKFEQEKKAREARKKQHTADVKEVKMRYKIEEHDYNVRVKQAERFLKDGD KVKATVMFRGREIQHSDLAEDLLKRMATDLEPFGEVQQAPKKEGRNMMMLISPKKMSMVALPGLKDLIESISRERNLPRLAVQ SSIREALLKGYERYRRAQNLERRQFDENYFDNFEVELDIEGEGFRVLSTKTIVEEVTNTDHQISLDEVQQVAPEAQSGDSVVLDV TPDQGEFGRMAAMQTKQVLAQKLRDQQRQMVQEEFQDLESTVLQARVLRFERQSVILAVSSGFGQPEVEAELPKREQLPNDT YRSNTTFKVYLKKVSQGQQRGPQLLVSRADAGLVVYLFANEVPEIEDEVVRIVAVAREANPPSRYVGPRTKIAVDTLDRDVDP VGACIGARGSRIQVVVNELRGEKIDVIRWSPDPATYIANALSPARVDEVRLMDPESRQTHVLVAEDQLSLAIGKEGQNVRLAAR LTGWKIDIKDQAKYDYAAEDAKFAAVRAKYQAENDETEMEQLEDEYQDKLELENDNFETNEEETVSKKSLASLSAADISGKR ALVRVDFNVPVDDQGNITDDTRIRAALPTIQDLTQKGAKVILTSHFGRPKGVDEKLRLTPVAKRLSELLGQEVVKTDDCIGDDV AAKVAALENGQVLLLENVRFYKEEEKNDPEFAQKLAANADFYVNDAFGTAHRAHASTEGVTKYLSPSVAGYLVEKELQYLQ SAIEVPQRPLAAIIGGSKVSSKIGVIETLLEKCDKLIIGGGMIFTFYKARGLSVGKSLVEEDKLELAKSLEAKAKERGVALLLPTD VVLADNFAADANSQTVTIEAIPDGWMGLDIGPDSVKVFQEALADCKTVIWNGPMGVFEFDKFAAGTEAIAHTLAEIGKTGTTTI IGGGDSVAAVEKVGLADQMSHISTGGGASLELLEGKVLPGIAALDEAMTKFIFVTGGVVSSIGKGIVAASLGRLLKSRDYSVSIL KLDPYINVDPGTMSPFQHGEVFVTQDGAETDLDLGHYERFTDTSMSRLNSVTTGLIYQSVINKERRGDYNGGTVQVIPHITNEIK DRILRVAKETNPAAVITEIGGTVGDIESLPFLEAIRQLRKEVGRQNVLYMHVTLLPWIASAGEMKTKPTQHSVKELRSIGIQPDIL VCRCDRPIGVGLKQKLSEFCDVPVECVITCQDASSIYEVPLILEKEGLAQQTLDLLQMEQRQPDLSQWETMVERMYSPKYSVEI AIVGKYVRLSDAYLSVVESLRHAAISTYGDLRIRWVNSETLETESAENYLAGVDGILVPGGFGSRGIDGKIAAIKFARDRQIPFLG LCLGMQCSVIEWARNVEGLADANSAEFDPYTTNPIINLLPEQQDVVDLGGTMRLGLYPCRVQPGTIAFDLYQEEVIYERHRHRY EFNNLYRNALLGSGYVVSGTSPDGRLVEIVEYPKHPFFIACQFHPEFQSRPSTPHPLFKGFMEAAISRTHHSKNTSKPVQVSMGK KISRRLQALLEKVEDRDYAPLDALALLKETATAKFPEAAEAHIRLGIDPKYTDQQLRTTVALPKGTGQVVRVAVIARGEKVTEA TNAGADIAGSEELIDEIQKGMMDFDKLIATPDVMPQVAKLGKLLGPRGLMPSPKGGTVTFDVASAIAEFKAGKLEFRADRTGIV HVMFGKASFTPEDLLVNLKALQETIDRNRPSGAKGRYWRTFYVSATMGPSIKVDINALRDLKVTDAAMGTRSYRPYTPSTRQV TISDFAEITKTEPEKSLTESVHRAKGRNNQGRITSRRRGGGHKKLYRIIDFKRDKRNIAATVTAIEYDPNRNARIALVQYEDGEK RYILHPNGLKVGAKIIAGPEAPFEDGNALPLSNIPLGTNVHNVELTAGKGGQIVRAAGATAQVVAKEGNYVTLKLPSGEVRMIR KECYATIGQVGNTDARNLSAGKAGRNRWKGRRPKVRGSVMNPVDHPHGGGEGRAPIGRSGPVTPWGKPALGAKTRKRKKAS TKLIVMSVGILGTKLGMTQIFDEAGVAIPVTVIKAGPCTVTQVKTQQTDGYSAIQVGYGEVKPKALNQPKLGHLAKSSAPALRH LNEYRTDTASEYALGQEIKADIFSEGQIVDVIGTSIGRGFAGNQKRNNFGRGPMSHGSKNHRAPGSIGAGTTPGRVYPGKRMAG RLGGTRVTIRKLTVVKVDAERNLILVKGAIPGKPGGLVNVVPTNKVGNKMVESVVKNWQGEEVGQTSFELRVAKEETAAHIV HRALVRQMTNSRQGTVSTKTRSEVRGGGRKPWRQKGTGRARAGSIRSPLWRGGGVIFGPKPRDFNIKLNRKERRLALRTAFVS RAEDLIVVEEFSNELQRPKTKELVAALARWGAVPEQKTLLILSEIAENVNLSARNVENLKVIAADQLNVFDLLHADKIVVTSSA

LTKIQEVYSAMATTRLKTVYQETIVPKLTQQFQYTNVHQVPKVVKITVNRGLGEAAQNAKALEASLNEIALITGQKPVVTRAK KAIAGFKIRQGMPVGIMVTLRGERMYAFLDRLISLALPRIRDFRGVSPKSFDGRGNYTLGVREQLIFPEVEYDSIDQIRGLDISIIT TAKNDEEGRALLKEMGMPFRDQMSRIGKRPITVPAKVQVAIDGTKVVVKGPKGELSRDLPANVIVSQEGETLLVTRRDETRTS RQMHGLSRTLVANMVEGVSQGFQRRLEIQGVGYRAQVQGRNLVLNIGYSHQVQIEPPDGIQFAVENNTNVIVSGYDKEVVGN TAAKIRAVRPPEPYKGKGIRYAGEVVRRMAKKVVAVIKLALNAGKANPAPPVGPALGOHGVNIMMFCKEYNAKTADOAGMV IPVEISVFEDRSFTFVLKTPPASVLIRKAAKIERGSEQPNKKKVGSITKAQLREIAQTKLPDLNANDIDAAMNIVAGTAKNMGVTI TDMSTATDQILEQLKSLTLLEAAELVKQIEEAFGVSAAAPAGGMMMMAAPGAAAPAEAVEEKTEFDAILESVPADKKIAVLKI VREITGLGLKEAKDLVEAAPKPVKEGVNKEAAEDIKKRIAEAGGTVTIKMSSKTYLPPQEKLEREWYVVDATDKRLGRLASEI AMVLRGKRKAEYTPHLDTGDFVVVINAEKVAVTGKKRTQKVYRRHSGRPGGMKTETFAKLQQRLPERIVEHAVKGMLPKNS LGKQLFTKLKVYAGPTHPHAAQKPKELIVNTIPGENMIQPQTYLNVADNSGAKKLMCIRVLGAGNRRYGGVGDKIIAVVKESN PNMAVKKSDVVEAVIVRTKKSINRDSGMSIRFDDNAAVIINKDGNPRGTRVFGPVARELRDKNFTKIVSLAPEVLMLSPKRTKF RKQQRGRMEGLAHRGSTLNFGDFALQAQEPCWITSRQIEASRRAMTRYIRRGGKIWIRIFPDKPVTMRPAETRMGSGKGNPEF WVAVVKPGRILFEIAGVSEEIAREAMRLAAYKLPIKTKFIVRSQPQEQEMNVQEVIRSIEAEHLKSDLPEIYVGDTVRVGVKIKE GDKYRVQPYEGVVIGKRNGGINETITVRRVFQGVGVERVFLLHSPRIDNIKVVRRGKVRRAKLYYLRQLSGKATRIKQRFDRAL MTRVKRGNVARKRRNKILKLAKGFRGSHSTLFRTANQQVMKALRSAYRDRKKKKRDFRRLWITRINAASRQHGLSYSQLIGN LKKANVDLNRKMLAQLAVLDPASFAKVAELANSAKGMAHKKGTGSTRNGRDSNAQRLGVKRFGGQTVLAGNILVRQRGTK FHPGNNVGIGSDDTLFALVDGVVTFERKGKSRKKVSVYPAIAAEAVASMTNETYMEPAFLLPDLIEIQRSSFRWFLEEGLIEELN SFSPITDYTGKLELHFIGQNYKLKEPKYSVEESKRRDSTYAVQMYVPTRLLNKETGDIKEQEVFIGDLPLMTDRGTFIINGAERVI VNQIVRSPGVYYKSEIDKNGRRTYSASLIPNRGAWLKFETDRNDLVWVRIDKTRKLSAQVLLKALGLSDNEIFDALRHPEYFQK TIEKEGQFSEEEALMELYRKLRPGEPPTVLGGQQLLDSRFFDPKRYDLGRVGRYKLNKKLRLSVPDTMRVLTPGDILAAVDYLI NLEYDIGSIDDIDHLGNRRVRSVGELLQNQVRVGLNRLERIIRERMTVSDAEVLTPASLVNPKPLVAAIKEFFGSSQLSQFMDQT NPLAELTHKRRLSALGPGGLTRERAGFAVRDIHPSHYGRICPIETPEGPNAGLIGSLATHARVNQYGFLETPFRPVENGRVCYEK AAVYMTADEEDDLRVAPGDIPVDENGHIIGPQVPVRYRQEFSTTTPEQVDYVAVSPVQIVSVATSMIPFLEHDDANRALMGSN MQRQAVPLLKPERPLVGTGLEAQAARDSGMVIVSRTDGDVVYADANEIRVRVRERTGDRLQVTGDSEETSSFPVSKPQEIKYV LSKYQRSNQDTCLNQKPLVRIGEKVVAGQVLADGSSTEGGELALGQNIVVAYMPWEGYNYEDAILISERLVQDDVYTSIHIEK YEIEAROTKLGPEEITREIPNVGEDALRQLDEQGIIRIGAWVESGDILVGKVTPKGESDQPPEEKLLRAIFGEKARDVRDNSLRVP NGEKGRVVDVRLFTREQGDELPPGANMVVRVYVAQKRKIQVGDKMAGRHGNKGIISRILPAEDMPYLPDGSPVDIVLNPLGVP SRMNVGQVFECLLGWAGQNLGVRFKITPFDEMYGEESSRRIVHGKLQEARDETGKTWVYNPNDSGKIMVYDGRTGEPFDRPV TVGVAYMLKLVHLVDDKIHARSTGPYSLVTQQPLGGKAQQGGQRFGEMEVWALEAFGAAYTLQELLTVKSDDMQGRNEAL NAIVKGKAIPRPGTPESFKVLMRELQSLGLDIAVHKVETQADGSSLDVEVDLMADQGSRRTPPRPTYMPVVSLAQMMESGVHF GHQTRRWNPKMSPYIYTARNGVHIIDLVQTAQLMDDAYNYMRTQAEQGKKFLFVGTKRQAAGIIAQEANRCGSHYINQRWL GGMLTNWATIKTRAERLKDLERREENGALDLLPKKEASMLRREMAKLQKYLGGIKNMRKVPDIVVIVDQRREYNAVQECQK

LGIPIVSMLDTNCDPDVVDIPIPANDDAIRSIKLIVGKLADAIYEGRHGQLEVEEDYEDYEGAEEEYDYDESEYTDSMMSDDDEE MGQKIHPVGFRLGITQEHQSRWFAVPDRYPALLQEDHKLRQYIEKKLGRTAQNNAGISEIRIERKADQIDLELRTARPGVVVGR GGQGIESLRTGLQDLLGGQRQIRINVVEVQKVDADAYLIAEYIAQQLERRVSFRRVVRQAIQRAQRAGVQGIKVQVGGRLNGA EIARTEWTREGRVPLHTLRADIDYSYCTAQTIYGILGIKVWVFKGEIIPGQEEAPQPSGREREPRRRDQKRRRQQFEDRSNEAMA TGRRKASKAKKEETNWQERVIQIRRVSKVVKGGKKLSFRAIVIVGNERGQVGVGVGKASDVIGAVKKGVADGKKHLIEIPITK SNSIPHPIDGIGGGAKVIMRPAAPGTGVIAGGAVRTVLELAGVRNVLAKQLGSSNPLNNARAAVNALSTLRTFAEVAEDRGIAV ENLYIMATVAEANSGRAVYWGTGRRKSAVAQVRLVPGEGKFTVNGKDGELYFQFNANYLGAIKAPLETLGLESEYDILVKAE GGGLTGQADSIRLGVARALCQLDPDNRSPLKIEGYLTRDPRAKERKKYGLHKARKAPQYSKRMATLQQQKIRIRLQAFDRRLL DTSCEKIVDTANRTNATAIGPIPLPTKRKIYCVLRSPHVDKDSREHFETRTHRRIIDIYQPSSKTIDALMKLDLPSGVDIEVKLMAR QPTKKTGSKKQKRNVPNGIAYIQSTFNNSIVTITDQNGDVISWASAGSSGFKGAKKGTPFAAQTAAESAGRRAMDQGMRQIEV MVSGPGAGRETAIRALQGAGLEITLIRDITPIPHNGCRPPKRRRVMARISGVDLPRDKRVEIGLTYIYGIGLTRSQEILAATGVNPD TRVKDLSDADVAALRAEIESNYQVEGDLRRLEAMSIKRLVDIGCYRGRRHRMGLPVRGQRTRTNARTRRGRRQTVAGKKKAP GKMGRSLKKGPFVADHLLSKIEKLNEKNEKQVIKTWSRASTIIPVMVGHTIAVHNGKQHVPVFVNEQMVGHKLGEFAPTRTYR GHGKSDKKSGRMSDKNEGYKVISDNRQARYLYEILETYEAGIQLAGTEVKSIRAGKANLQDGYALIRNGEAWLINVHISPYTSS GQYFNHEPRRTRKLLLHRQELRKLIGKVEQQGLTLVPLKMYLKRGWVKVSIGLCKGKKIHDKRESLKRRQDQRDIQRAMKNY MAEISAKLVQELRQKTGAGMMDCKKALKENDGNIDAAIDWLRKKGIASAGKKSDRVAAEGLVDTYIQPDGKVGVLIEVNCQ TDFVARNDAFKTLVKNLAQQAATADSVESLLAQPYIEKAEVTVDEFIKESIATLGENIQVRRFVNFSLGDTPGVVDSYIHTGGR VGVLLQVIAKTDDAAGNEEFKKFAKNAAMQVAACPNVEYVSVDQIPAETVQKEKDIEMGKEDLANKPENIREKIVQGRIEKRL KELTLLDQPYIRDQSISVADLVKQVQSKVGEDITVHGFVRYVLGEGIEKQESNFAEEVAAQMGAK

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MQIPRLHPDTIEEVKHRADIVDVVSDYVVLRRRGKDFVGLCPFHDEKTPSFTVSPSKQMYYCFGCQAAGNAIKFVMDLNKRHF TEVVLDLAKRYQVPVKTLAPEQRQELQRQISLREQLYEILASTAQFYQHALRQNLGQKAMQYLQEKRLFKIETIQQFGLGYAPP GWETLYRYLVDNKNYPVQLVEKAGLIKPRKEGGSYYDVFRDRLMIPIRDIQGRVIAFGGRTLTEEQPKYLNSPETELFSKGKTL FALDQAKDGISKSDQGVVVEGYFDAIALHAAGINNVVASLGTALSIEQVRLLLRYSDSKQLILNFDADKAGINAAERAIGEIATL AYKGEVQLKILNIPDGKDADEYLHSHTATEYQQLLANAPLWLNWQIEEIIKDRDLKQAANFQIVTKEMVKLLQKIVNSDTLNY YISYCAEILSLGDARLIPLRVENLLTQIAPANVQTPPLRPRKPESKTPKLSLVTTERSLLEQAEALLLRIFLHCPEQRKVVFAELEE RNLEFSLSHHRFLWQQSLEFPLEEVDLISNLQNRYLELEEDLKIVSHVFHLNEKNKTEILRTPQVVQATLACMERVLREKRYRHF

MELWKKIDPQAEPDKYKSYADAIYADKMRIQELDKQRQFPISELFMQKTVEATQRAFNTIRTGRANASLLDKVQVDYYGSPTP LKSLANISTPDASTILIQPYDKKSLNMVEKAISLSDVGLTPSNDGSVIRLNIPPLTSDRRREFAKLAAKYAEEGRVGIRNIRRDALD SIRKQEKAAEISEDESRDQQDKLQKLTNKYTAKIDDLLAEKEKDITTVMPVIEKKRTRDLPQINERIRFPKIRVIDTDGGQLGIMP PHEALKLAEEKELDLVLLSDKADPPVCRIMDYGKYKFEQEKKAREARKKQHTADVKEVKMRYKIEEHDYNVRVKQAERFLK DGDKVKATVMFRGREIQHSDLAEDLLKRMATDLEPFGEVQQAPKKEGRNMMMLISPKKMSMVTLPGLKDLIESISRERNLPRL AVOSSIREALLKGYERYRRAQNLERRQFDENYFDNFEVELDIEGEGFRVLSTKTIVEEVTNTDHQISLDEVQQVAPEAQSGDSV VLDVTPDQGEFGRMAAMQTKQVLAQKLRDQQRQMVQEEFQDLESTVLQARVLRFERQSVILAVSSGFGQPEVEAELPKREQL PNDTYRSNTTFKVYLKKVSQGQQRGPQLLVSRADAGLVVYLFANEVPEIEDEVVRIVAVAREANPPSRYVGPRTKIAVDTLDR DVDPVGACIGARGSRIQVVVNELRGEKIDVIRWSPDPATYIANALSPARVDEVRLMDPESRQTHVLVAEDQLSLAIGKEGQNVR LAARLTGWKIDIKDQAKYDYAAEDAKFAAVRAKYQAENDETEMEQLEDEYQDKLELENDNFETNEEETVSKKSLASLSAADI SGKRALVRVDFNVPVDDQGNITDDTRIRAALPTIQDLTQKGAKVILTSHFGRPKGVDDKLRLTPVAKRLSELLGQEVVKTDDCI GDDVAAKVAALENGQVLLLENVRFYKEEEKNDPEFAQKLAANADFYVNDAFGTAHRAHASTEGVTKYLSPSVAGYLVEKEL QYLQSAIEVPQRPLAAIIGGSKVSSKIGVIETLLEKCDKLIIGGGMIFTFYKARGLSVGKSLVEEDKLELAKSLEAKAKERGVALL LPTDVVLADNFAADANSQTVSIEAIPDGWMGLDIGPDSVKVFQEALADCKTVIWNGPMGVFEFDKFAVGTEAIAHTLAEIGKT GTTTIIGGGDSVAAVEKVGLADQMSHISTGGGASLELLEGKVLPGIAALDEAMTKFIFVTGGVVSSIGKGIVAASLGRLLKSRDY SVSILKLDPYINVDPGTMSPFQHGEVFVTQDGAETDLDLGHYERFTDTSMSRLNSVTTGLIYQSVINKERRGDYNGGTVQVIPHI TNEIKDRILRVAKETNPAAVITEIGGTVGDIESLPFLEAIRQLRKEVGRQNVLYMHVTLLPWIASAGEMKTKPTQHSVKELRSIGI QPDILVCRCDRPIGVGLKQKLSEFCDVPVECVITCQDASSIYEVPLILEREGLAQQTLDLLQMEQRQPDLSQWETMVERMYSPK YSVEIAIVGKYVRLSDAYLSVVESLRHAAISTYGDLRIRWVNSETLETESAENYLAGVDGILVPGGFGSRGIDGKIAAIKFARDR QIPFLGLCLGMQCSVIEWARNVEGLADANSAEFDPYTTNPIINLLPEQQDVVDLGGTMRLGLYPCRVQPGTIAFDLYQEEVIYER HRHRYEFNNLYRNALLESGYVVSGTSPDGRLVEIVEYPKHPFFIACQFHPEFQSRPSTPHPLFKGFMEAAISRTHHSKNTSKPVQ VSMGKKISRRLQALLEKVEDRDYAPLDALALLKETATAKFPEAAEAHIRLGIDPKYTDQQLRTTVALPKGTGQVVRVAVIARG EKVTEATNAGADIAGSEELIDEIQKGMMDFDKLIATPDVMPQVAKLGKLLGPRGLMPSPKGGTVTFDVASAIAEFKAGKLEFR ADRTGIVHVMFGKASFTPEDLLVNLKALQETIDRNRPSGAKGRYWRTFYVSATMGPSIKVDINALRDLKVTDAAMGTRSYRPY TPSTRQVTISDFAEITKTEPEKSLTESVHRAKGRNNQGRITSRRRGGGHKKLYRIIDFKRDKRNIAATVTAIEYDPNRNARIALVQ YEDGEKRYILHPNGLKVGAKIIAGSEAPFEDGNALPLSNIPLGTNVHNVELTAGKGGQIVRAAGATAQVVAKEGNYVTLKLPS GEVRMIRKECYATIGQVGNTDARNLSAGKAGRNRWKGRRPKVRGSVMNPVDHPHGGGEGRAPIGRSGPVTPWGKPALGAKT RKRKKASTKLIVMSVGILGTKLGMTQIFDEAGVAIPVTVIKAGPCTVTQVKTKQTDGYSAIQVGYGEVKPKALNQPKLGHLAK SSAPALRHLNEYRTDTASEYALGQEIKADIFSEGQIVDVIGTSIGRGFAGNQKRNNFGRGPMSHGSKNHRAPGSIGAGTTPGRVY PGKRMAGRLGGTRVTIRKLTVVKVDAERNLILVKGAIPGKPGGLVNVVPTNKVGNKMVESVVKNWQGEEVGQTSFELRVAK EETAAHIVHRALVROMTNSRQGTVSTKTRSEVRGGGRKPWRQKGTGRARAGSIRSPLWRGGGVIFGPKPRDFNIKLNRKERRL ALRTAFVSRAEDLIVVEEFSNELQRPKTKELVAALARWGAVPEQKTLLILSEIAENVNLSARNVENLKVIAADQLNVFDLLHAD

KIVVTSSALTKIQEVYSAMATTRLKTVYQETIVPKLTQQFQYTNVHQVPKVVKITVNRGLGEAAQNAKALEASLNEIALITGQK PVVTRAKKAIAGFKIRQGMPVGIMVTLRGERMYAFLDRLISLALPRIRDFRGVSPKSFDGRGNYTLGVREQLIFPEVEYDSIDQIR GLDISIITTAKNDEEGRALLKEMGMPFRDQMSRIGKRPITVPAKVQVAIDGTKVVVKGPKGELSRDLPANVIVSQEGETLLVTRR DETRTSROMHGLSRTLVANMVEGVSQGFQRRLEIQGVGYRAQVQGRNLVLNIGYSHQVQIEPPDGIQFAVENNTNVIVSGYDK EVVGNTAAKIRAVRPPEPYKGKGIRYSGEVVRRMAKKVVAVIKLALNAGKANPAPPVGPALGOHGVNIMMFCKEYNAKTAD QAGMVIPVEISVFEDRSFTFVLKTPPASVLIRKAAKIERGSEQPNKKKVGSITKAQLREIAQTKLPDLNANDIDAAMNIVAGTAK NMGVTITDMSTATDQILEQLKSLTLLEAAELVKQIEEAFGVSAAAPAGGMMMMAAPGAAAPAEAVEEKTEFDAILESVPADK KIAVLKIVREITGLGLKEAKDLVEAAPKPVKEGVNKEAAEDIKKRIAEAGGTVTIKMSSKTYLPPQEKLEREWYVVDATDKRLG RLASEIAMVLRGKRKAEYTPHLDTGDFVVVINAEKVAVTGKKRTQKVYRRHSGRPGGMKTETFAKLQQRLPERIVEHAVKGM LPKNSLGKQLFTKLKVYAGPTHPHAAQKPKELIVNTIPGENMIQPQTYLNVADNSGAKKLMCIRVLGAGNRRYGGVGDKIIAV VKESNPNMAVKKSDVVEAVIVRTKKSINRDSGMSIRFDDNAAVIINKDGNPRGTRVFGPVARELRDKNFTKIVSLAPEVLMLSP KRTKFRKQQRGRMEGLAHRGSTLNFGDFALQAQEPCWITSRQIEASRRAMTRYIRRGGKIWIRIFPDKPVTMRPAETRMGSGK GNPEFWVAVVKPGRILFEIAGVSEEIAREAMRLAAYKLPIKTKFIVRSQPQEQEMNVQEVIRSIEAEHLKSDLPEIYVGDTVRVG VKIKEGDKYRVQPYEGVVIGKRNGGINETITVRRVFQGVGVERVFLLHSPRIDNIKVVRRGKVRRAKLYYLRQLSGKATRIKQR FDRALMTRVKRGNVARKRRNKILKLAKGFRGSHSTLFRTANQQVMKALRSAYRDRKKKKRDFRRLWITRINAASRQHGLSYS QLIGNLKKANVDLNRKMLAQLAVLDPASFAKVAELANSAKGMAHKKGTGSTRNGRDSNAQRLGVKRFGGQTVLAGNILVRQ RGTKFHPGNNVGIGSDDTLFALVDGVVTFERKGKSRKKVSVYPAIAAEAVASMTNETYMEPAFLLPDLIEIQRSSFRWFLEEGLI EELNSFSPITDYTGKLELHFIGQNYKLKEPKYSVEESKRRDSTYAVQMYVPTRLLNKETGDIKEQEVFIGDLPLMTDRGTFIINGA ERVIVNQIVRSPGVYYKSEIDKNGRRTYSASLIPNRGAWLKFETDRNDLVWVRIDKTRKLSAQVLLKALGLSDNEIFDALRHPE YFQKTIEKEGQFSEEEALMELYRKLRPGEPPTVLGGQQLLDSRFFDPKRYDLGRVGRYKLNKKLRLSVPDTMRVLTPGDILAAV DYLINLEYDIGSIDDIDHLGNRRVRSVGELLQNQVRVGLNRLERIIRERMTVSDAEVLTPASLVNPKPLVAAIKEFFGSSQLSQFM DOTNPLAELTHKRRLSALGPGGLTRERAGFAVRDIHPSHYGRICPIETPEGPNAGLIGSLATHARVNOYGFLETPFRPVENGRVC YEKAAVYMTADEEDDLRVAPGDIPVDENGHIIGPQVPVRYRQEFSTTTPEQVDYVAVSPVQIVSVATSMIPFLEHDDANRALM GSNMQRQAVPLLKPERPLVGTGLEAQAARDSGMVIVSRTDGDVVYADANEIRVRVRERTGDRLQVTGDSEETSSSPVSKPQEI KYVLSKYQRSNQDTCLNQKPLVRIGEKVVAGQVLADGSSTEGGELALGQNIVVAYMPWEGYNYEDAILISERLVQDDVYTSIH IEKYEIEARQTKLGPEEITREIPNVGEDALRQLDEQGIIRIGAWVESGDILVGKVTPKGESDQPPEEKLLRAIFGEKARDVRDNSLR VPNGEKGRVVDVRLFTREQGDELPPGANMVVRVYVAQKRKIQVGDKMAGRHGNKGIISRILPAEDMPYLPDGSPVDIVLNPLG VPSRMNVGQVFECLLGWAGQNLGVRFKITPFDEMYGEESSRRIVHGKLQEARDETGKTWVYNPDDSGKIMVYDGRTGEPFDR PVTVGVAYMLKLVHLVDDKIHARSTGPYSLVTQQPLGGKAQQGGQRFGEMEVWALEAFGAAYTLQELLTVKSDDMQGRNE ALNAIVKGKAIPRPGTPESFKVLMRELQSLGLDIAVHKVETQADGSSLDVEVDLMADQGSRRTPPRPTYESLSRESLEEDEMPV VSLAQMMESGVHFGHQTRRWNPKMSPYIYTARNGVHIIDLVQTAQLMDDAYNYMRTQAEQGKKFLFVGTKRQAAGIIAQEA NRCGSHYINQRWLGGMLTNWATIKTRAERLKDLERREENGALDLLPKKEASMLRREMAKLQKYLGGIKNMRKVPDIVVIVDQ

RREYNAVQECQKLGIPIVSMLDTNCDPDVVDIPIPANDDAIRSIKLIVGKLADAIYEGRHGQLEVEEDYEDYEGAEEEYDYDESE YTDSMMSDDDEEMGQKIHPVGFRLGITQEHQSRWFAVPDRYPALLQEDHKLRQYIEKKLGRTAQNNAGISEIRIERKADQIDLE LRTARPGVVVGRGGQGIESLRTGLQDLLGGQRQIRINVVEVQKVDADAYLIAEYIAQQLERRVSFRRVVRQAIQRAQRAGVQG IKVQVGGRLNGAEIARTEWTREGRVPLHTLRADIDYSYCTAQTIYGILGIKVWVFKGEIIPGQEEAPQPSGREREPRRRDQKRRR QQFEDRSNEAMATGRRKASKAKKEETNWQERVIQIRRVSKVVKGGKKLSFRAIVIVGNERGQVGVGVGKASDVIGAVKKGVA DGKKHLIEIPITKSNSIPHPIDGIGGGAKVIMRPAAPGTGVIAGGAVRTVLELAGVRNVLAKQLGSSNPLNNARAAVNALSTLRT FAEVAEDRGIAVENLYITVAEANSGRAVYWGTGRRKSAVAQVRLVPGEGKFTVNGKDGELYFQFNANYLGSIKAPLETLGLES EYDILVKAEGGGLTGQADSIRLGVARALCQLDPDNRSPLKIEGYLTRDPRAKERKKYGLHKARKAPQYSKRMATLQQQKIRIR LQAFDRRLLDTSCEKIVDTANRTNATAIGPIPLPTKRKIYCVLRSPHVDKDSREHFETRTHRRIIDIYQPSSKTIDALMKLDLPSGV DIEVKLMARQPTKKTGSKKQKRNVPNGIAYIQSTFNNSIVTITDQNGDVISWASAGSSGFKGAKKGTPFAAQTAAESAGRRAM DQGMRQIEVMVSGPGAGRETAIRALQGAGLEITLIRDITPIPHNGCRPPKRRRVMARISGVDLPRDKRVEIGLTYIYGIGLTRSQEI LAATGVNPDTRVKDLSDADVAALRAEIESNYQVEGDLRRLEAMSIKRLVDIGCYRGRRHRMGLPVRGQRTRTNARTRRGRRQ TVAGKKKAPGKMGRSLKKGPFVADHLLSKIEKLNEKNEKQVIKTWSRASTIIPVMVGHTIAVHNGKQHVPVFVNEQMVGHKL GEFAPTRTYRGHGKSDKKSGRMSDKNEGYKVISDNRQARYLYEILETYEAGIQLAGTEVKSIRAGKANLQDGYALIRNGEAWL INVHISPYTSSGQYFNHEPRRTRKLLLHRQELRKLIGKVEQQGLTLVPLKMYLKRGWVKVSIGLCKGKKIHDKRESLKRRQDQR DIQRAMKNYMAEISAKLVQELRQKTGAGMMDCKKALKENDGNIDAAIDWLRKKGIASAGKKSDRVAAEGLVDTYIQPDGKV GVLIEVNCQTDFVARNDAFKTLVKNLAQQAATADSVESLLAQPYIEKAEVTVDEFIKESIATLGENIQVRRFVNFSLGDTPGVV DSYIHTGGRVGVLLQVIAKTDDAAGNEEFKKFAKNAAMQVAACPNVEYVSVDQIPAETVQKEKDIEMGKEDLANKPENIREKI VQGRIEKRLKELTLLDQPYIRDQSISVADLVKQVQSKVGEDITVHGFVRYVLGEGIEKQESNFAEEVAAQMGAK

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MQIPRLHPDTIEEVKHRADIVDVVSDNVVLRRRGKDFVGLCPFHDEKTPSFTVSPSKQMYYCFGCQAAGNAIKFVMDLNKRHF AEVVLDLAKRYQVPVKTLAPEQRQELQRQISLREQLYEILASTAQFYQHALRQNLGQKAMQYLQENRQFKIETIQQFGLGYAP PGWETLYRYLVDNKNYPVQLVEKAGLIKPRKEGGGCYDVFRDRLMIPIRDVQGRVIAFGGRTLTDEQPKYLNSPETELFSKGK TLFALDQAKDGISKSDQGVVVEGYFDAIALHAAGINNVVASLGTALSIEQVRLLLRYSDSKQLILNFDADKAGINAAERAIGEIA TLAYKGEVQLKILNIPDGKDADEYLHSHTAADYQQLLANAPLWLNWQIEEIIKDRDLKQATDFQIVTKEIVKLLQKIVNSDTLN YYISYCAEILSLGDTRLIPLRVENLLTQIAPASVQTPPLRLRKPESKTPKLSLVTTERSLLEQAEALLLRIFLHCAEQRQVIFEELEE RNLEFSLSHHRFLWQQSLEFPLQELDLISKLQNRYLELEEDLKIVSHVFHLNEKNKTEILRTPQVVQATLACMERVLREKRYRHF

MELWKKIDPQAEPDKYKSYADAIYADKMRIQELDKQRQFPISELFMQKTVEATQRAFNTIRTGRANASLLDKVQVEYYGTPTP LKSLANISTPDASTILIQPYDKSSLNIVEKAISLSDVGLTPSNDGSVIRLNIPPLTSDRRKEFVKLAAKYAEEGRVGIRNIRRDALDS IRKQEKAAEISEDESRDQQDKLQKLTNKYTTRIDELLAEKEKDITTVMPVIEKKRTRDLPQINERIRFPKIRVIDTDGGQLGIMPPH EALKLAEEKELDLVLLSDKADPPVCRIMDYGKYKFEQEKKAREARKKQHTADVKEVKMRYKIEEHDYNVRVKQAERFLKDG DKVKATVMFRGREIQHSDLAEDLLKRMATDLEPFGEVQQAPKKEGRNMMMLISPKKMSMVTLPGLKDLIESISRERNLPRLAV QSSIREALLKGYERYRRAQNLERRQFDENYFDNFEVELDIEGEGFRVLSTKTIVEEVTNSDHQISLDEVQQVAPEAQSGDSVVLD VTPDQGEFGRMAAMQTKQVLAQKLRDQQRQMVQEEFQDLESTVLQARVLRFERQSVILAVSSGFGQPEVEAELPKREQLPND TYRSNTTFKVYLKKVSQGQQRGPQLLVSRADAGLVVYLFANEVPEIEDEVVRIVAVAREANPPSRYVGPRTKIAVDTLDRDVD PVGACIGARGSRIQVVVNELRGEKIDVIRWSPDPATYIANALSPARVDEVRLMDPESRQTHVLVAEDQLSLAIGKEGQNVRLAA RLTGWKIDIKDQAKYDYAAEDAKFAAVRANYQAENDETEMEQLEDEYQDKLELENDNFETNEEETMSKKSLASLSAADISGK RALVRVDFNVPVDDQGNITDDTRIRAALPTIQDLTQKGAKVILTSHFGRPKGVDEKLRLTPVAKRLSELLGQEVVKTDDCIGDE VAAKVAALDNGQVLLLENVRFYKEEEKNDPEFAQKLAANADFYVNDAFGTAHRAHASTEGVTKFLSPSVAGYLVEKELQYL QSAIEAPQRPLAAIIGGSKVSSKIGVIETLLEKCDKLIIGGGMIFTFYKARGLSVGKSLVEEDKLELAKTLEAKAKERGVALLLPT DIVAADKFAPDANATTVSIENIPADGMGLDIGPDSVKVFQEALADCKTVIWNGPMGVFEFDKFAVGTEAIAHTLAEIGKTGAITI IGGGDSVAAVEKVGLADQMSHISTGGGASLELLEGKVLPGIAALDEAMTKFIFVTGGVVSSIGKGIVAASLGRLLKSRDYSVSIL KLDPYINVDPGTMSPFQHGEVFVTQDGAETDLDLGHYERFTDTSMSRLNSVTTGLIYQSVINKERRGEYNGGTVQVIPHITNEIK DRILRVAKETNPAAVITEIGGTVGDIESLPFLEAIRQLRKEVGRQNVLYMHVTLLPWIASAGEMKTKPTQHSVKELRSIGIQPDIL VCRCDRPIGVGLKQKLSEFCDVPVECVITCQDASSIYEVPLILEKEGLAQQTLDLLQMEQRQPDLSQWETMVERMYSPKYSVEI AIVGKYVRLSDAYLSVVESLRHAAISTYGDLRIRWVNSETLETESAENYLAGVDGILVPGGFGSRGIDGKIAAIKFARDRQIPFLG LCLGMQCSVIEWARNVEGLADANSAEFDPYTTNPIINLLPEQQDVVDLGGTMRLGLYPCRVQPDTLAFDLYQEEVIYERHRHR YEFNNLYRNALLESGYVVSGTSPDGRLVEIVEYPKHPFFIACQFHPEFQSRPSTPHPLFKGFMEAAISRTHHSKNTSKPVQVSMG KKISRRLQALLEKVEDRDYAPLDALALLKETATAKFPEAAEAHIRLGIDPKYTDQQLRTTVALPKGTGQVVRVAVIARGEKVTE ATNAGADIAGSEELIDEIQKGMMDFDKLIATPDVMPQVAKLGKLLGPRGLMPSPKGGTVTFDVASAIAEFKAGKLEFRADRTGI VHVMFGKASFTPEDLLVNLKALQETIDRNRPSGAKGRYWRTFYVSATMGPSIRIDINALRDLKVTDAAMGTRSYRPYTPSTRQ VTISDFAEITKTEPEKSLTESVHRAKGRNNQGRITSRRRGGGHKKLYRIIDFKRDKRDIAATVTAIEYDPNRNARIALVQYEDGE KRYILHPNGLKVGAKIIAGPEAPFEDGNALPLSNIPLGTNVHNVELTAGKGGQIVRAAGATAQVVAKEGNYVTLKLPSGEVRMI RRECYATIGQVGNTDARNLSAGKAGRNRWKGRRPKVRGSVMNPVDHPHGGGEGRAPIGRSGPVTPWGKPALGAKTRKRKKA STKLIVMSVGILGTKLGMTQIFDEAGVAIPVTVIKAGPCTVTQVKTKQTDGYSAIQVGYGEVKPKALNQPKLGHLAKSSAPALR HLNEYRTDAASEYALGQEIKADIFSEGQIVDVIGTSIGRGFAGNQKRNNFGRGPMSHGSKNHRAPGSIGAGTTPGRVYPGKRMA GRLGGTRVTIRKLTVVKVDAERNLILIKGAIPGKPGGLVNVVPTNKVGNKMVESVVKNWQGEEVGQTSFELRVAKEETAAHIV HRALVRQMTNSRQGTASTKTRSEVRGGGRKPWRQKGTGRARAGSIRSPLWRGGGVIFGPKPRDFNLKLNRKERRLALRTAFVSRAEDLIVVEEFSNELQRPKTKELVAALARWGAAPEQKTLLILSEIAENVNLSARNVENLKVIAADQLNVFDLLHADKIVVTSS

ALTKIQEVYSAMATTRLKTVYQETIVPKLTQQFQYTNVHQVPKVVKITVNRGLGEAAQNAKALEASLNEIALITGQKPVVTRA KKAIAGFKIRQGMPVGIMVTLRGERMYAFLDRLISLSLPRIRDFRGVSPKSFDGRGNYTLGVREQLIFPEVEYDSIDQIRGLDISIIT TAKNDEEGRALLKEMGMPFRDQMSRIGKRPITVPAKVQVAIDGTKVVVKGPKGELSRDLPANVIVSQEGETLLVTRRDETRTS RQMHGLSRTLVANMVEGVSQGFQRRLEIQGVGYRAQVQGRNLVLNIGYSHQVQIEPPDGVQFAVENNTNVIVSGYDKEVVGN TAAKIRAVRPPEPYKGKGIRYAGEVVRRMAKKVVAVIKLALNAGKANPAPPVGPALGOHGVNIMMFCKEYNAKTADOAGMV IPVEISVFEDRSFTFVLKTPPASVLIRKAAKIERGSEQPNQKKVGSITKAQLREIAQTKLPDLNANDIDAAMNIVAGTAKNMGVTI TDMSAATDQILEQLKSLTLLEASELVKQIEEAFGVSAAAPAGGMMMMAAPGAAAPAEAVEEKTEFDAILESVPADKKIAVLKI VREITGLGLKEAKDLVEATPKPVKEGVNKEAAEDIKKRIAEAGGTVTIKMSSKTYLPPQEKLEREWYVVDATDKRLGRLASEIA MVLRGKRKAEYTPHLDTGDFVVVINAEKVAVTGKKRTQKVYRRHSGRPGGMKTETFAKLQQRLPERILEHAVKGMLPKNSL GKQLFTKLKVYAGPTHPHAAQKPKELIVNTIPGENMIQPQTYLNVADNSGAKKLMCIRVLGAGNRRYGGVGDKIIAVVKESNP NMAVKKSDVVEAVIVRTKKSINRDSGMSIRFDDNAAVIINKDGNPRGTRVFGPVARELRDKNFTKIVSLAPEVLMLSPKRTKFR KQQRGRMEGLAHRGSTLNFGDFALQAQEPCWITSRQIEASRRAMTRYIRRGGKIWIRIFPDKPVTMRPAETRMGSGKGNPEFW VAVVKPGRILFEIAGVSEEIAREAMRLAAYKLPIKTKFIVRSQPQEQEMNVQEVIRSIEAEHLKSDLPEIYVGDTVRVGVKIKEGD KYRVQPYEGVVIGKRNGGINETITVRRVFQGVGVERVFLLHSPRIDNIKVVRRGKVRRAKLYYLRQLSGKATRIKQRFDRALM TRVKRGNVARKRRNKILKLAKGFRGSHSTLFRTANQQVMKALRSAYRDRKKKKRDFRRLWITRINAASRQHGLSYSQLIGNL KKANVDLNRKMLAQLAVLDPASFAKVAELANSVKAMAHKKGTGSTRNGRDSNAQRLGVKRFGGQTVLAGNILVRQRGTKF HPGNNVGIGSDDTLFALVDGVVTFERKGKSRKKVSVYPAVAAEAVASMTNETYMEPAFLLPDLIEIQRSSFRWFLEEGLIEELN SFSPITDYTGKLELHFIGQNYKLKEPKYSVEESKRRDSTYAVQMYVPTRLLNKETGDIKEQEVFIGDLPLMTDRGTFIINGAERVI VNQIVRSPGVYYKSEIDKNGRRTYSASLIPNRGAWLKFETDRNDLVWVRIDKTRKLSAQVLLKALGLSDNEIFDALRHPEYFQK TIEKEGQFSEEEALMELYRKLRPGEPPTVLGGQQLLDSRFFDPKRYDLGRVGRYKLNKKLRLSVPDTLRVLTPGDILAAVDYLI NLEYDIGSIDDIDHLGNRRVRSVGELLQNQVRVGLNRLERIIRERMTVSDAEVLTPASLVNPKPLVAAIKEFFGSSQLSQFMDQT NPLAELTHKRRLSALGPGGLTRERAGFAVRDIHPSHYGRICPIETPEGPNAGLIGSLATHARVNQYGFLETPFRPVENGRVCYEK AAVYMTADEEDDLRVAPGDIPVDENGHIIGPQVPVRYRQEFSTTTPEQVDYVAVSPVQIVSVATSMIPFLEHDDANRALMGSN MQRQAVPLLKPERPLVGTGLEAQAARDSGMVIVSRTDGDVVYADANEIRVRVREKALTTGEETSSAKPQEIRYVLSKYQRSNQ DTCLNQKPLVRIGEKVVAGQVLADGSSTEGGELALGQNIVVAYMPWEGYNYEDAILISERLVQDDVYTSIHIEKYEIEARQTKL GPEEITREIPNVGEDALRQLDEQGIIRIGAWVESGDILVGKVTPKGESDQPPEEKLLRAIFGEKARDVRDNSLRVPNGEKGRVVD VRLFTREQGDELPPGANMVVRVYVAQKRKIQVGDKMAGRHGNKGIISRILPAEDMPYLPDGSPVDIVLNPLGVPSRMNVGQVF ECLLGWAGQNLGVRFKITPFDEMYGEESSRRIVHGKLQEARDETGKTWVYNPDDSGKIMVYDGRTGEPFDRPVTVGVAYMLK LVHLVDDKIHARSTGPYSLVTQQPLGGKAQQGGQRFGEMEVWALEAFGAAYTLQELLTVKSDDMQGRNEALNAIVKGKAIPR PGTPESFKVLMRELQSLGLDIAVHKVETQADGSSLDVEVDLMADQGSRRTPPRPTYESLSRESLEEDEMPVVSLAQMMESGVH FGHQTRRWNPKMSPYIYTSRNGVHIIDLVQTAQLMDNAYNYMRTQAEQGKKFLFVGTKRQAAGIIAQEANRCGSHYINQRWL GGMLTNWATIKTRAERLKDLERREENGALDLLPKKEASMLRREMAKLQKYLGGIKNMRKVPDIVVIVDQRREYNAVQECQK

LGIPIVSMLDTNCDPDVVDIPIPANDDAIRSIKLIVGKLADAIYEGRHGQLEVEEDYEDYEGAEEEYDYDESEYTDSMMSDDDEE MGQKIHPVGFRLGITQEHQSRWFAVPDRYPALLQEDHKLRQYIEKKLGRNAQNNAGISEIRIERKADQIDLELRTARPGVVVGR GGQGIESLRTGLQDLLGGQRQIRINVVEVQKVDADAYLIAEYIAQQLERRVSFRRVVRQAIQRAQRAGVQGIKVQVGGRLNGA EIARTEWTREGRVPLHTLRADIDYSYCTAQTIYGILGIKVWVFKGEIIPGQEEAPQPSGREREPRRRDQKRRRQQFEDRSNETMA TGRRKASKAKKEETNWQERVIQIRRVSKVVKGGKKLSFRAIVIVGNERGQVGVGVGKASDVIGAVKKGVADGKKHLIDIPITK SNSIPHPIDGIGGGAKVIMRPAAPGTGVIAGGAVRTVLELAGVRNVLAKQLGSNNPLNNARAAVNALSTLRTFAEVAEDRGISV ENLYITVAEANSGRAVYWGTGRRKSAVAQVRLVPGEGKFTVNGKDGELYFQFNANYLGAIKAPLETLGLESEYDILVKAEGG GLTGQADSIRLGVARALCQLDPDNRSPLKTEGYLTRDPRAKERKKYGLHKARKAPQYSKRMATLQQQKIRIRLQAFDRRLLDT SCEKIVDTANRTNATAIGPIPLPTKRKIYCVLRSPHVDKDSREHFETRTHRRIIDIYQPSSKTIDALMKLDLPSGVDIEVKLMARQP TKKTGSKKQKRNVPNGMAYIQSTFNNSIVTITDQNGDVISWASAGSSGFKGAKKGTPFAAQTAAESAGRRAMDQGMRQIEVM VSGPGAGRETAIRALQGAGLEITLIRDITPIPHNGCRPPKRRRVMARISGVDLPRDKRVEIGLTYIYGIGLTRSQEILAATGVNPDT RVKDLSDADVAALRAEIESNYQVEGDLRRLEAMNIKRLVDIGCYRGRRHRMGLPVRGQRTRTNARTRRGRRQTVAGKKKAP GKMGRSLKKGPFVADHLLSKIEKLNEKNEKQVIKTWSRASTIIPVMVGHTIAVHNGKQHVPVFVNEQMVGHKLGEFAPTRTYR GHGKSDKKSGRMSDKNEGYKVISDNRQARYLYEILETYEAGIQLAGTEVKSIRAGKANLQDGYALIRNGEAWLINVHISPYTSS GQYFNHEPRRTRKLLLHRQELRKLIGKVEQQGLTLVPLKMYLKRGWVKVSIGLCKGKKIHDKRESLKRRQDQRDIQRAMKNY MAEISAKLVQELRQKTGAGMMDCKKALKETEGNIEEAINWLRKKGIASAGKKSDRVAAEGLVETYIQPDGKVGVLIEVNCQT DFVARNDAFKSLVKNLAQQAATADSVESLLAQPYIEKADVTVDEFIKESIATLGENIQVRRFVNFSLGDTPGVVDSYIHTGGRV GVLVQINANTAAAAGNEEFKILAKNTAMQVAACPNVEYVSVDQIPAETVQKEKDIEMGKEDLANKPENIREKIVQGRIEKRLK ELTLLDQPYIRDQSISVADLVKQVQSKVDEDIKVHGFVRYVLGEGIEKQETNFAEEVAAQMGAK

>Sphaerospermopsis_sp_SIO1G1

MQIPRIHPDTIEEVKSRADIVEVVSDYVVLKKRGKDFVGLCPFHNEKTPSFTVSPGKQIYYCFGCQAGGNAIKFIMELDKRNFGD VVLGLAQRYQVPVKSLAPEQRQELQRQISLRDQLYEVLASAAQFYQHALRQSLGQKAMLYLQEERKLTTETIQQFGLGYAPAG WETLYRYLVENKNYPVQLVDKAGLIKPRKEDKGYYDVFRDRLMIPIRDVQGRVIAFGGRTLTEEQPKYLNSPETELFLKGKTLF ALDQAKDGVSKLDQAVVVEGYFDAIALHAAGVNNVVASLGTALSIEQIRLLLRYCDSKQLILNFDADKAGTNATERAIGEIAN LAYQGEVQLKILNLPNGKDADEYLQNHTVENYQQLLANAPLWLNWQIEEIIKDRDLKQATDFQIVTKEIVKILQNIGNSDTLNY YISYCAEILSLGDTRLIPLRVENLLTQIAPSHFKTPARPRKQESKKPKFTVATTEKSLLEQAEALLLRIFLHCPEQREMIFAELEDR NLEFSLSHHRLLWQQSLVFPLEDNDLISKLENRYLELAEDLNILSHVFHLDEKNKLEIIRTPQVVQATLACMEKVFREKRHRYF

MEQWEKVDSKTEPEKERLYYENAMGEKRRIQELEKQRQFSIIELFMKLDESESKMKSSVEATQRDFNTVRTGRANSSLLDKVE VEYYGTPTPLKSLASVSTPDASTIMIQPYDKGTLNIIEKAISLSDVGITPNNDGSSIRLNIPPLTSERRQEFVKLASKYAEDGKVAIR NIRRETVDSIRKREKAGEISEDESRDEQDKLQKLTNKYTAKIDDLLAEKEKDITKVMPVIEKKRARDLPQINERIRFPKIRVIDTD GAQLGILTPSEAIRLAEEKELDLVLLSDKADPPVCRIMDYGKYKFEQEKKAREARKKQHTADVKEVKMRYKIEEHDYNVRVK QAERFLKDGDKVKATVMFRGREIQHSDLAEELLKRMANDLQAIGEVQQAPKKEGRNMMMLISPKKMVTLPGLKDLIEKISQE RNLPRLAVQSSIREALLKGYERYRRAQNLERKQFDEDYFENFEVELDIEGEGFRVLSTKTIVEEVSNSDHQISLEEVOOVAPEAO SGDSVVLDVTPDQGEFGRMAAMQTKQVLAQKLRDQQRQMVQEEFQDLESTVLQARVLRFERQSVILAVSSGFGQPEVEAELP KREQLPNDTYRSNTAFKVYLKKVSQGQQRGPQLLVSRADAGLVVYLFANEVPEIEDEVVRIVAVAREANPPSRYVGPRTKIAV DTLDRDVDPVGACIGARGSRIQVVVNELRGEKIDVIRWSPDPATYIANALSPARVDEVRLMDPESRQTHVLVAEDQLSLAIGKE GQNVRLAARLTGWKIDIKDKAKYDYAAEDAKFAEVRAKYQMSKKSLASLSAADIAGKRALVRVDFNVPMDEGKITDDTRIRA ALPTIQDLTQKGAKVILASHFGRPKGKVKDEFRLTPVAKRLSELLGQEVVKTDDCIGDDVATKVAALQNGQVLLLENVRFYPG EEENDPQFAEKLAANADFYVNDAFGTAHRAHASTEGVTKYLSPSVAGYLVEKELQYLQGAIEEPKRPLAAIIGGSKVSSKIGVIE TLLEKCDKLIIGGGMIFTFYKARGLSVGKSLVEDDKLELAKSLEAKAKEKGVTFLLPTDIVSADKFDKDANATTVSIENIPADGM GLDIGPDSVKVFQEALADCKTVIWNGPMGVFEFDKFAVGTEAIARTLAEISQTGTTTIIGGGDSVAAVEKVGLAEKMSHISTGG GASLELLEGKVLPGIAALDEAMTKFIFVTGGVVSSIGKGIVAASLGRLLKSRDYSVSILKLDPYINVDPGTMSPFQHGEVFVTQD GAETDLDLGHYERFTDTSMSRLNSVTTGLIYQSVINKERRGDYNGGTVQVIPHITNEIKDRILRVAKESNPAAVITEIGGTVGDIE SLPFLEAIRQLRKEVGRQNVLYMHVTLLPWIASAGEMKTKPTQHSVKELRSIGIQPDILVCRSDRPIPVGLKRKLSEFCDVPVKC VITAQDASSIYEVPLILEREGLAQQTLDLLQMEQRQPDLTQWANMVERMYSPKYSVEIAIVGKYVRLSDAYLSVVESLRHAAIS TYGDLRIRWVNSELLENEPADNYLSGVDGIIVPGGFGSRGIDGKINAIKYARDRQIPFLGLCLGMQCSVIEWARNVKGLDTANS AEVDPYTEHPVINLLPEQQDVVDLGGTMRLGLYPCSIQPGTLAHNLYQEDIIYERHRHRYEFNNFYRQALLDSGYVVSGTSPDG RLVEIVEYPNHPFFIACQFHPEFQSRPNTPHPLFQGLMQAAISRTHHAPSTPKPVQVSMGKKISKRLKALLEKVEDRDYAPEEAL ALLKETATAKFPEAAEAHIRLGIDPKYTDQQLRTTVALPKGTGQDVRVAVIARGEKVTEATNAGANIAGSEELINDIQKGMMD FDKLIATPDVMPQVAKLGKMLGPRGLMPSPKGGTVTFDIAGAIAEFKAGKLEFRADRTGIVHVMFGKASFSPDDLLVNLKALQ ETIDRNRPSGAKGRYWRTVYVSATMGPSIRVDINALRDLKITDAAMGTRSYRPYTPSTRQVTISDFAEITKSKPEKSLTEFIHRAK GRNNQGRITSRRRGGGHKKLYRIIDFKRDKRDIPATVKAVEYDPNRNARIALVQYEDGEKRYILHPNGLKVGTTIIAGVDSPIED GNALPLYRIPTGTSVHNVEMTPGKGGQIVRAAGATAQVMAKDGDYVTLKLPSGEFRMIRRECYATIGQVGNTEARNLSAGKA GRNRWKGRRPKVRGSVMNPVDHPHGGGEGRAPIGRSGPVTPWGKPALGAKTRKRKKASSKFIVMSVGILGTKLGMTQVFTEE GVAIPVTVVKVGPCTVTQVKTRQTDGYSAIQVGYGEVKPKALNKPKMGHLAKSNAPALRHLKEYRTDTAGDYNIGQEIKADIF SEGQIVDVAGTSIGRGFAGNQKRHNFGRGPMSHGSKNHREPGSIGAGTTPGRVYPGKRMAGRLGGSSVTIRKLTVVKVDAERN LLLIKGAIPGKPGGLVDVSPTNKVGNKMVESVVKNWQGDQVGQTNFDLKVAKEETAAHIVHRALVRQMTNSRQGTASTKTR SEVRGGGRKPWRQKGTGRARAGSIRSPLWRGGGVIFGPKPREFNIKLNRKERRLALRTAFVSRAEDLIVVEEFSSELQRPKTKEL VAALVRWGAAPEQKTLLILSEIAENVNLSARNVENLKLIAADQLNVYDILHADKIVVTPASLEKIQEVYSAMATTRLKTLYQET

IVPKLTQQFQYTNIHQVPKLVKITVNRGLGEAAQNAKALEASLSEIALITGQKPVVTRAKKAIAGFKIRQGMPVGIMVTLRSER MYAFLDRLISLALPRIRDFRGISPKSFDGRGNYTLGVREQLIFPEVEYDSIDQIRGLDISIITTAKNDEEGRALLKEMGMPFRDMSR IGKRPITIPAKVQVTINGTQVAVKGPKGELSREISNTIAISQEGETLRVTRRDETRVARQMHGLSRTLIANMVEGVSNGFERRLE MQGVGYRAQMQGTKLVLNIGYSHQIQVEPPAGVNFKVENNTNIIVSGYDKEVVGNTAAKIRDYRPPEPYKGKGIRYVGEVVR RMAKKVVAVIKLALSAGKANPAPPVGPALGQHGVNIMMFCKEYNAKTADQAGMVIPVEISVFEDRSFTFVLKTPPASVLIRKA AKIDKGSSEPNKKKVGSITTEQLKEIAQTKLPDLNANDIEAAMNIVAGTARNMGVTVKDMSAATEQILEQLKSLTLLEAAELVK EIEEAFGVSAAAPAGGMMMMAAPGAGGGAAEAVEEKTEFDVVLESVPADKKIAILKIVREITGLGLKEAKDLVESAPKAIKEGI AKDAAEDIKKRITDAGGTVSVKMSSKTYLPPQASLERDWYIVDATDKRLGRLASEIAMVLRGKRKAEYTPHLDTGDFVVVINA EKVAVTGKKRSQKLYRRHSGRPGGMKTETFAKLQQRIPERIVEKAVKGMLPKNSLGRQLFTKLKVYAGSTHPHAAQKPKELII NTIPGDMIQPQTYLNVADNSGAKKLMCIRVLGAGNRRYGGVGDRIIAVVKESSPNMAVKKSDVVEAVIVRTKKNINRDSGMSI RFDDNAAVIINKEGNPRGTRVFGPVARELRDKNFTKIVSLAPEVLMLSPKRTKFRKQQRGRMEGLAHRGSSINFGDFALQAQEP SWITSRQIEAARRAMTRYIRRGGKIWIRIFPDKPITMRPAETRMGSGKGNPEFWVAVVKPGRILFEISGVSEEVAREAMRLASHK LPIKTKFIVRPKVQEQMNVQEIIRSIEAEHLKSDIPQIYVGDTVRVGVKIKEGNKYRVQPYEGVVIGKRNGGINETITVRKVFQGV GVERVFLLHSPRIDNIKVVRRGKVRRAKLYYLRNRTGKATRIKQRFDRPLMTRVKRGNVARKRRNKILKLAKGFRGSHSTLFR TANQQVMKALRSAYRDRKKKKRDFRRLWIARINAASRQQGLSYSQLIGNLKKANVELNRKMLAQLAVLDPDSFVKVTELANS VKMAHKKGTGSTRNGRDSNSQRLGVKRYGGQSVIAGNILVRQRGTKFHPGNNVGIGSDDTLFALVDGIVTFERKGKTRKKVS VYPVATEAVAMTNETYMEPAFLLPDLIEIQRSSFRWFLEEGLIEELSSFSPITDYTGKLELHFLGHNYRLKEPKYSVEESKRRDST YAVQMYVPTRLLNKETGDIKEQEVFIGDLPLMTDRGTFIINGAERVIVNQIVRSPGVYYKSEIDKNGRRTYSASLIPNRGAWLKF ETDRNDLVWVRIDKTRKLSAQVLLKALGLSDNEIFDALRHPEYFQKTIEKEGQFSEEEALMELYRKLRPGEPPTVLGGQQLLES RFFDPKRYDLGRVGRYKLNKKLRLSVPDSVRVLTPGDILAAIDYLINLEYDIGSIDDIDHLGNRRVRSVGELLQNQVRVGLNRLE RIIRERMTVSDAEVLTPASLVNPKPLVAAIKEFFGSSQLSQFMDQTNPLAELTHKRRLSALGPGGLTRERAGFAVRDIHPSHYGRI CPIETPEGPNAGLIGSLATHARVNKYGFLETPFRPVENGKVKFDIPPVYMTADEEDDLRTATGDVPLDENGYIKGPQVPVRYRQ DWTTTSPEQVDYVAVSPVQIVSVATSMIPFLEHDDANRALMGSNMQRQAVPLLKPERPLVGTGLEAQAARDSGMVIVSRTDG DVVYVDANEIRVRVREKTITSGTEISEPPKHQEIRYPLSKYQRSNQDTCLNQKPLVRIGEKVVTGQVLADGSSTEGGELALGQNI IVTYMPWEGYNYEDAILISERLVQDDIYTSIHIEKYEIEARQTKLGPEEITREIPNVGEDALRQLDEQGIIRIGAWVEAGDILVGKV TPKGESDQPPEEKLLRAIFGEKARDVRDNSLRVPNGEKGRVVDVRLFTREQGDELPPGANMVVRVYVAQKRKIQVGDKMAGR HGNKGIISRILPIEDMPYLPDGSPVDIVLNPLGVPSRMNVGQVFECLLGWAGHNLGVRFKITPFDEMYGEESSRRIVHGKLQEAR DETGKDWLYNPDNAGKIMVYDGRTGEPFDHPVTVGVAYMLKLVHLVDDKIHARSTGPYSLVTQQPLGGKAQQGGQRFGEM EVWALEAFGAAYTLQELLTVKSDDMQGRNEALNAIVKGKAIPRPGTPESFKVLMRELQSLGLDIAVHKVETQADGSSLDVEVD LMADQNSRRTPPRPTYQMPVVSLAQMMESGVHFGHQTRRWNPKMSPYIYTARNGVHIIDLVQTAQLIDQAYNYMRSESEQGK RFLFVGTKRQAAGIIAQEAARCGSHYINQRWLGGMLTNWATIKTRADRLKDLERREESGALDLLPKKEASMLRREMAKLQKY LGGIKNMRKVPDVVVIVDQKREYNAVQECQKLNIPIVSMLDTNCDPDVVDIPIPANDDAIRSIKLIVGKLADAIYEGRHGQLESE

NDYEDYEGAEEDYDYDEGEYTDSMGMGQKIHPVGFRLGITKEHQSRWFAVPDRYPELLQEDYKLRQYIDQKLGKKAQNNAGI SEVRIERKADQIDLEVRTARPGVVVGRGGQGIEALRTGLQELLGSNRQIRINVVEVQRVDADAYLIGEYIAQQLERRVSFRRVV RQAIQRAQRAGVQGIKVQVSGRLNGAEIARTEWTREGRVPLHTLRANIDYAYCTAQTIYGILGIKVWVFTGEIIPGQEEAPAQPA NREREPRRRQQQRRRQQFEDRSNETMATGRRKANRAKKEETNWQERVIQIRRVSKVVKGGKKLSFRAIVVIGNERGQVGVGV GKASDVIGAVKKGVADGKKHLIDIPITKSNSIPHPIDGIGGGAKVIMRPASPGTGVIAGGAVRTVLELAGVRNVLAKOLGSNNPL NNARAAVNALSTLRTLSEVAEDRGIALENLYFATEANSGRAIYWGTGRRKSSVARVRLIPGEGKFSVNGKDGELYFQFNANYL GSIKAPLETLGLESEYDIVVKAEGGGLTGQADSIRLGVARALCQLDPDNRLPLKTEGYLTRDPRAKERKKYGLHKARKAPQYS KRMATLQQQKIRIRLQAFDRRLLDTSCEKIVDTANRTNATAIGPIPLPTKRKIYCVLRSPHVDKDSREHFETRTHRRIIDIYQPSSK TIDALMKLDLPSGVDIEVKLMARQPTKKSGSKKQKKNVPNGIAYIQSTFNNSIVTITDQNGDVISWASAGSSGFKGAKKGTPFA AQTAAESAGRRAIDQGMRQIEVMVSGPGAGRETAIRALQGAGLEITLIRDITPIPHNGCRPPKRRRVMARISGIDLPRDKRIEYGL TYIYGIGLTSSHQILAATGVNPDTRVKDLSDADVAALRAEIESNYQVEGDLRRLEAMNIKRLVDIGCYRGRRHRMGLPVRGQR TRTNARTRRGRRQTVAGKKKAPGKMGRSLKKGPFVADHLLSKIEKLNANNDKQVIKTWSRASTIIPIMVGHTIAVHNGKQHVP VFVNEQMVGHKLGEFAPTRPYRGHGRSDKKSGRMSDKNNSDGYKVITDNRQARYLYQILETYEAGIQLAGTEVKSIRAGKVN LQDGYALLRNGEAWLINAHISPYTSSGQYFNHEPRRTRKLLLHRQELRKLIGKVEQQGLTLIPLKMYLKRGWVKVSIGLCKGK KIHDKREDLKRRQDQRDIQRALKRYMAEISAKLVQELRQKTGAGMMDCKKALKENDGSIEAATDWLRKKGIAKADKASSRV AAEGLVENYIQPDGKVGVIIEVNCQTDFVARNEAFKALVKTLAKQAANADSVEALLAQPYIENSSVTVDEAIKQTTATLGENIQ VRRFVTFAPASTPGIVDSYIHTGGRVGVLVELGSKTEDTTGKEEFQGLAKNIAMQVAACPNVEYVNIGQIPAEFVQKEKEIEMG KDDLGKKPENIREKIVQGRIDKRLKEITLLDQPYIRDQSISVEDLVKQVKSQVGDEIEVNRFVRYVLGEGIDKQEVSFAEEVAAQ MG

>Sphaerospermopsis torques reginae ITEP 024

MQIPRLHPDTIEEVKHRADIVDVVSDYVVLRRRGKDFVGLCPFHDEKTPSFTVSPTKQMYYCFGCQAAGNAIKFVMDLNKRHF AEVVLDLAKRYQVPVKTLAPEQRQELQRQLSLREQLYEILASTAQFYQHALRQNLGQKAMQYLQENRQFKIETIQQFGLGYAP PGWETLYRYLVDNKNYPVQLVEKAGLIKPRKEGGSYYDVFRDRLMIPIRDVQGRVIAFGGRTLTEEQPKYLNSPETELFSKGKT LFALDQAKDGISKSDQGVVVEGYFDAIALHAAGINNVVASLGTALSIEQVRLLLRYTDSKQLILNFDADKAGINAAERAIGEIAT LAYKGEVQLKILNIPDGKDADEYLHSHTAADYQQLLANAPLWLNWQIEEIIKDRDLKQATDFQIVTKEMVKLLQKIVNSDTLN YYISYCAEILSLGETRLIPLRVENLLTQIAPASVQTPPLRLRKPESKTPKLSLVTTERSLLEQAEALLLRIFLHCAEQRQVIFEELEE RNLEFSLSHHRFLWQKSLEFPLEELDLISKLQNRYLELEEDLKIVSHVFHLNEKNKTEILRTPQVVQATLACMERVLREKRYRHF

MELWKKIDPQAEPDKYKSYADAIYADKMRIQELDKQRQFPISELFMKLAEAESTMQKTVEATQRAFNTIRTGRANASLLDKVQ VEYYGTPTPLKSLANISTPDASTILIQPYDKGSLNIVEKAISLSDVGLTPSNDGSVIRLNIPPLTSDRRKEFVKLAAKYAEEGRVGI RNIRRDALDSIRKQEKAAEISEDESRDQQDKLQKLTNKYTTRIDELLAEKEKDITTVMPVIEKKRTRDLPQINERIRFPKIRVIDTD GGQLGIMPPHEALKLAEEKELDLVLLSDKADPPVCRIMDYGKYKFEQEKKAREARKKQHTADVKEVKMRYKIEEHDYNVRV KQAERFLKDGDKVKATVMFRGREIQHSDLAEDLLKRMATDLEPFGEVQQAPKKEGRNMMMLISPKKMSMVTLPGLKDLIESI SRERNLPRLAVOSSIREALLKGYERYRRAONLERROFDENYFDNFEVELDIEGEGFRVLSTKTIVEOVSNSDHOISLEEVOOVAP EAQSGDSVVLDVTPDQGEFGRMAAMQTKQVLAQKLRDQQRQMVQEEFQDLESTVLQARVLRFERQSVILAVSSGFGQPEVEA ELPKREQLPNDTYRSNTTFKVYLKKVSQGQQRGPQLLVSRADAGLVVYLFANEVPEIEDEVVRIVAVAREANPPSRYVGPRTKI AVDTLDRDVDPVGACIGARGSRIQVVVNELRGEKIDVIRWSPDPATYIANALSPARVDEVRLMDPESRQTHVLVAEDQLSLAIG KEGQNVRLAARLTGWKIDIKDKAKYDYAAEDAKFAAVRAQYQSEDDENDMSKKSLASLSAADISGKRALVRVDFNVPVDDQ GNITDDTRIRAALPTIQDLTQKGAKVILTSHFGRPKGVDEKLRLTPVAKRLSELLGQEVIKTDDCIGDDVAAKVAALDNGQVLL LENVRFYKEEEKNEPEFAQKLAANADFYVNDAFGTAHRAHASTEGVTKFLSPSVAGYLVEKELQYLQSAIEVPQRPLAAIIGGS KVSSKIGVIETLLEKCDKLIIGGGMIFTFYKARGLDVGKSLVEEDKLELAKSLEAKAKERGVTFLLPTDIVAADKFAPDANATTV SIENIPADGMGLDIGPDSVKVFQAALADCKTVIWNGPMGVFEFDKFAVGTEAIAHTLAEIGKTGAITIIGGGDSVAAVEKVGLA DQMSHISTGGGASLELLEGKVLPGIAALDEAMTKFIFVTGGVVSSIGKGIVAASLGRLLKSRDYSVSILKLDPYINVDPGTMSPFQ HGEVFVTQDGAETDLDLGHYERFTDTSMSRLNSVTTGLIYQSVINKERRGEYNGGTVQVIPHITNEIKDRILRVAKETNPAAVIT EIGGTVGDIESLPFLEAIRQLRKEVGRQNVLYMHVTLLPWIASAGEMKTKPTQHSVKELRSIGIQPDILVCRCDRPIGVGLKQKLS EFCDVPVECVITCQDASSIYEVPLILEKEGLAQQTLDLLQMEQRQPDLSQWETMVERMYSPKYSVEIAIVGKYVRLSDAYLSVV ESLRHAAISTYGDLRIRWVNSETLETESAENYLAGVDGILVPGGFGSRGIDGKIAAIKFARDRQIPFLGLCLGMQCSVIEWARNV EGLADANSAEFDPYTTNPIINLLPEQQDVVDLGGTMRLGLYPCRVQPGTLAFDLYQEEVIYERHRHRYEFNNLYRNALLESGYV VSGTSPDGRLVEIVEYPKHPFFIACQFHPEFQSRPSTPHPLFKGFMEAAISRTHHSKNTSKPVQVSMGKKISRRLQALLEKVEDRD YAPLEALALLKETATAKFPEAAEAHIRLGIDPKYTDQQLRTTVALPKGTGQVVRVAVIARGEKVTEATNAGADIAGSEELIDDI QKGMMDFDKLIATPDVMPQVAKLGKLLGPRGLMPSPKGGTVTFDVASAIAEFKAGKLEFRADRTGIVHVMFGKASFTPEDLL VNLKALQETIDRNRPSGAKGRYWRTFYVSATMGPSIRIDINALRDLKVTDAAMGTRSYRPYTPSTRQVTISDFAEITKTEPEKSL TESVHRAKGRNNQGRITSRRRGGGHKKLYRIIDFKRDKRDIAATVTAIEYDPNRNARIALVQYEDGEKRYILHPNGLKVGAKIIA GPEAPFEDGNALPLSNIPLGTNVHNVELTAGKGGQIVRAAGATAQVVAKEGNYVTLKLPSGEVRMIRKECYATIGQVGNTDAR NLSAGKAGRNRWKGRRPKVRGSVMNPVDHPHGGGEGRAPIGRSGPVTPWGKPALGAKTRKRKKASTKLIVMSVGILGTKLG MTQIFDEAGVAIPVTVIKAGPCTVTQVKTKQTDGYSAIQVGYGEVKPKALNQPKLGHLAKSSAPALRHLNEYRTDAASEYALG QEIKADIFSEGQIVDVIGTSIGRGFAGNQKRNNFGRGPMSHGSKNHRAPGSIGAGTTPGRVYPGKRMAGRLGGTRVTIRKLTVV KVDAERNLILIKGAIPGKPGGLVNVVPTNKVGNKMVESVVKNWQGEEVGQTSFELRVAKEETAAHIVHRALVRQMTNSRQGT ASTKTRSEVRGGGRKPWRQKGTGRARAGSIRSPLWRGGGVIFGPKPRDFNLKLNRKERRLALRTAFVSRAEDLIVVEEFSNELQ RPKTKELVAALARWGAAPEQKTLLILSDIAENVNLSARNVENLKVIAADQLNVFDLLHADKIVVTSSALTKIQEVYSAMATTRL

KTVYQETIVPKLTQQFQYTNVHQVPKVVKITVNRGLGEAAQNAKALEASLNEIALITGQKPVVTRAKKAIAGFKIRQGMPVGI MVTLRGERMYAFLDRLISLSLPRIRDFRGVSPKSFDGRGNYTLGVREQLIFPEVEYDSIDQIRGLDISIITTAKNDEEGRALLKEM GMPFRDQMSRIGKRPITVPAKVQVAIDGTKVVVKGPKGELSRDLPANVIVSQEGETLLVTRRDETRTSRQMHGLSRTLVANMV EGVSQGFQRRLEIQGVGYRAQVQGRNLVLNIGYSHQVQIEPPDGVQFAVENNTNVIVSGYDKEVVGNTAAKIRAVRPPEPYKG KGIRYAGEVVRRMAKKVVAVIKLALNAGKANPAPPVGPALGOHGVNIMMFCKEYNAKTADOAGMVIPVEISVFEDRSFTFVL KTPPASVLIRKAAKIERGSEQPNKKKVGSITKAQLREIAQTKLPDLNANDIDAAMNIVAGTAKNMGVTITDMSAATDQILEQLK SLTLLEAAELVKQIEEAFGVSAAAPAGGMMMMAAPGAAAPAEAAEEKTEFDAILESVPADKKIAVLKIVREITGLGLKEAKDL VEAAPKPIKEGVNKEAAEDIKKRIAEAGGTVTIKMSSKTYLPPQEKLEREWYVVDATDKRLGRLASEIAMVLRGKRKAEYTPH LDTGDFVVVINAEKVAVTGKKRTQKVYRRHSGRPGGMKTETFAKLQQRLPERILEHAVKGMLPKNSLGKQLFTKLKVYAGPT HPHAAQKPKELIVNTIPGENMIQPQTYLNVADNSGAKKLMCIRVLGAGNRRYGGVGDKIIAVVKESNPNMAVKKSDVVEAVIV RTKKSINRDSGMSIRFDDNAAVIINKDGNPRGTRVFGPVARELRDKNFTKIVSLAPEVLMLSPKRTKFRKQQRGRMEGLAHRGS TLNFGDFALQAQEPCWITSRQIEASRRAMTRYIRRGGKIWIRIFPDKPVTMRPAETRMGSGKGNPEFWVAVVKPGRILFEIAGVS EEIAREAMRLAAYKLPIKTKFIVRSQPQEQEMNVQEVIRSIEAEHLKSDLPEIYVGDTVRVGVKIKEGDKYRVQPYEGVVIGKRN GGINETITVRRVFQGIGVERVFLLHSPRIDNIKVVRRGKVRRAKLYYLRQLSGKATRIKQRFDRALMTRVKRGNVARKRRNKIL KLAKGFRGSHSTLFRTANQQVMKALRSAYRDRKKKKRDFRRLWITRINAASRQHGLSYSQLIGNLKKANVDLNRKMLAQLAV LDPASFAKVAELANSVKGMAHKKGTGSTRNGRDSNAQRLGVKRFGGQTVLAGNILVRQRGTKFHPGNNVGIGSDDTLFALVD GVVTFERKGKSRKKVSVYPAVAAEAVASMTNETYMEPAFLLPDLIEIQRSSFRWFLEEGLIEELNSFSPITDYTGKLELHFIGQN YKLKEPKYSVEESKRRDSTYAVQMYVPTRLLNKETGDIKEQEVFIGDLPLMTDRGTFIINGAERVIVNQIVRSPGVYYKSEIDKN GRRTYSASLIPNRGAWLKFETDRNDLVWVRIDKTRKLSAQVLLKALGLSDNEIFDALRHPEYFQKTIEKEGQFSEEEALMELYR KLRPGEPPTVLGGQQLLDSRFFDPKRYDLGRVGRYKLNKKLRLSVPDTLRVLTPGDILAAVDYLINLEYDIGSIDDIDHLGNRRV RSVGELLQNQVRVGLNRLERIIRERMTVSDAEVLTPASLVNPKPLVAAIKEFFGSSQLSQFMDQTNPLAELTHKRRLSALGPGGL TRERAGFAVRDIHPSHYGRICPIETPEGPNAGLIGSLATHARVNQYGFLETPFRPVENGRVCYEKAAVYMTADEEDDLRVAPGD IPVDENGHIIGPQVPVRYRQEFSTTTPEQVDYVAVSPVQIVSVATSMIPFLEHDDANRALMGSNMQRQAVPLLKPERPLVGTGL EAQAARDSGMVIVSRTDGDVVYADANEIRVRVRERTGDRSQVLRHGDSEETSSLPVSKPQEIKYVLSKYQRSNQDTCLNQKPL VRIGEKVVAGQVLADGSSTEGGELALGQNIIVAYMPWEGYNYEDAILISERLVQDDVYTSIHIEKYEIEARQTKLGPEEITREIPN VGEDALRQLDEQGIIRIGAWVESGDILVGKVTPKGESDQPPEEKLLRAIFGEKARDVRDNSLRVPNGEKGRVVDVRLFTREQGD ELPPGANMVVRVYVAQKRKIQVGDKMAGRHGNKGIISRILPAEDMPYLPDGSPVDIVLNPLGVPSRMNVGQVFECLLGWAGQ NLGVRFKITPFDEMYGEESSRRIVHGKLQEARDETGKNWVYNPDDPGKIMVYDGRTGEPFDRPVTVGVAYMLKLVHLVDDKI HARSTGPYSLVTQQPLGGKAQQGGQRFGEMEVWALEAFGAAYTLQELLTVKSDDMQGRNEALNAIVKGKAIPRPGTPESFKV LMRELQSLGLDIAVHKVETQADGSSLDVEVDLMADQGSRRTPPRPTYESLSRESLEEDEMPVVSLAQMMESGVHFGHQTRRW NPKMSPYIYTARNGVHIIDLVQTAQLMDDAYNYMRTQAEQGKKFLFVGTKRQAAGIIAQEATRCGSHYINQRWLGGMLTNW ATIKTRAERLKDLERREENGALDLLPKKEASMLRREMTKLQKYLGGIKNMRKVPDIVVIVDQRREYNAVQECQKLGIPIVSML

DTNCDPDVVDIPIPANDDAIRSIKLIVGKLADAIYEGRHGQLEVEEDYEDYEGAEEEYDYDESEYTDSMMSDDDEEMGQKIHPV GFRLGITQEHQSRWFAVPDRYPALLQEDHKLRQYIEQKLGRNAQNNAGISEIRIERKADQIDLELRTARPGVVVGRGGQGIESLR TGLQDLLGGQRQIRINVVEVQKVDADAYLIAEYIAQQLERRVSFRRVVRQAIQRAQRAGVQGIKVQVGGRLNGAEIARTEWTR EGRVPLHTLRADIDYSYCTAQTIYGILGIKVWVFKGEIIPGQEEAPQPSGREREPRRRDQKRRRQQFEDRSNEAMATGRRKASK AKKEETNWOERVIOIRRVSKVVKGGKKLSFRAIVIVGNERGOVGVGVGKASDVIGAVKKGVADGKKHLIDIPITKSNSIPHPIDG IGGGAKVIMRPAAPGTGVIAGGAVRTVLELAGVRNVLAKQLGSNNPLNNARAAVNALSTLRTFAEVAEDRGISVENLYIMATV AEANSGRAVYWGTGRRKSAVAQVRLVPGEGKFTVNGKDGELYFQFNANYLGAIKAPLETLGLESEYDILVKAEGGGLTGQAD SIRLGVARALCQLDPDNRSPLKIEGYLTRDPRAKERKKYGLHKARKAPQYSKRMATLQQQKIRIRLQAFDRRLLDTSCEKIVDT ANRTNATAIGPIPLPTKRKIYCVLRSPHVDKDSREHFETRTHRRIIDIYQPSSKTIDALMKLDLPSGVDIEVKLMARQPTKKTGSK KQKRNVPNGIAYIQSTFNNSIVTITDQNGDVISWASAGSSGFKGAKKGTPFAAQTAAESAGRRAMDQGMRQIEVMVSGPGAGR ETAIRALQGAGLEITLIRDITPIPHNGCRPPKRRRVMARISGVDLPRDKRVEIGLTYIYGIGLTRSQEILAATGVNPDTRVKDLSDA DVAALRAEIESNYQVEGDLRRLEAMNIKRLVDIGCYRGRRHRMGLPVRGQRTRTNARTRRGRRQTVAGKKKAPGKMGRSLK KGPFVADHLLSKIEKLNEKNEKQVIKTWSRASTIIPVMVGHTIAVHNGKQHVPVFVNEQMVGHKLGEFAPTRTYRGHGKSDKK SGRMSDKNEGYKVISDNRQARYLYEILETYEAGIQLAGTEVKSIRAGKANLQDGYALIRNGEAWLINVHISPYTSSGQYFNHEP RRTRKLLLHRQELRKLIGKVEQQGLTLVPLKMYLKRGWVKVSIGLCKGKKIHDKRESLKRRQDQRDIQRAMKNYMAEISAKL VQELRQKTGAGMMDCKKALKENDGNIDAAIDWLRKKGIASAGKKSDRVAAEGLVDTYIQPDGKVGVLIEVNCQTDFVARND AFKSLVKNLAQQAATADSIESLLAQPYIEKAEVTVDEFIKESIATLGENIQVRRFVNFSLGDTPGVVDSYIHTGGRVGVLLQVSA KTDAAADNEEFKNLAKNAAMQVAACPNVEYVSVDQIPAETVQKEKDIEMGKEDLANKPENIREKIVQGRIEKRLKELTLLDQP YIRDQSISVADLVKQVQSKVGADITVQGFVRYVLGEGIEKQESNFAEEVAAQMGAK

>Anabaena cylindrica PCC 7122

MEIPRLHPDTIEEVKLRADIVDVVSEYVVLRKRGKDFVGLCPFHDEKSPSFTVSPSKQMFYCFGCQAGGNAIKFVMDLGKRHFT EVVLDLARRYQVPVQTLEPEQKQELQRQLSLREQLYEVLASTAQFYQHALRHTQQQKVMQYLRENRQLREETIQQFGLGYAP AGWETLHRYLVEDKHYPVQLVEKAGLIKPRKEGGGYYDVFRDRLMIPIRDVQGRVIAFGGRTLTEEQPKYLNSPETELFSKGK TLFALDQAKDGIAKLDQAVVVEGYFDAIALHAAGINNAVASLGTALSIEQVRLLLRYTDSKQLILNFDADKAGTNAAERAIGEI ATLAYKGEVQLKILNLPNGKDADEYLQSHTSADYQQLLATAPLWLNWQIDQIIQNRDLRQATDFQQVTQQIVKLLQNIVNGDT LNYYISYCAEILSLGDSRIIPLRVENLLTQIAPASVQTPPSRFRKQESKTPKLSLVNTERSLLEQAEALLLQIYLHCPEQRQLIINELE ERNLELSLTHHRFLWLQISELTDEADLISNLQNRYLELSEELGLISHLFHLNEKTNKEILRTPQVVQATLACMEIVLREKRYRHF

MELWENIDIQAEPDKYKSYADAIYAEKMRIQELDKQRQFPITELLMKLDEAESKMQHTVEATQRAFNTIRTGRANASLLDKVQ VEYYGTPTGLKSLANISTPDASTILIQPYDKGSLNIVEKAISLSDIGITPSNDGSVIRLNIPPLTSDRRKEFVKMAAKYAEEGRVGIR NIRRDALDSIRKQEKAAEVSEDESRDQQDKLQKLTNKYTARIDDLLTEKEKDITTVMPVIEKKRTRDLPQINERIRFPKIRVIDTD GAOLGIMPPOEALQLAEDKELDLVLLSDKADPPVCRIMDYGKYKFEQEKKAREARKKQHTADVKEVKMRYKIEEHDYLVRV KQAERFLKDGDKVKATVMFRGREIQHSDLAETLLKRMATDLDALGEVQQAPKKEGRNMMMLISPKKMSMVTLPGLKELIESI SRERNLPRLAVOSSIREALLKGYERYRRAQNLERRQFDEEYFDNFEVELDIEGEGFRVLSTKTIVDEVSNTDHQISLEEVQQVAP EAQSGDSVVLDVTPDQGEFGRMAAMQTKQVLAQKLRDQQRQMVQEEFQDLEGTVLQARVLRFERQSVILAVSSGFGQPEVE AELPKREQLPNDNYRANATFKVYLKKVSQGQQRGPQLLVSRADAGLVVYLFANEVPEIEDEVVRIVAVAREANPPSRYVGPRT KIAVDTLDRDVDPVGACIGARGSRIQVVVNELRGEKIDVIRWSPDPATYIANALSPARVDEVRLMDPETRQTHVLVAEDQLSLA IGKEGQNVRLAARLTGWKIDIKDKAKYDYAAEDAKFVAVRAKYQMSKKSLASLSAADVSGKRALVRVDFNVPVDDQGSITD DTRIRAALPTIQDLTKKGAKVILASHFGRPKGVDDKLRLTPVAKRLSELLGQEVVKTDDCIGDDVAAKVAALQNGQVLLLENV RFYKEEEKNEPEFAKKLAANADFYVNDAFGTAHRAHASTEGVTKFLSPSVAGYLVEKELQYLQSAIEEPKRPLAAIIGGSKVSS KIGVIETLLEKCDKLIIGGGMIFTFYKARGLSVGKSLVEEDKLELAKALEAKAKERGVALLLPTDIVSADKFAPDANATTVSIENI PADGMGLDIGPDSIKVFQAALADCKTVIWNGPMGVFEFDKFAAGTEAIAHTLAEIGKTGTTTIIGGGDSVAAVEKVGLADQMS HISTGGGASLELLEGKILPGIAALDEAMTKFIFVTGGVVSSIGKGIVAASLGRLLKSRDYSVSILKLDPYINVDPGTMSPFQHGEV FVTQDGAETDLDLGHYERFTDTSMSRLNSVTTGLIYQSVINKERRGDYNGGTVQVIPHITNEIKDRILRVAKETNPSAVITEIGGT VGDIESLPFLEAIRQLRKEVGRQNVLYMHVTLLPWIASAGEMKTKPTQHSVKELRSIGIQPDILVCRSDRTIPVGLKQKLSEFCD VPVECVITCQDASSIYEVPLILEREGLAQQALDLLQMEQRQPNLTQWETMVERMYSPKHSIEIAIVGKYVRLSDAYLSVVESLR HAAIATHGDLRLRWVNSEALENEPPENYLAGVDGIVVPGGFGSRGIDGKIAAIKYARDRQIPFLGLCLGMQCSVIEWARNVAGL VDANSAEFDPYTSDPVINLLPEQQDVVDLGGTMRLGLYPCRVIPGTLAFDLYQEEVIYERHRHRYEFNNVYRNPLLDSGYVVS GTSPDGRLVEIVELPNHPFFLACQFHPEFQSRPSSPHPLFKGFMQATISMGKKLSRRLQALQEKVEDRDYTPVEALALLKETATA KFAEAVEAHIRLGIDPKYTDQQLRTTVALPKGTGQIVRVAVIARGEKVTEATNAGADIAGSEELIEDIQKGMMDFDKLIATPDV MPMVAKLGKLLGPRGLMPSPKGGTVTFDVASAIAEFKAGKLEFRADRTGIVHVMFGKASFAPEDLLVNLKALQETIDRNRPSG AKGRYWRTLYVSATMGPSIKIDISALRDLKLTDAAMGTRSYRPYTPSTRQVIVSDFAEITKTEPEKSLTESVHRPKGRNNQGRIT SRRRGGGHKQLYRIIDFKRDKRDIPATVTAIEYDPNRNARIALLLYEDGEKRYILHPNGLKVGTTIIAGADAPFEDGNALPLFKIP LGTSVHNVEMTPGKGGQIVRAAGAEAQVVAKEGNYVTLKLPSGEVRLIRRDCYATIGKVGNTDARNLSAGKAGRNRWKGRR PKVRGSVMNPVDHPHGGGEGRAPIGRAGPVTPWGKPTLGAKTRKRKKASSKLIVMSVGILGTKLGMTQIFDDAGRAIPVTVIQ AGPCTVTQVKTKQTDGYAAIQVGYGEVKPKALNRPLLGHLAKSSAPALRHLNEYRTDASGDYALGQELKADIFSEGQIVDVIG TSIGRGFAGNQKRNNFGRGPMSHGSKNHRAPGSIGAGTTPGRVYPGKRMAGRLGGTRVTIRKLTVVRVDAERNLILIKGAIPGK PGALVNVVPTNKVGNKMVESVVKNWQGEQVGETTFDLRVAKAETAAHIVHRALVRQMTNSRQGTASTKTRSEVRGGGRKP WRQKGTGRARAGSIRSPLWRGGGVIFGPKPRDFNLKLNRKERRLALRTAFVSRAEDLIVVEEFSNELQRPKTKELVAALARWG ALPEQKSLLILSEIAENVLLSARNIENLKLIAADQLNVYDLLHADKIILTSAALAKIQEVYSAMAKTRLKNLYQETIVPKLINQFQ

YTNVHQVPKVVKITINRGLGEAAQNAKSLEASLNEIALITGQKPVVTRAKKAIAGFKIRQGMPVGIMVTLRGERMYAFLDRLVS LSLPRIRDFRGISPKSFDGRGNYTLGVREQLIFPEVEYDSIDQIRGLDISIITTAKNDEEGRALLKEMGMPFRDQMSRIGKRPITVPA KVQVAIDGSKVVVKGPKGELSRVLPSNVIVSQEGETLLVTRRDETRTSRQLHGLSRTLVANMVEGVSLGFQRRLEIQGVGYRA QVQGRNLVLNMGYSHQVQIEPPEGIQFAVEGTTNVIVSGYDKEIVGNTAAKVRGVRPPEPYKGKGIRYAGEVVRRKAGKTGKS GKKMAKKVVAVIKLALNAGKANPAPPVGPALGQHGVNIMMFCKEYNAKTADQAGMVIPVEISVFEDRSFTFVLKTPPASVLIR KAAKIERGSNEPNKKKVGSITRVQLREIAQTKLPDLNANDIDAAMNIVEGTAKNMGVTITDMSAATEQILEQLKTLTLLEASEL VKQIEEAFGVSAAPAAGGMMMMAAPGAAAAEVVEEKTEFDAVLESVPADKKIAVLKIVREITGLGLKEAKDLVEAAPKAIKE AVAKEAAEDIKKRVEEAGGKVVIKMSSKTYLPPQATLERDWYVVDATDKRLGRLASEIAMILRGKKKPEYTPHMDTGDFVVV INAEKVAVTGKKRTQKIYRRHSGRPGGMKTETFAKLQQRLPERILEHAVKGMLPKNSLGKQLFTKLKVYAGPTHPHAAQQPK ELVINTIPGENMIQPQTYLNVADNSGAKKLMCIRVLGAGNRRYGGVGDKIIAVVKESTPNMAVKKSDVVEAVIVRTRKAINRD SGMCIRFDDNAAVIINKDGNPRGTRVFGPVARELRDKNFTKIVSLAPEVLMLSPRRTKFRKQQRGRMEGLATRGSTLNFGDFAL QAQEPAWITSRQIEASRRAMTRYIRRGGKIWIRIFPDKPVTMRPAETRMGSGKGNPEFWVAVVKPGRILFEIAGVTEEIAREAMR LAAYKLPIKTKFIIRSQPQEQEMNAQEIIRSIEAEHLKSDIPIIYVGDTVRVGVKIKEGDKYRVQPYEGVVIGKRNGGINETITVRR VFQGVGVERVFLLHSPRIDNIKVLRRGRVRRAKLYYLRDRVGKATRIKQRFDRALMTRVKRGNVARKRRNKILKIAKGFRGSH STLFRTANQQVMKALRSSYRDRKKKKRDFRRLWITRINAASRQHGLSYSQLIGNLKKANIELNRKMLAQLAVLDPASFAKVAE MANAVKGMAHKKGTGSTRNGRDSNAQRLGVKRFGGQVVRAGNILIRQRGTKIHPGNNVGIGNDDTLFALVDGVVTFERKGK TRKKVSVYPVVAVEALASMTNETYMEPAFLLPDLIEIQRSSFRWFLEEGLIEELNSFSPITDYTGKLELHFLGNNYKLKEPKYSV EESKRRDSTYAVQMYVPTRLLNKETGDIKEQEVFIGDLPLMTDRGTFIINGAERVIVNQIVRSPGVYYKSEIDKNGRRTYSASLIP NRGAWLKFETDRNDLVWVRIDKTRKLSAQVLLKALGLSDNEIFDALRHPEYFQKTIEKEGQFSEEEALMELYRKLRPGEPPTVL GGQQLLDSRFFDPKRYDLGRVGRYKLNKKLRLSVPDTMRVLTPGDILAAVDYLINLEYDIGSIDDIDHLGNRRVRSVGELLQNQ VRVGLNRLERIIRERMTVSDAEVLTPASLVNPKPLVAAIKEFFGSSQLSQFMDQTNPLAELTHKRRLSALGPGGLTRERAGFAVR DIHPSHYGRICPIETPEGPNAGLIGSLATHARVNLYGFLETPFRPVENGKVRFDVQPVYMTADEEDDLRTATGDIPVDENGYIKG PQVPVRYRQDWATTTPEQVDYVAVSPVQIVSVATSMIPFLEHDDANRALMGSNMQRQAVPLLKPERPLVGTGLEAQGARDSG MVIVSRTDGDVVYVDAAEIRVRVREQTTDKNLTQLPASLKESPTGKPPEVTYYLSKYQRSNQDTCLNQKPLVRIGEKVVAGQV LADGSSTEGGELALGQNIVVAYMPWEGYNYEDAILISERLVQDDVYTSIHIEKYEIEARQTKLGPEEITREIPNVGEDALRQLDE QGIIRIGAWVEAGDILVGKVTPKGESDQPPEEKLLRAIFGEKARDVRDNSLRVPNGEKGRVVDVRLFTREQGDELPPGANMVV RVYVAQKRKIQVGDKMAGRHGNKGIISRILPAEDMPYLPDGSPVDIVLNPLGVPSRMNVGQVFECLLGWAGQNLGVRFKITPF DEMYGEESSRRIVHGKLQEARDETGKNWVYNPDDPGKIMVYDGRTGEPFDRPITIGVAYMLKLVHLVDDKIHARSTGPYSLVT QQPLGGKAQQGGQRFGEMEVWALEAFGAAYTLQELLTVKSDDMQGRNEALNAIVKGKAIPRPGTPESFKVLMRELQSLGLDI AVHKVETQADGSSLDVEVDLMADQATRRTPPRPTYESLSRESLEEEMPVVSLAQMMESGVHFGHQTRRWNPKMSPYIYTSRN GVHIIDLVQTAQLMDNAYNYMRSQSEQGKKFLFVGTKRQAAGIIAQEAARCGSHYINQRWLGGMLTNWATIKTRADRLKDLE RREENGALDLLPKKEASMLRREMTKLQKYLGGIKNMRKVPDVVIIVDQRREYNAVQECEKLGIPIVSMLDTNCDPDVVDIPIPA

NDDAIRSIKLIVGKLADAIYEGRHGQLEAEGDYDDYEGAEGDYDDYDESEYTDAVIPDEEEEMGQKIHPVGFRLGITOEHOSRWF AVPDRYPELLQEDHKLRKYIEQKLGRYAQNNAGISEVRIERKADQIDLEVRTARPGVVVGRGGQGIESLRTGLQDLLGSNRQIRI NVVEVQRVDADAYLIAEYIAQQLERRVSFRRVVRQAIQRAQRAGVQGIKVQVGGRLNGAEIARTEWTREGRVPLHTLRADIDY SYCTAQTIYGILGIKVWVFKGEIIPGQEETPSAPTTREPRRRQQQRRRQQFEDRSNEGMATGRRKTNRAKKEETNWQERVIQIRR VSKVVKGGKKLSFRAIVVVGNERGQVGVGVGKASDVIGAVKKGVADGKKHLIDIPITKSNSIPHPIDGIGGGAKVMMRPAAPG TGVIAGGAVRTVLELAGVRNVLAKQLGSNNPLNNARAAVNALSTLRTFAEVAEDRGIPIESLYIVAEANSGRAVYWGTGRRKS AVARVRLVPGEGKFVVNGKDGELYFQFNANYLGAIKAPLETLGLESEYDILVKAEGGGLTGQADSIRLGVARALCQLDPDNRP PLKTEGYLTRDPRAKERKKYGLHKARKAPQYSKRMATLQQQKIRIRLQAFDRRLLDTSCEKIVDTANRTNATAIGPIPLPTKRRI YCVLRSPHVDKDSREHFETRTHRRIIDIYQPSSKTIDALMKLDLPSGVDIEVKLMARQPTKKSGSKKQKRNVPNGMAYIQSTFN NSIVTITDQNGDVISWASAGSSGFKGAKKGTPFAAQTAAESAGRRAIDQGMRQIEVMVSGPGAGRETAIRALQGAGLEITLIRDI TPIPHNGCRPPKRRRVMARISGVDLPRDKRVEIGLTYIYGIGLSRSQEILAATGVNPDTRVKDLSDADVAALRGEIESNYQVEGD LRRLEAMNIKRLVDIGSYRGRRHRMGLPVRGQRTRTNARTRRGRRQTVAGKKKAPGKMGRSLKKGPFVADHLLSKIEKLNAK NEKQVIKTWSRASTILPMMVGHTIAVHNGRQHVPVFVNEQMVGHKLGEFSPTRTYRGHGKSDKKSGRMSDKKEGFKVISDNR QARYLYEIIETYEAGIQLTGTEVKSIRAGKVNLQDGYALLRNGEAWLINIHISPYTSSGQYFNHEPRRTRKLLLHRQELRKLIGKV EQQGLTLVPLKMYLQRGWVKVSIALGKGKKLHDKRESLKRRQDQRDIQRAMKSYMAEISAKLVQELRQKTGAGMMDCKKA LKETEGNIEEAVDWLRKKGIASAGKKSDRIAAEGLVDTYIQSGGQVGVLIEVNCQTDFVARNDAFKSLVKNLAQQAATADSVE SLLAOPYLEKSSVSVDEFIKETMATLGENIOVRRFVNFALSAATPGVVDSYIHTGGRVGVLLELNAOTESAAGNEDFONLAKNA AMQVAACPNVEYVTIEQIPAEFVQKEKDIEMGKDDLGNKPENIKEKIVQGRIDKRLKEITLLDQPYIRDQAISVEELVKQVKSKV GEEIKINRFVRYVLGEGIDKQEISFADEVAAQMGAK

>Anabaena_sp_90

MQIPRLHPDTIEEVKLRADIVDVVSEYVVLRKRGKDFLGLCPFHDEKSPSFSVSPNKQMYYCFGCQAAGNAIKFVMDLGKRQF ADVVLDLAKRYQVPVKTLEPEQRQELQRQISLRDQLYTVLATAAQFYQHTLRQSQGQKALEYLEQTRQFKQGTIQQFGLGYAP AGWETLYRYLVESKHYPVQLVEQAGLIKPRKEGGGYYDVFRDRLMIPIRDIQGRVIAFGGRTLTDEQPKYLNSPETELFSKGKM LFALDEAKDGISKVDQAVVVEGYFDAIALHAAGINNAVASLGTALSIEQVRLLLRYTESKQLILNFDADKAGTNATERAIGEIA NLAYAGEVQLKILNLPNGKDADEYLHSHTSADYQKLLTNAPLWLDWQIQNIIKNRDLKQATDFQQVTQQIVKLLQNIVNSDTL NYYVSSCAEILSLGDTRLIPLRVENLLTQIKPGRIKSLNPRTSNPATKTPKLSLVNTERSLLERAEALLLIIYLHSSQQRQIIIEDLEN RNLEFSLSHHRFLWQQMAEFTVDEVDLISSVQNRYLELAEELEIVSHIFHLNEKNKTEILRTPHVIQAALACMERVFREKRYRYF

MEQWEKIDPEAEPEKDKYYAEAIYIEKLHLQDLEKQRQFSITDLIMKLAEAESMMQKTVESTQRAFNTIRTGRANASLLDKVQ VEYYGTPTSLKALTNISTPDSSTILIQPYDKGSLNIIEKAISLSDVGLTPSNDGSVIRLNIPPLTSDRRKEFVKLAAKYAEEGRVAIR NIRRDANDSIRKQEKSAEISEDESRDQQDKLQKLTNKHTEKIDHLLVEKEKEITTVMPVIEKKRTRDLPQINERIRFPKIRVIDTDG AQLGIITPQEAIQLAEEKELDLVLISDKADPPVCRIMDYGKYKFEQEKKAREARKKQHTADVKEVKMRYKIEEHDYNVRVKQA ERFLKDGDKVKATVMFRGREIQHSDLAETLLKRMATDLEPFGELQQAPKKEGRNMMMLISPKKMSMVTLSGLKELIESISQER NLPRLAVQAAIREALIKGYERYRRAQNLERRQFDEEYFNNFEVELDIEGEGFRVLSTKTIVEAVANTDHQISLDEVOOVAPEAO LGDSVVLDVTPDQGEFGRMAAMQTKQVLAQKLRDQQRQMVQEEFQDLEGTVLQARVLRFERQSVVLAVSSGFGQSEVEAEL PKREQLPNDNYRANATFKVYLKKVSQGQQRGPQLMVSRADAGLVVYLFANEVPEIEDEVVRIVAVAREANPPSRYVGPRTKIA VDTLDRDVDPVGACIGARGSRIQVVVNELRGEKIDVIRWSPDPATYIANALSPAKVDEVRLMDPESRQTHVLVAEDQLSLAIGK EGONVRLAARLTGWKIDIKDQAKYDEEAENTKFAAVRAQYQSQNDRDDRSDREDAMAEELELDEDRFDNSEEDMSKKSLAS LSAADISGKRALVRVDFNVPVDDQGNITDDTRIRAALPTIQDLTQKGAKVILTSHFGRPKGVDEKLRLTPVAKRLSELLGQEVIK TDDCIGDDVAAKVAALDNGQVLLLENVRFYKEEEKNDREFAQKLAANADFYVNDAFGTAHRAHASTEGVTEFLSPSVAGYL VEKELQYLQSAIEEPKRPLAAIIGGSKVSSKIGVIETLLEKCDKLIIGGGMIFTFYKARGLNVGKSLVEEDKLELARELEAKAKER GVALLLPTDIVSADKFAPDANATTVSIENIPADGMGLDIGPDSIKVFQAALADCQTVIWNGPMGVFEFDKFAAGTEAIAHTLAEI GKTGATTIIGGGDSVAAVEKVGLADQMSHISTGGGASLELLEGKVLPGIAALDEAMTKFIFVTGGVVSSIGKGIVAASLGRLLKS RDYSVSILKLDPYINVDPGTMSPFQHGEVFVTQDGAETDLDLGHYERFTDTSMSRLNSVTTGLIYQSVINKERRGDYNGGTVQV IPHITNEIKERILRVAKETNPAAVITEIGGTVGDIESLPFLEAIRQLRKEVGKRNVLYMHVTLLPWIAAAGEMKTKPTQHSVKELR SIGIQPDILVCRSDRPIPVGLKQKLSEFCDVPVECVITSPDARSIYEVPVILEREGLAEQVLNLLQMEQRQPNMTQWENMVDRMY NPKYTVEIAIVGKYVRLGDAYLSVVESLRHAAIATHGDLRLRWINSEVLENEPPENYLAGVDGIIVPGGFGSRGIDGKIAAIKYA RDRQIPFLGLCLGMQCSVIEWARNVEGLSNANSAEFDPYTDNPVINLLPEQQDVVDLGGTMRLGLYPCRVLPNSLAFQLYQEE VIYERHRHRYEFNNVYRSQLLDSGYLVSGTSPDGRLVEIIEYPKHPFFIACQFHPEFQSRPNAPHPLFKGFMTAAISQFHSTTTTPK PVQVSMAKKVSRRLQALLEKVEDRDYTPLEALALLKETATAKFAEAAEAHIRLGIDPKYTDQQLRTTVALPKGTGQIIRVAVIA RGEKVTEATNAGADIAGSEELIEDIQKGMMDFDKLIATPDVMPQVAKLGKLLGPRGLMPSPKGGTVTFDVASAIAEFKAGKLE YRADRTGIVHVMFGKTAFSPEDLLINLKALQESIDRNRPSGAKGRYWRSVYISSTMGPSIAIDISALRELKITDAAMGTRSYRPYT SSTRQVIISDFAEITKTEPEKSLTESVHRPKGRNNQGRITSRRRGGGHKQLYRIIDFKRDKRNMSATVTAIEYDPNRNARIALVLY EDGEKRYILQTNGMTVGTKIIAGPESPIEDGNALPLSNMPLGTSVHNVEMTPGKGGQIVRAAGAVAQVVAKEGNYVTLKLPSG EVRLIRRDCYATIGQVGNTDARNLSAGKAGRNRWKGRRPKVRGSAMNPVDHPHGGGEGRAPIGRAGPVTPWGKPTLGAKTR NRKKASTKLIIMSVGILGTKLGMTQIFDEAGVSIPVTVIKAGPCTVTQVKTKQTDGYSAIQVGYGEVKPKSLNRPLLGHLAKSSA PPVRHLNEYRTDSTGDYALGQEIKADIFSVGEIVDVVGTSIGRGFAGNQKRNNFARGPMSHGSKNHRAPGSIGAGTTPGRVYPG KRMAGRLGGTRVTIRKLTVIRVDAERNLIIIKGAIPGKPGALVSVVPATIVGKKMVESVIKNWQGEQVGETSFDLRVAKETTAA HIVHRALVRQMTNSRQGTVSTKTRAEVRGGGRKPWRQKGTGRARAGSIRSPLWRGGGVIFGPKPRDFDLKMNRKERRLALRT AFVGRAEDLIVVEEFSNELQRPKTKDLVAALARWGATSEQKTLLILSEIAENVLLSARNIENLKLIPADQLNVYDLLHADKIIVTS

STLDKIQEVYSAMAKTRLKTVYQETITPKLTTQFEYTNVHQVPKVIKITINRGLGESAQNAKSLEASISEIALITGQKPVVTRAKK AIAGFKIRQGMPVGIMVTLRGERMYAFLDRLINLTLPRIRDFRGVSPKSFDGRGNYTLGVREQLIFPEVEYDRIDQVRGLDISIITT AKTDEEGRALLKEMGMPFRDQMSRIGKRPITIPAKVQVAIDGVKVVVKGPKGELSRQLPKNVIVSQEGETLIVTRRDETRTSRQ MHGLSRTLVANMVEGVSQGFQRRLEIQGVGYRAQLQGSNLVLNMGYSHQVQIEPPAGIQFAVEGTTNVIVSGYDKEIVGNTA AKIRAVRPPEPYKGKGIRYAGEVVRRMAKKVVAVIKLALNAGKANPAPPVGPALGOHGVNIMMFCKEYNAKTADOAGMVIP VEISVYEDRSFTFVLKTPPASVLIRKAAKIERGSSEPNKTKVGSISRTQLREIAQTKLPDLNANDIDAAMNIVEGTAKNMGVTITD MSAATEQILDQLKSLTLLEASELVKQIEEAFGVSAAPTGGGMMMMAAPGAVAEVVEEKTEFDAILDSVPADKKIAVLKIVREIT GLGLKEAKDLVEAAPKAVKEAVTKEAAEDIKKRIEEAGGKVTVKTKTYLPPQASIERDWYLVDATDKRLGRLATEVAMILRG KKKPEFTPHMDTGDFVIIINAEKVAVTGKKRTQKVYRRHSGRPGGMKTETFAKLQQRLPERILEHAIKGMLPKNSLGKQLFTKL KVYAGPTHPHAAQLPKEITISTIPGENMIQPQSYLNVADNSGAKKLMCIRVLGAGNRRYGGVGDRIIAVVKESSPNMAVKKSDV VEAVIVRTRKAISRDSGMAIRFDDNAAVIINKEGNPRGTRVFGPVARELRDKNFTKIVSLAPEVLMLSPRRTKFRKQQRGRMEG LASRGSTLNFGDFGLQAQEPSWITSRQIEASRRAMTRYIRRGGKIWIRIFPDKPITMRPAETRMGSGKGNPEFWVAVVKPGRIMF EIGGVTEEIAREAMRLADSKLPIKTKFITRSQPQEQEMNAQEIIRSIEAEQMKSDLPDIYVGDTVKVGIKIQEGTKFRVQPYEGVVI ARRNGGINETITVRKVFQGVGVERVFLLHSPLVESIKVLRRGKVRRAKLYYLRALVGKATRIKQRFDRPLMTRVKRGNVARKR RNKILKLAKGFRGSHSTLFRTANQQVMKALRSAYRDRKKKKRDFRRLWIARINAASRQHGLSYSRLIGNLKKANVELNRKML AQLAILDPASFAKIAELANSVNGMAHKKGTGSTRNGRDSNAQRLGVKRYGGQTVRAGNILVRQRGTKVHPGNNVGIGSDDTL FALIDGVVTFERRGKSQKKVSVYAVAAELVEAVANDDKYMESAFLLPDLIEIQRSSFRWFLEEGLIEELNSFSPITDYTGKLELH FLGNNYKLKEPKYSVEESKRRDSTYAVQMYVPTRLLNKETGDIKEQEVFIGDLPLMTDRGTFIINGAERVIVNQIVRSPGVYYKS EIDKNGRRTYSASLIPNRGAWLKFETDRNDLVWVRIDKTRKLSAQVLLKALGLSDNEIFDALRHPEYFQKTIEKEGQFSEEEAL MELYRKLRPGEPPTVLGGQQLLDSRFFDPKRYDLGKVGRYKLNKKLRLSAPDTMRVLTPGDILAAIDYLINLEYDIGSIDDIDHL GNRRVRSVGELLQNQVRVGLNRLERIIRERMTVSDAESLTPASLVNPKPLVAAIKEFFGSSQLSQFMDQTNPLAELTHKRRLSAL GPGGLTRERAGFAVRDIHPSHYGRICPIETPEGPNAGLIGSLATHARVNLYGFLETPFRPVENGKVLFDVLPVYMTADEEDDLRT ATGDVPLDENGYIKGPHVPVRYRQDWTTTGPEQVDYVAVSPVQIVSVATSMIPFLEHDDANRALMGSNMQRQAVPLLRPERP LVGTGLEAQAARDSGMVIVSRTDGDVVYVDATEIRVRASGQLSAASGSQVIEKGQELKYKLSKYQRSNQDTCLNQKPLVRIGE KVVAGQVLADGSSTEGGELALGQNIVVAYMPWEGYNYEDAILISERLVQEDVYTSIHIEKYEIEARQTKLGPEEITREIPNVGED ALRQLDEQGIIRIGAWVDAGDILVGKVTPKGESDQPPEEKLLRAIFGEKARDVRDNSLRVPNGEKGRVVDVRLFTREQGDELPP GANMVVRVYVAQKRKIQVGDKMAGRHGNKGIISRILAAEDMPYLADGSPVDIVLNPLGVPSRMNVGQVFECLLGWAGHNLG VRFKITPFDEMYGEETSRRLVHGKLQEARDETTKDWIYNPDNAGKIMVYDGRTGEPFDRAITVGVAYMLKLVHLVDDKIHAR STGPYSLVTQQPLGGKAQQGGQRFGEMEVWALEAFGAAYTLQELLTVKSDDMQGRNEALNAIVKGKAIPRPGTPESFKVLMR ELQSLGLDIAVHKVETQADGSSLDVEVDLMADQAARRTPPRPTYESLSRESLEGEEMPVVSLAQMMESGVHFGHQTRRWNPK MAPYIYTSRNGVHIIDLVQTAQLMDNAYNYMRTQSEQGKKFLFVGTKRQAAGIIAQEALRCGSHYINQRWLGGMLTNWATIK TRAERLKDLERREETGALDLLPKKEASMLRREMTKLQKYLGGIKNMRKVPDIVVIVDQKREYNAVQECEKLGIPIVSMLDTNC

DPDVVDIPIPANDDAIRSIKLIVGKLADAIYEGRHGQLMGQKIHPVGFRLGITQEHQSRWFAEPDRYPELLQEDYKLRQYIEQKL GRYAQNNAGISEVRIERKADQIDLEVRTARPGVVVGRGGQGIESLRLGLQGALGGNRQIRINVVEVQRVDADAYLIAEYIAQQL ERRVSFRRVVRQAIQRAQRAGVQGIKVQVGGRLNGAEIARSEWTREGRVPLHTLRADIDYSGCTAKTVYGILGIKVWVFKGEII PGQEQAPAQPAMVTGRRKASRTKKEETTWQERVIQIRRVSKVVKGGKKLSFRAIVVVGNERGQVGVGVGKASDVIGAVKKG VADGKKHLIDIPITKSNSIPHPIDGVGGGAKVMMRPAAPGTGVIAGGAVRTVLELAGIRNILAKOLGSNNPLNNARAAVNALST LRTLSEVAEDRGISIEKLYIVAETTSGRAVYWGTGRRKCSVASVRLVPGEGKMTVNGKDGDLYFQFNPNYLGAIKAPLETLGLE SEYDILVKAEGGGLTGQADSIRLGVARALCQLDPDNRSPLKTEGYLTRDPRAKERKKYGLHKARKAPQYSKRMATLQQQKIRI RLKAFDRRLLDTSCEKIVETANRTNATAIGPIPLPTKRKIYCVLRSPHVDKDSREHFETRTHRRIIDIYQPSSKTIDALMKLDLPSG VDIEVKLMARQPTKKSGSKKQKRNVPNGVAYIQSTFNNSIVTITDQNGDVISWASAGSSGFKGAKKGTPFAAQTAAESAARRA TDQGMRQIEVMVSGPGAGRETAIRALQGAGLEITLIRDITPIPHNGCRPPKRRRVMARISGVDLPRDKRVEIGLTYIYGIGLTRSH QILAATGVNPDIRVKDLSDADVAALRGEIESNYQVEGDLRRLEGLNIKRLVDIGCYRGRRHRMGLPVRGQRTRTNARTRRGRR QTVAGKKKAPGKMGRSLKKGPFVADHLLKKIEKLNAKDEKQVVKTWSRASTILPLMVGHTIAVHNGRQHIPVFVNEQMVGH KLGEFAPTRTYRGHGKSDKKSGRMSDKQSEGYKVICDNRQARFLYEIIETYEAGVQLTGTEVKSIRAGKANLQDGYALLRDGE AWLINVHISPYASSGAYFNHEPRRTRKLLLHKQELRKLIGRVQQEGLTLVPLKMYLKRGWVKIVIALGKGKKLHDKRESLKRR DDQRDMQRAMKRYMAEISAKLVQELRQKTGAGMMDCKKALKENNGDVEESITWLRQKGIAKADKGSARIAAEGLVDTYIQ ADGHIGVLIEVNCQTDFVARNEAFKALVKNLAQQAATTDSVESLLAQPYLEKSSVTVDEFIKETIATLGENIQVRRFVNFSLTTD TPGIADSYIHTGGRVGVLLELTAQSASAAANEEFQSLAKNAAMQVAACPNVEYVSVDQIPAEIVTKEKGIEMGKDDLGNKPENI KEKIVQGRIDKRLKEMTLLDQPYIRDQSISVEELVKQVKSKVGEEIQVSRFVRYVLGEGIEKNEMSFADEVAAQMGAK

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MQIPRLHPDTIEEVKIRADIVDVVSEYVVLRKRGKDFVGLCPFHNEKSPSFTVSPNKQMYYCFGCQAAGNAIKFVMDLGKRQF ADVVLDLAKRYQVPIKTLEPEQRQELQRQISLRDQLYTVLAAAAQFYQHTLRQSQGQKALEYLEKIRQFQQGTIQQFGLGYAP AGWETLYRYLVESKHYPVQLLEQAGLIKPRKEGGGYYDVFRDRLMIPIRDIQGRVIAFGGRTLTDEQPKYLNSPETELFSKGKIL FALDEAKEGISKVDQSVVVEGYFDAISLHAAGINHVVASLGTALSIEQVRLLLRYTESKQLILNFDADKAGINATEKAIGEIANL AYTGEVQLKILNLPNGKDADEYLHGHTSDDYQQLLTNAPLWLDWQIQKIIENRDLKQATDFQQVTQQIVKLLQNIVNSDTLNY YVSYCAEILSLGDSRLKPLRVENLLTQIKPSSVKSLSPRTTNPQPKTPKLSLVTTERSLLERAEALLLIIYLHSFEQRQIIIEDLEARN LEFSLSHHRFLWQQMAEFTIDEIDLISSVQNRYLELGEELDIVSHIFHLNEKNKTEILRTPHVIQAALACMERVFREKRYRYFMEQ

WEKIDPETEPEKDKYYAEAMYIEKIHLHDLEKQRQFSITDLIMKLAEAQETMQKTVEATQRSFNTIRTGRANASLLDKVQVEYY GTPTSLKSLANITTPDSSIILIQPYDKGSLNIIEKAISLSDVGLTPSNDGVVIRLNIPPLTSDRRKEFVKLAAKYAEEGRVAIRNIRRD AIDAIRKQEKSAEISEDEARDQQDKLQKLTNKHTEKIDHLFAEKEKEITTVMPVIEKKRTRDLPQINERIRFPKIRVIDTDGAQLGI ITPQEAIQLAEEKELDLVLISDKADPPVCRIMDYGKYKFEQEKKAREARKKQHTADVKEVKMRYKIEEHDYNVRVKQAERFLK DGDKVKATVMFRGREIQHSDLAETLLKRMATDLEPFGELQQAPKKEGRNMMMLISPKKMVTLSGLKELIESISQERNLPRVAV QAAIREALIKGYERYRRAQNLERRQFDEEYFNNFEVELDIDGEGFRVLSTKTIVDTVSNTDHQISLDEVQQVAPEAQLGDSVVL DVTPDQGEFGRMAAMQTKQVLAQKLRDQQRQMVQEEFQDLEGTVLQARVLRFERQSVVLAVTSGFGQSEVEAELPKREQLP NDNYRANATFKVYLKKVSQGQQRGPQLMVSRADAGLVVYLFANEVPEIEDEVVRIVAVAREANPPSRYVGPRTKIAVDTLDR DVDPVGACIGARGSRIQVVVNELRGEKIDVIRWSPDPATYIANALSPAKVDEVRLMDPESRQTHVLVAEDQLSLAIGKEGQNVR LAARLTGWKIDIKDQAKYDQEAEDIKFAAVRAQNQPQNDHDDRSNREDKMEEELELEEDRFDSREEDMSKKSLASLSAADISG KRALVRVDFNVPVDDQGNITDDTRIRAALPTIQDLTQKGAKVILTSHFGRPKGVDEKLRLTPVAKRLSELLGQEVIKTDDCIGD DVAAKVAALDNGQVLLLENVRFYKEEEKNDREFAQKLAANADFYVNDAFGTAHRAHASTEGVTKFLSPSVAGYLVEKELQY LQSAIEAPQRPLAAIIGGSKVSSKIGVIETLLEKCDKLIIGGGMIFTFYKARGLSVGKSLVEEDKLELAKSLEAKAKERGVALLLPT DIVSADKFAPDANATTVSIENIPADGMGLDIGPDSVKVFQAALADCKTVIWNGPMGVFEFDKFAAGTEAIAHTLAEISKTGAITII GGGDSVAAVEKVGLADQMSHISTGGGASLELLEGKVLPGIAALDEAMTKFIFVTGGVVSSIGKGIVAASLGRLLKSRDYSVSIL KLDPYINVDPGTMSPFQHGEVFVTQDGAETDLDLGHYERFTDTSMSRLNSVTTGLIYQSVINRERRGDYNGGTVQVIPHITNEIK ERILRVAKETNPSAVITEIGGTVGDIESLPFLEAIRQLRKEVGKRNVLYMHVTLLPWIAAAGEMKTKPTQHSVKELRSIGIQPDIL VCRSDRPIPVGLKQKLSEFCDVAVECVITSPDARSIYEVPVILEREGLAEQVLNLLQMEQRQPNMSQWEMMVERMYNPKYSVE IAIVGKYVRLSDAYLSVVESLRHAAIATHSDLRLRWVNSEALETEPAENYLSGVDGIIVPGGFGSRGIDGKIAAIKYARTRQIPFL GLCLGMQCSVIEWARNVEGLSHADSAEFNPYTEDPVINLLPEQQDVVDLGGTMRLGLYPCRILPNTLAFQLYQEEVIYERHRHR YEFNNIYRNQLLDSGYLVSGTSPDGRLVEIVEYSQHPFFIACQFHPEFQSRPNAPHPLFKGFITAAISQSMAKKVSRRLQALLDKV EDRDYSPLEALALLKETATAKFSEAAEAHVRLGIDPKYTDQQLRTTVALPKGTGQIIRVAVIARGEKVTEATNAGADIAGSEELI DQIQKGFMEFDKLIATPDVMPQVAKLGKLLGPRGLMPSPKGGTVTFDIASAIAEFKAGKLEYRADRTGIVHVMFGKAAFSPEDL LINLKALQESIDRNRPSGAKGRYWRSLYISSTMGPSIAIDISALRDLKLTEAAMGTRSYRPYTPSTRQVIISDFAEITKTEPEKSLTE SVHRPKGRNNQGRITSRRRGGGHKQLYRIIDFKRDKRNMTATVTAIEYDPNRNARIALLLYEDGEKRYILQPNGMTVGTKVIAG PDSPIEDGNALPLANMPLGTGVHNVEMTPGKGGQIVRAAGAVAQVVAKEGNYVTLRLPSGEVRLIRRDCYATIGQVGNTDAR NLSAGKAGRNRWKGRRPKVRGSVMNPVDHPHGGGEGRAPIGRSGPVTPWGKPTLGAKTRNRKKSSTKLILMSVGILGTKLGM TQIFDEAGVSIPITIIQAGPCTVTQVKTKQTDGYSAIQVGYGEVKPKALNKPLLGHLAKSSAPALRHLNEYRTDSAGDYTPGQEI KADIFSAGEIVDVVGTSIGRGFAGNQKRNNFGRGPMSHGSKNHRAPGSIGAGTTPGRVYPGKRMAGRLGGTRVTIRKLTVVRV DTERNLILIKGAIPGKPGALVSVVPATIVGKKMVESVIKNWQGEQVGETSFDLPVAKETTAAHIVHRALVRQMTNSRQGTASTK TRAEVRGGGRKPWRQKGTGRARAGSIRSPLWRGGGVIFGPKPRDFDLKMNRKERRLALRTALIGRAEDIIIVEEFSNELQRPKT KDLVAALARWGAVPEQKTLLILSEIAENVLLSARNIENLKLIPADQLNVYDLLHADKIVVTSSTLEKIQEVYSAMAITRLKTVYQ

ETITPKLITQFQYTNVHQVPKVTKITINRGLGEAAQNAKSLEASISEIALITGQKPVVTRAKKAIAGFKIRQGMPVGIMVTLRGER MYAFLDRLINLTLPRIRDFRGVSAKSFDGRGNYTLGVREQLIFPEVEYDKIDQVRGLDISIITTAKTDEEGRALLKEMGMPFRDQ MSRIGKRPITIPAKVQVAIDGVKVVVKGPKGELSRQLPNNVIVSQEGETLLVTRRDETRTSRQMHGLSRTLVANMVEGVSQGFQ RRLEIQGVGYRAQLQGSNLVLNMGYSHQVQIEPPPGIKFAVEGTTNVIVSGYDKEIVGNTAAKIRAVRPPEPYKGKGIRYAGEV VRRMAKKVVAVIKLALNAGKANPAPPVGPALGQHGVNIMMFCKEYNAKTADQAGMVIPVEISVYEDRSFTFVLKTPPASVLIR KAAKIERGSNEPNKKKVGSISRTQLREIAQTKLPDLNANDIDAAMNIVEGTAKNMGVTVTDMSAATEQILEQLKSLTLLEASEL VKQIEEAFGVSAAAPAGGMMMMAPGAGAAAEEVVEKTEFDAILDSVPADKKIAVLKIVREITGLGLKEAKDLVEAAPKAVKE AVTKDAAEDIKKRIEEAGGKVTVKMSSKTYLPPQASLERDWYLVDATDKRLGRLASEVAMILRGKRKAEYTPHLDTGDFVIII NAEKVAVTGKKRTQKLYRRHSGRPGGMKTETFAKLQQRLPERILEHAIKGMLPKNSLGKQLFTKLKVYAGPTHPHEAQQPKEI TISTIPGENMIQPQSYLNVADNSGAKKLMCIRVLGAGNRRYGGVGDRIIAVVKESSPNMAVKKSDVVEAVIVRTRKAISRDSGM TIRFDDNAAVIINKEGNPRGTRVFGPVARELRDKNFTKIVSLAPEVLMLSPRRTKFRKQQRGRMEGLASRGSTLNFGDFGLQAQ EPSWITSRQIEASRRAMTRYIRRGGKIWIRIFPDKPITMRPAETRMGSGKGNPEFWVAVVKPGRIMFEIGGVTEEIAREAMRLAD AKLPIKTKFIVRSQPQEQEMNAQEIIRSIEAEQMKSNLPDIYVGDTVKVGVKIQEGNKFRVQPYEGVVIAMRNGGINETITVRKV FQGVGVERVFLLHSPLIETIKVLRRGKVRRAKLYYLRALVGKATRIKQRFDRPLMTRVKRGNVARKRRNKILKLAKGFRGSHS TLFRTANQQVMKALRSAYRDRKKKKRDFRRLWIARINAASRQHGLSYSRLIGNLKKANVELNRKMLAQLAILDPTSFAKIAEL AQSVNGMAHKKGTGSTRNGRDSNAQRLGVKRYGGQTVRAGNILVRQRGTKVHPGNNVGIGSDDTLFALVDGVVTFERKGKS QKKVSVYPNDDKYMESAFLLPDLIEIQRSSFRWFLEEGLIEELNSFSPITDYTGKLELHFLGNNYKLKEPKYSVEESKRRDSTYA VQMYVPTRLLNKETGDIKEQEVFIGDLPLMTDRGTFIINGAERVIVNQIVRSPGVYYKSEIDKNGRRTYSASLIPNRGAWLKFET DRNDLVWVRIDKTRKLSAQVLLKALGLSDNEIFDALRHPEYFQKTIEKEGQFSEEEALMELYRKLRPGEPPTVLGGQQLLDSRF FDPKRYDLGKVGRYKLNKKLRLSAPDTMRVLSSSDILAAIDYLINLEFDIGNIDDIDHLGNRRVRSVGELLQNQVRVGLNRLERI IRERMTVSDAEVLTPASLVNPKPLVAAIKEFFGSSQLSQFMDQTNPLAELTHKRRLSALGPGGLTRERAGFAVRDIHPSHYGRIC PIETPEGPNAGLIGSLATHARVNLYGFLETPFRPVENGKVLFHLPPVYMTADEEDDLRTATGDIPLDEYGFIKGPNVPVRYROD WTTTPPEQVDYVAVSPVQIVSVATSMIPFLEHDDANRALMGSNMQRQAVPLLKPERPLVGTGLEAQAARDSGMVIVSRTDGD VVYVDATEIRVRVGGQRLVAGDNEKTGDREQLRTDKPQELKYKLSKYQRSNQDTCLNQKPLVRIGEKVVAGQVLADGSSTEG GELALGQNIVVAYMPWEGYNYEDAILISERLVQEDVYTSIHIEKYEIEARQTKLGPEEITREIPNVGEDALRQLDEQGIIRVGAW VDAGDILVGKVTPKGESDQPPEEKLLRAIFGEKARDVRDNSLRVPNGEKGRVVDVRLFTREQGDELPPGANMVVRAYVAQKR KIQVGDKMAGRHGNKGIISRILPAEDMPYLSDGSPVDIVLNPLGVPSRMNVGQVFECLLGWAGHNLGVRFKITPFDEMYGEETS RRLVHGKLEEAREETGRDWVYNPDNAGKITVYDGRTGEAFDRDVTVGVAYMLKLVHLVDDKIHARSTGPYSLVTQQPLGGK AQQGGQRFGEMEVWALEAFGAAYTLQELLTVKSDDMQGRNEALNAIVKGKAIPRPGTPESFKVLMRELQSLGLDVAVHKVE TQTDGSSLDVEVDLMIDQATRRTPPRPTYESLSRESLDEEEMPVVSLAQMMESGVHFGHQTRRWNPKMAPYIYTSRNGVHIIDL VQTAQLMDDAYNYMRTQSEQGKKFLFVGTKRQAAGIIAQEALRCGSHYINQRWLGGMLTNWATIKTRAERLKDLERREETG ALDLLPKKEASMLRREMTKLQKYLGGIKNMRKVPDIVVIVDQKREYNAVQECEKLGIPIVSMLDTNCDPDVVDIPIPANDDAIR

SIKLIVGKLADAIYEGRHGQLEVMGQKIHPVGFRLGITQEHQSLWFAEPDRYPELLQEDYKLRQYIEQKLGRYAQNNAGISEVRI ERKADQIDLEVRTARPGVVVGRGGQGIESLRLGLQGALGGNRQIRINVVEVQRVDADAYLIAEYIAQQLERRVSFRRVVRQAIQ RAQRAGVQGIKVQVGGRLNGAEIARSEWTREGRVPLHTLRADIDYSGCTAKTIYGILGIKVWVFKGEIIPGQEQAPAQPARERD RDRDRGDREREPRRRQQORRRQQFEDRSNETMVTGRRKASRTKKEETTWQERVIQIRRVSKVVKGGKKLSFRAIVVVGNERG QVGVGVGKASDVIGAVKKGVADGKKHLIDIPITKSNSIPHPIDGIGGGAKVMMRPAAPGTGVIAGGAVRTVLELAGIRNILAKQ LGSNNPLNNARAAVNALSTLRTLTEVAEDRGIAIEKLYIIAEINSGRAVYWGTGRRKASVARVRLVPGEGKMIVNGKDGELYF QFNPNYLGSIKAPLETLGLENEYDILVKAEGGGLTGQADSIRLGVARALCELDPDNRSPLKTEGYLTRDPRAKERKKYGLHKAR KAPQYSKRMATLQQQKIRIRLKAFDRRLLDTSCEKIVDTANRTNATAIGPIPLPTKRKIYCVLRSPHVDKDSREHFETRTHRRIIDI YQPSSKTIDALMKLDLPSGVDIEVKLMARQPTKKTGSKKQKRNVPNGVAYIQSTFNNSIVTITDQNGDVISWASAGSSGFKGAK KGTPFAAQTAAESAARRATDQGMRQVEVMVSGPGAGRETAIRALQGAGLEITLIRDITPIPHNGCRPPKRRRVMARISGVDLPR DKRIEIGLTYIYGIGLTRSHQILAATGVNPDTRVKDLSDADVTALRGEIESNYQVEGDLRRLEGLNIKRLVDIGCYRGRRHRMGL PVRGQRTRTNARTRRGRRQTVAGKKKAPGKMGRSLKKGPFVADHLLKKIEKLNAKDEKQVVKTWSRASTILPLMVGHTIAVH NGRQHVPVFVNEQMVGHKLGEFAPTRTYRGHGKSDKKSGRMSEKQSEGYKVICDNRQARFLYEIIETYEAGVQLTGTEVKSIR AGKANLQDGYALLRDGEAWLINVHISPYTSSGAYFNHEPRRTRKLLLHKQELRKLIGRVQQEGLTLVPLKMYLKRGWVKIVIA LGKGKKLHDKRESMKRRDDQRDMQRAMKRYMAEISAKLVQELRQKTGAGMMDCKKALKENDGDIEAATTWLRQKGIAKA DKGSSRIAAEGLVDTYIRPDGQVGVLIEVNCQTDFVARNDAFKDLVKKLAQQAATTDSVESLLAQPYIGKESVSVDEFIKETIAT LGENIQVRRFVNFSFTSDTPGIADSYIHTGGRVGVLVELTTPGALAGTNEDLQGLAKNAAMQVAACPNVEYVSVDQIPVEVVQ KEKDIEMGKDDLANKPVNIREKIVQGRIDKRLKEMTLLDQPYIRDQSISVEDLVKQVKSKVDREIQVSRFVRYILGEGIEKKEISF **ADEVAAQIGAK**

>Aphanizomenon_flos_aquae_KM1D3

MQIPRLHPDTIEEVKLRADIVDVVSEYVVLRKRGKDFVGLCPFHDEKSPSFTVSPNKQMYYCFGCQAAGNAIKFVMDLGKRQF ADVVLDLAKRYQVPVKTLEPEQRQELQRQISLRDQLYTVLASAAQFYQHTLRQSQGQKALEYLEKTRQFQQGTIQQFGLGYAP AGWETLYRYLVESKHYPVQLVEQAGLIKPRKEGGGYYDVFRDRLMIPIRDIQGRVIAFGGRTLTEEQPKYLNSPETELFSKGKT LFALDEAKDGISKVDQAVVVEGYFDAIALHAAGINNAVASLGTALSLEQVRLLLRYTESKQLILNFDADKAGTTATERAIGEIA NLAYTGEVQLKILNLPNGKDADEYLHSHTPADYQQLLTNAPLWLDWQIQNIIKNRDLKQATDFQQVTQQIVKLLQNIVNSDTL NYYVSYCAEILSLGDTRLIPLRVENLLTQIKPGSIKPSIPRTSRPPTKTPKLSLVTTERSLLERAEALLLIIYLHSSQQRQIIIEDLETR NLEFSLSHHRFLWQQMAEFIVDEVDLISSVQNRYLELGEELDIVSHIFHLNEKNKTEILRTPHVIQAALACMERVFREKRYRYFM

EQWEKIDPQTEPEKDKYYAEAIYIEKIHLHDLEKQRQFSITDLIMKLAEAESTMQKTVESTQRAFNTIRTGRANSSLLDKVOVDY YGSPTSLKSLANITTPDSSTILIQPYDRNALNIVEKAISLSDVGLTPSNDGSVIRLNIPPLTSDRRKEFVKLAAKYAEEGRVAIRNIR RDALDTIRKQEKSAEISEDEARDQQDKLQKLTNKHIVKIDELLREKEQEISTVMPVIEKKRTRDLPQINERIRFPKIRVIDTDGAQL GIITPQEAIQLAEEKELDLVLISDKADPPVCRIMDYGKYKFEQEKKAREARKKQHTADVKEVKMRYKIEEHDYNVRVKQAERF LKDGDKVKATVMFRGREIQHSDLAETLLKRMATDLEPFGELQQAPKKEGRNMMMLISPKKMVTLSGLKELIESISKERNLPRL AVQAAIREALIKGYERYRRAQNLERRQFDEEYFNNFEVELDIEGEGFRVLSTKTIVDAVSNTDHQISLDEVQQVAPEAQLGDSV VLDVTPDQGEFGRMAAMQTKQVLAQKLRDQQRQMVQEEFQDLEGTVLQARVLRFERQSVILAVSSGFGQSEVDAELPKREQL PNDNYRANATFKVYLKKVSQGQQRGPQLMVSRADAGLVVYLFANEVPEIEDEVVRIVAVAREANPPSRYVGPRTKIAVDTLD RDVDPVGACIGARGSRIQVVVNELRGEKIDVIRWSPDPATYIANALSPARVDEVRLMDPESRQTHVLVAEDQLSLAIGKEGQNV RLAARLTGWKIDIKDQAKYDQEAEDIKFAAVRAQNQPRNDEDDRSDREYEMAEELELDEDRFNNREEDMSKKSLASLSAADIS GKRALVRVDFNVPVDDQGNITDDTRIRAALPTIQDLTQKGAKVILTSHFGRPKGVDEKLRLTPVAKRLSELLGQEVIKTDDCIG DDVAAKVAALDNGQVLLLENVRFYKEEEKNDPEFAQKLAANADFYVNDAFGTAHRAHASTEGVTKFLSPSVAGYLVEKELQ YLQSAIEVPQRPLAAIIGGSKVSSKIGVIETLLEKCDKLIIGGGMIFTFYKARGLSVGKSLVEEDKLELAKSLEAKAKERGVALLL PTDIVSADKFAPDANATTVSIENIPADGMGLDIGPDSIKVFQAALADCKTVIWNGPMGVFEFDKFAAGTEAIAHTLAEIGKTGAT TIIGGGDSVAAVEKVGLADKMSHISTGGGASLELLEGKILPGIAALDEAMTKFIFVTGGVVSSIGKGIVAASLGRLLKSRDYSVSI LKLDPYINVDPGTMSPFQHGEVFVTQDGAETDLDLGHYERFTDTSMSRLNSVTTGLIYQSVINKERRGDYNGGTVQVIPHITNEI KDRILRVAKETNPSAVITEIGGTVGDIESLPFLEAIRQLRKEVGKRNVLYMHVTLLPWIAAAGEMKTKPTQHSVKELRSIGIQPDI LVCRSDRPIPVGLKQKLSEFCDVPVECVITSPDARSIYEVPVILEREGLAEQVLNLLQMEQRQPNMTQWETMVDRMYNPQHTV EIAIVGKYVRLGDAYLSVVESLRHAAIATHGDLRLRWVNSEVLENEPPENYLSGVDGIIVPGGFGSRGIDGKIAAIKYARDRQIPF LGLCLGMQCSVIEWARNVEGLSNANSAEFDPYTDNPVINLLPEQQDVVDLGGTMRLGLYPCRVLPNTLAFQLYQEEVIYERHR HRYEFNNVYRSQLLDSGYLVSGTSPDGRLVEIVEYPKHPFFIACQFHPEFQSRPNAPHPLFKGLMTAAISQSHSATATPKPVQVM AKKVSRRLQALLEKVEDKDYTPLEALALLKETATAKFPEAAEAHIRLGIDPKYTDQQLRTTVALPKGTGQIIRVAVIARGEKVT EATNAGADIAGSEELIEDIQKGMMDFDKLIATPDVMPQVAKLGKLLGPRGLMPSPKGGTVTFDVASAIAEFKAGKLEYRADRT GIVHVMFGKTAFSPEDLLINLKALQESIDRNRPSGAKGRYWRSLYISSTMGPSIAIDISALRELKLTDAAMGTRSYRPYTPSTRQV IISDFAEITKTEPEKSLTESVHRPKGRNNQGRITSRRRGGGHKQLYRIIDFKRDKRNIPATVTAIEYDPNRNARIALLLYEDGEKRY ILQPNGMTVGTKIIAGPESPIEDGNALPLSNIPLGTGVHNVEMTPGKGGQIVRAAGAVAQVVAKEGNYVTLKLPSGEVRLIRRD CYATIGQVGNTDARNLSAGKAGRNRWKGRRPKVRGSAMNPVDHPHGGGEGRAPIGRSGPVTPWGKPTLGAKTRKRKKASTK LIIMSVGILGTKLGMTQIFDEAGVSIPVTVVKAGPCTVTQVKTKQTDGYSAIQVGYGEVKPKALNKPLLGHLAKSSAPAVRHLN EYRTDSAGDYALGQEIKADIFSAGEIVDVVGTSIGRGFAGNQKRNNFGRGPMSHGSKNHRAPGSIGAGTTPGRVYPGKRMAGR LGGTRVTIRKLTVVRVDTERNLILIKGAIPGKPGALVSVVPATIVGKKMVESVIKNWQGEQVGETNFDLRVAKETTAAHIVHRA LVRQMTNSRQGTASTKTRAEVRGGGRKPWRQKGTGRARAGSIRSPLWRGGGVIFGPKPRDFDLKMNRKERRLALRTAFISRA EDLIVVEEFSNELQRPKTKDLVAALARWGAAPEQKALLILSEIAENVLLSARNIENLKLIPADQLNVYDLLHADKIIVTSSTLEKI

QEVYSAMAITRLKTVYQETITPKLINQFQYTNVHQVPKVIKVTINRGLGEAAQNAKSLEASISEIALITGQKPVVTRAKKAIAGF KIRQGMPVGIMVTLRGERMYAFLDRLINLTLPRIRDFRGVSPKSFDGRGNYTLGVREQLIFPEVEYDRIDQVRGLDISIITTAKTD EEGRALLKEMGMPFRDQMSRIGKRPITIPAKVQVAIDGVKVVVKGPKGELSRQLPNNVILSLDGETLLVTRRDETRTSRQMHGL SRTLVANMVEGVSQGFQRRLEIQGVGYRAQLEGRNLVLNMGYSHKVQIEPPEGIQFAVEGTTNVIVSGYDKEIVGNTAAKIRA VRPPEPYKGKGIRYAGEVVRRMAKKVVAVIKLALNAGKANPAPPVGPALGOHGVNIMMFCKEYNAKTADOAGMVIPVEISV YEDRSFTFVLKTPPASVLIRKAAKIERGSNEPNKKKVGSISRTQLREIAQTKLPDLNANDIDAAMNIVEGTAKNMGVTVTDMSA ATEQILEQLKSLTLLEASELVKQIEEAFGVSAAATGGGMMMMAAPGGAAAEVVEEKTEFDAILDSVPADKKIAVLKIVREITGL GLKEAKDLVEAAPKAVKEAVTKDAAEDIKKRIEEAGGKVTVKMSSKTYLPPQASLERDWYLVDATDKRLGRLASEVAMILRG KRKAEYTPHLDTGDFVIIINAEKVAVTGKKRTQKLYRRHSGRPGGMKTETFAKLQQRLPERILEHAIKGMLPKNSLGKQLFTKL KVYAGPTHPHAAQQPKEITISTIPGENMIQPQSYLNVADNSGAKKLMCIRVLGAGNRRYGGVGDRIIAVVKESSPNMAVKKSD VVEAVIVRTRKAISRDSGMCIRFDDNAAVIINKEGNPRGTRVFGPVARELRDKNFTKIVSLAPEVLMLSPRRTKFRKQQRGRME GLASRGSTLNFGDFGLQAQEPSWITSRQIEASRRAMTRYIRRGGKIWIRIFPDKPITMRPAETRMGSGKGNPEFWVAVVKPGRIM FEIGGVTEEIAREAMRLADAKLPIKTKFIVRSQPQEQEMNAQEIIRSIEAEQMKSDLPEIYVGDTVKVGVKIQEGTKFRVQPYEGV VIARRNGGINETITVRKVFQGVGVERVFLLHSPLVESIKVLRRGKVRRAKLYYLRKLVGKATRIKQRFDRPLMTRVKRGNVAR KRRNKILKLAKGFRGSHSTLFRTANQQVMKALRSAYRDRKKKKRDFRRLWIARINAASRQHGLSYSRLIGNLKKANVELNRK MLAQLAILDPASFAKIAELANSVNGMAHKKGTGSTRNGRDSNAQRLGVKRYGGQTVRAGNILVRQRGTKVHPGNNVGIGSDD TLFALVDGVVTFERRGKSQKKVSVYPVAVELVEAVASNDDKYMESAFLLPDLIEIQRSSFRWFLEEGLIEELNSFSPITDYTGKL ELHFLGNNYKLKEPKYSVEESKRRDSTYAVQMYVPTRLLNKETGDIKEQEVFIGDLPLMTDRGTFIINGAERVIVNQIVRSPGVY YKSEIDKNGRRTYSASLIPNRGAWLKFETDRNDLVWVRIDKTRKLSAQVLLKALGLSDNEIFDALRHPEYFQKTIEKEGQFSEEE ALMELYRKLRPGEPPTVLGGQQLLDSRFFDPKRYDLGKVGRYKLNKKLRLSAPDTMRVLTPGDILAAIDYLINLEYDIGSIDDID HLGNRRVRSVGELLQNQVRVGLNRLERIIRERMTVSDAEVLTPASLVNPKPLVAAIKEFFGSSQLSQFMDQTNPLAELTHKRRL SALGPGGLTRERAGFAVRDIHPSHYGRICPIETPEGPNAGLIGSLATHARVNLYGFLETPFRPVENGKVLFDVPPVYMTADEEDD LRTATGDVPLDENGYIKGPQVPVRYRQDWTTTGPEQVDYVAVSPVQIVSVATSMIPFLEHDDANRALMGSNMQRQAVPLLKP ERPLVGTGLEAQAARDSGMVIVSRTDGDVVYVDATEIRVRSSGQLSAASGSQVIEKGQELKYKLSKYQRSNQDTCLNQKPLVR IGEKVVAGQVLADGSSTEGGELALGQNIVVAYMPWEGYNYEDAILISERLVQEDVYTSIHIEKYEIEARQTKLGPEEITREIPNV GEDALRQLDEQGIIRIGAWVDAGDILVGKVTPKGESDQPPEEKLLRAIFGEKARDVRDNSLRVPNGEKGRVVDVRLFTREQGD ELPPGANMVVRVYVAQKRKIQVGDKMAGRHGNKGIISRILPAEDMPYLADGSPVDIVLNPLGVPSRMNVGQVFECLLGWAGH NLGVRFKITPFDEMYGEETSRRLVHGKLQEARDETAKDWVYNPDNAGKIMVYDGRTGEPFDRAITVGVAYMLKLVHLVDDKI HARSTGPYSLVTQQPLGGKAQQGGQRFGEMEVWALEAFGAAYTLQELLTVKSDDMQGRNEALNAIVKGKAIPRPGTPESFKV LMRELQSLGLDIAVHKVETQADGSSLDVEVDLMADQAARRTPPRPTYESLSRESLEGDDMPVVSLAQMMESGVHFGHQTRR WNPKMAPYIYTSRNGVHIIDLVQTAQLMDNAYNYMRTQSEQGKKFLFVGTKRQAAGIIAQEALRCGSHYINQRWLGGMLTN WATIKTRAERLKDLERREESGALDLLPKKEASMLRREMTKLQKYLGGIKNMRKVPDIVVIVDQKREYNAVQECEKLGIPIVSM

LDTNCDPDVVDIPIPANDDAIRSIKLIVGKLADAIYEGRHGQLMGQKIHPVGFRLGITQEHQSRWFAEPDRYPELLQEDYKLRQY IEQKLGRYAQNNAGISEVRIERKADQIDLEVRTARPGVVVGRGGQGIESLRLGLQGALGGNRQIRINVVEVQRVDADAYLIAEY IAQQLERRVSFRRVVRQAIQRAQRAGVQGIKVQVGGRLNGAEIARSEWTREGRVPLHTLRADIDYSGCTAKTIYGILGIKVWVF KGEIIPGQEQAPAQPAMVTGRRKASRTKKEETTWQERVIQIRRVSKVVKGGKKLSFRAIVVVGNERGQVGVGVGKASDVIGAV KKGVADGKKHLIDIPITKSNSIPHPIDGIGGGAKVMMRPAAPGTGVIAGGAVRTVLELAGIRNILAKOLGSNNPLNNARAAVNA LSTLRTLSEVAEDRGIAIEKLYIVAEITSGRAVYWGTGRRKASVARVRLVPGEGKMTVNGKDGDLYFQFNPNYLGAIKAPLETL GLESEYDIVVKAEGGGLTGQADSIRLGVARALCQLDPDNRSPLKTEGYLTRDPRAKERKKYGLHKARKAPQYSKRMATLQQQ KIRIRLKAFDRRLLDTSCEKIVETANRTNATAIGPIPLPTKRKIYCVLRSPHVDKDSREHFETRTHRRIIDIYQPSSKTIDALMKLDL PSGVDIEVKLMARQPTKKSGSKKQKRNVPNGVAYIQSTFNNSIVTITDQNGDVISWASAGSSGFKGAKKGTPFAAQTAAESAA RRATDQGMRQIEVMVSGPGAGRETAIRALQGAGLEITLIRDITPIPHNGCRPPKRRRVMARISGVDLPRDKRIEIGLTYIYGIGLT RSHQILAATGVNPDTRVKELSDADVAALRGEIESNYQVEGDLRRLEGLNIKRLVDIGCYRGRRHRMGLPVRGQRTRTNARTRR GRRQTVAGKKKAPGKMGRSLKKGPFVADHLLKKIEKLNAKDEKQVVKTWSRASTILPLMVGHTIAVHNGRQHVPVFVNEQM VGHKLGEFAPTRTYRGHGKSDKKSGRMSDKQSEGYKVICDNRQARFLYEIIETYEAGIQLTGTEVKSIRAGKANLQDGYALLR DGEAWLINVHISPYTSSGAYFNHEPRRTRKLLLHKQELRKLIGRVQQEGLTLVPLKMYLKRGWVKIVIALGKGKKLHDKRESL KRRDDQRDMQRAMKRYMAEISAKLVQELRQKTGAGMMDCKKALKENEGDVEAATTWLRQKGIAKADKGSARIAAEGLVD TYIRPDGQVGVLIEVNCQTDFVARNEAFKALVKNLAKQAANADTVESLLAQPYTEKSSVTVDEFIKETIATLGENIQVRRFVNF SLTTDKPGIVDSYIHTGGRVGVLLELNSQTDAPATQEEFQNLARNAAMQVAACPNVEYVNIDQIPVEVVTKEKDIEMGKDDLG NKPENIKEKIVQGRIEKRLKEMTLLDQPFIRDQSISVEDLVKQVEKIVGEGIQVSRFVRYVLGEGIERKEMSFADEVAAQIGAK

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MQIPRLHPDTIEEVKLRADIVDVISEYVVLRKRGKDFVGLCPFHDEKTPSFTVSPYKQMYYCFGCQAAGNAIKFVMDLGKRQF AEVVLDLAKRYQVPVKTLEPEQRQELQRQISLRDQLYTVLASAAQFYQHTLRQSQGQKAREYLTKIRQFQEETIQQFGLGYAPP GWETLYRYLVESKHYPLQLVEQAGLIKPRKEGGGYYDVFRDRLMIPIRDLQGRVIAFGGRTLTEEQPKYLNSPETELFSKGKTL FALDAAKNAISKVDQAVVVEGYFDVISLHAAGINNAVASLGTALSIEQVRLLLRYTESKQLILNFDADKAGINATEKAIGEVSNL VYTGEVQLKILNLPHSKDADEYLHDHTSSDYQQLLKDAPLWLDWQIQNIIKNRDLKQATDFQQVTQQIIKLLQNIVNSDTLNYY VSYCAEILSLGDSRLKPLRVENLLTQIRPNSLKSLSPRINKPQPQKLKLSLVNTERTLLERAEASLLIIYIHFSEQRQIIIDELETRNL EFSLSHHRFLWQQMLEFSLDELDLISHVQNRYLELGEELDIISHLFHLNEKNKKEDILRISYIIQVALACMERVFREKRCRYFIEQ

WEKINPOTEPEKDKYYAEAIYIEKIHLODLEKQOMKLAEAESTMQKTVESTQRAFNTIRTGRANASLLDKVQVEYYGTPTSLKS LANISTPDASTILIQPYDKSSLNIVEKAISLSDVGLTPSNDGIVIRLNIPPLTTDRRKEFVKLAAKYAEEGRVAIRNIRRDAIESIRKQ EKNAEIPEDEARDQQDKLQKLTNKYTAKIDELLAEKEKDISTVMPVIEKKRTRDLPQINERIRFPKIRVIDTDGAQLGIITPQEAIQ LAEEKELDLVLISDKADPPVCRIMDYGKYKFEQEKKAREARKKQHTADVKEVKMRYKIEEHDYNVRVKQAERFLKDGDKVK ATVMFRGREIQHSDLAETLLKRMATDLEPFGELQQAPKKEGRNMMMLISPKKMSMVTLSGLKELIESISQERNLPRLAVQAAIR EALLKGYERYRRAQNLERKQFDEEYFKNFEVELDIEGEGFRVLSTKNIVETVSNTDHQISLDEVQQVAPEAQLGDSVVLDVTPD OGEFGRMAAMOTKOVLAOKLRDOOROMVQEEFODLEGTVLOARVLRFEROSVVLAVSSGFGOSEVEAELPKREOLPNDNYR ANATFKVYLKKVSQGQQRGPQLMVSRADAGLVVYLFANEVPEIEDEVVRIVAVAREANPPSRYVGPRTKIAVDTLDRDVDPV GACIGARGSRIQVVVNELRGEKIDVIRWSPDPATYIANALSPAKVDEVRLMDPESRQTHVLVAEDQLSLAIGKEGQNVRLAARL TGWKIDIKDQAKYDYEAENTKFAAVRAQYQSQNMSKKSLASLSAADISGKRALVRVDFNVPVDDQGNITDDTRIRAALPTIQD LTQKGAKVILTSHFGRPKGVDEKLRLTPVAKRLSALLGQEVIKTDDCIGDDVAAKVAALDNGQVLLLENVRFYAEEEKNDPEF AQKLAANADFYVNDAFGTAHRAHASTEGVTKFLSPSVAGYLVEKELQYLQSAIEAPQRPLAAIVGGSKVSSKIGVIETLLEKCD KLIIGGGMIFTFYKARGLSVGKSLVEEDKLELAKSLEAKAKERGVALLLPTDVVLADKFAPDADSQTVNIDAIPDGWMGLDIGP DSVKVFQAALADCKTVIWNGPMGVFEFDKFAKGTEAIAHTLADISKTGAITIIGGGDSVAAVEKVGLADQMSHISTGGGASLEL LEGKILPGIAALDEAMTKFIFVTGGVVSSIGKGIVAASLGRLLKSRDYSVSILKLDPYINVDPGTMSPFQHGEVFVTQDGAETDL DLGHYERFTDTSMSRLNSVTTGLIYQSVINKERRGDYNGGTVQVIPHITNEIKDRIVRVAKETNPSAVITEIGGTVGDIESLPFLEA IRQLRKEVGRRNVLYMHVTLLPWIASAGEMKTKPTQHSVKELRSIGIQPDILVCRSDRPIPVGLKQKLSEFCDVAVECVIPAPDA RSIYEVPVILEREGLAEQVLDLLQMEQRQPNLQEWETMVERMYTPKYSVEIAIVGKYVRLSDAYLSVVESLRHAAIATHGDLRL RWVNSEALETEPAENYLSGVDGIIVPGGFGSRGIDGKIAAIKYARDRQIPFLGLCLGMQCSVIEWARNVEGLSHANSAEFDPNTN DPVINLLPEQQDVVDLGGTMRLGLYPCRILPNTLAFQLYQEEVIYERHRHRYEFNNVYRSQLLDSGYLVSGTSPDGRLVEIVEY SOHPFFIACOFHPEFOSRPNAPHPLFKGFVNAAISQAHSTTNIPKPLKVSMAKKVSRRLRALLEKVEDRDYTPLEGLALLKETAT AKFAEAAEAHIRLGIDPKYTDQQLRTTVALPKGTGQIIRVAVIARGEKVTEATNAGADIAGSEELIEQIQKGFMDFDKLIATPDV MPQVAKLGKLLGPRGLMPSPKGGTVTFDIGSAIAEFKAGKLEYRADRTGIVHVMFGKAGFSPEDLLINLKALQESIDRNRPSGA KGRYWRSLYVSSTMGPSIAIDISALRELKLTEAAMGTRSYRPYTPSTRQVTISDFAEITKTEPEKSLTESVHRPKGRNNQGRITSR RRGGGHKQLYRIIDFKRDKRNIPATVTAIEYDPNRNARIALLLYEDGEKRYILQPNGMTVGTKVIAGPDSPIEDGNALPLSNIPLG SNVHNVEMTPGKGGQIVRAAGATAQVVAKEGNYVTLKLPSGEVRLIRRDCYATIGQVGNTDARNLSAGKAGRNRWKGRRPK VRGSVMNPVDHPHGGGEGRAPIGRSGPVTPWGKPTLGAKTRKRKKASTKLIIMSVGILGTKLGMTQIFDEEGVSIPVTVIQAGP CTVTQVKTKQTDGYAAIQVGYGEVKPKALNRPLLGHLAKSSAPAVRHLNEYRTDSAGDYALGQEIKADIFSAGEIVDVVGTSI GRGFAGNQKRNNFGRGPMSHGSKNHRAPGSIGAGTTPGRVYPGKRMAGRLGGTRVTIRKLTVVRVDTERNLIIIKGAIPGKPG ALVNVLPAKKVGKKMVESVIKNWQGEQVGETSFDLRVAKETTAAHIVHRALVRQMTNSRQGTASTKTRAEVRGGGRKPWR QKGTGRARAGSIRSPLWRGGGVIFGPKPRDFNLQMNRKERRLALRTAFISRAEDLIIVEEFSNELQRPKTKELVAALARWGAAP EQKTLLILSEIAENVLLSARNIENLKLIPANQLNVYDLLHADKIVVTSSTIDKIQEVYSAMATTRLKTVYQETITPKLISQFQYTNV

HQVPKVTKITVNRGLGEAAQNAKSLEASLSEIALITGQKPVVTRAKKAIAGFKIRQGMPVGIMVTLRGERMYAFLDRLINLTLP RIRDFRGVSPKSFDGRGNYTLGVREQLIFPEVEYDKIDQVRGLDISIITTAKTDEEGRALLKEMGMPFRDQMSRIGKRPITVPAKV QVAIDGVKVVVKGPKGELSRQLPNNVIVSQEGETLLVTRRDETRTSRQMHGLSRTLVANMVEGVSQGFQRRLEIQGVGYRAQI QGRNLVLNMGYSHQVQIEPPEGIQFAVEGTTNVIVSGYDKEIVGNTAAKIRAVRPPEPYKGKGIRYAGEVVRRMAKKLVAVIK LALNAGKANPAPPVGPALGQHGVNIMMFCKEYNAKTADQAGMVIPVEISVYEDRSFTFVLKTPPASVLIRKAAKIERGSNEPNK KKVGSISRNOLREIAOTKLPDLNANDIDAAMKIVAGTAKNMGVTVTDMSAATEQILEQLKALTLLEASELVKQIEEAFGVSAA ATGGMMMVAPGAAAPAEEVVEKTEFDAILDSVPADKKIAVLKIVREITGLGLKEAKELVEAAPKAVKEGVAKEAAEDIKKRIE EAGGKVVIKMSSKTYLPPQASLERDWYLVDATDKRLGRLASEVAMILRGKRKAEYTPHLDTGDFVIIINAEKVAVTGKKRTQK IYRRHSGRPGGMKTETFAKLQQRLPERILEHAIKGMLPKNSLGKQLFTKLKVYAGPTHPHAAQQPKEITISTIPGENMIQPQSYL NVADNSGAKKLMCIRVLGAGNRRYGGVGDRIIAVVKESSPNMAVKKSDVVEAVIVRTRKAINRDSGMTIRFDDNAAVIINKEG NPRGTRVFGPVARELRDKNFTKIVSLAPEVLMLSPRRTKFRKQQRGRMEGLASRGSTLNFGDFGLQAQEPSWITSRQIEASRRA MTRYIRRGGKIWIRIFPDKPITMRPAETRMGSGKGNPEFWVAVVKPGRIMFEIAGVAEEIAREAMRLADAKLPIKTKFIVRSQPQ EQEMNAQEIIRSIEAEQLKSDLPDIYVGDTVKVGVKIKEGTKYRVQPYEGVVIAMRNGGINETITVRKVFQGVGVERVFLLHSPR IESIKVLRRGKVRRAKLYYLRALVGKATRIKQRFDRALMTRVKRGNVARKRRNKILKLAKGFRGSHSTLFRTANQQVMKALR SAYRDRKKKKRDFRRLWIARINAASRQHGLSYSRLIGNLKKANVELNRKMLAQLAILDPASFAKIAELAQSVMAHKKGTGSTR NGRDSNAQRLGVKSYGGQTVRAGNILVRQRGTKVHPGNNVGIGSDDTLFALVDGVVTFERKGKSRKKVSVYPVVVAEVEAM TNDKYMESAFLLPDLIEIQRSSFRWFLEEGLIEELNSFSPITDYTGKLELHFLGNNYKLKEPKYSVEESKRRDSTYAVQMYVPTR LLNKETGDIKEQEVFIGDLPLMTDRGTFIINGAERVIVNQIVRSPGVYYKSEIDKNGRRTYSASLIPNRGAWLKFETDRNDLVWV RIDKTRKLSAQVLLKALGLSDNEIFDALRHPEYFQKTIEKEGQFSEEEALMELYRKLRPGEPPTVLGGQQLLDSRFFDPKRYDLG KVGRYKLNKKLRLSAPDTMRVLTSGDILAAIDYLINLEFDIGSIDDIDHLGNRRVRSVGELLQNQVRVGLNRLERIIRERMTVSD AEVLTPASLVNPKPLVAAIKEFFGSSQLSQFMDQTNPLAELTHKRRLSALGPGGLTRERAGFAVRDIHPSHYGRICPIETPEGPNA GLIGSLATHARVNQYGFLETPFRPVENGKVLFDVPPVYMTADEEDDLRTATGDVPLDENGYIKGPQVPVRYRQDWTTTGPEQV DYVAVSPVQIVSVATSMIPFLEHDDANRALMGSNMQRQAVPLLKPERPLVGTGLEAQAARDSGMVIVSRTDGEVVYVDATEIR VRVSSQWSVISGQSSLAEKRTTDNEQLTTDKPQEIRYNLSKYQRSNQDTCLNQKPLVRIGEKVVAGQVLADGSSTEGGELALG QNIVVAYMPWEGYNYEDAILISERLVQEDIYTSIHIEKYEIEARQTKLGPEEITREIPNVGEDALRQLDEQGIIRIGAWVDAGDILV GKVTPKGESDQPPEEKLLRAIFGEKARDVRDNSLRVPNGEKGRVVDVRLFTREQGDELPPGANMVVRVYVAQKRKIQVGDKM AGRHGNKGIISRILPAEDMPYLADGSPVDIVLNPLGVPSRMNVGQVFECLLGWAGHNLGVRFKVTPFDEMYGEETSRRLVHGK LQEARDETGRDWVYNPENCGKIMVYDGRTGEPFDRAVTVGVAYMLKLVHLVDDKIHARSTGPYSLVTQQPLGGKAQQGGQR FGEMEVWALEAFGAAYTLQELLTVKSDDMQGRNEALNAIVKGKAIPRPGTPESFKVLMRELQSLGLDIAVHKVETQVDGSSLD VEVDLMADLAPRRTPPRPVYESLSYESLEDDDMPVVSLAQLMESGVHFGHQTRRWNPKMDPYIYTSRNGVHIIDLVQTAQLM DNAYNYMRTQSEQGKKFLFVGTKRQAAGIIAQEALRCGSHYINQRWLGGMLTNWATIKTRAERLKDLERREETGALDLLPKK EASMLRREMTKLQKYLGGIKNMRKVPDIVIIVDQKREYNAVQECEKLGIPIVSMLDTNCDPDVVDIPIPANDDAIRSIKLIVGKL

ADAIYEGRHGQLMGQKIHPVGFRLGITQEHQSRWFAEPDRYPELLQEDYKLRQYIEQKLGRYAQNNAGISEVRIERKADQIDLE VRTARPGVVVGRGGQGIESLRLGLQGALGGNRQIRINVVEIQRVDADAYLIAEYIAQQLERRVSFRRVVRQAIQRAQRAGVQGI KIQVGGRLNGAEIARSEWTREGRVPLHTLRADIDYSGCTAKTIYGILGIKVWVFKGEIIPGQEQAPVQPARDRDRDRDRGDRER EPRRRQQQRRRQQFEDRSNEAMVTGRRKASRAKKEETNWQERVIQIRRVSKVVKGGKKLSFRAIVVVGNERGQVGVGVGKA SDVIGAVKKGVADGKKHLIDIPITKSNSIPHPIDGIGGGAKVMMRPAAPGTGVIAGGAVRTVLELAGIRNILAKQLGSNNPLNNA RAAVNALSTLRTLSEVAEDRGVAIEKLYIVAEINSGRAVYWGTGRRKCSVARVRLVPGAGKMTVNGKDGELYFQFNPNYLGA IKAPLETLGLENEYDIVVKAEGGGLTGQADSIRLGVARALCELDPDNRSPLKTEGYLTRDPRAKERKKYGLHKARKAPQYSKR MATLQQQKIRIRLKAFDRRLLDTSCEKIVDTANRTNATAIGPIPLPTKRKIYCVLRSPHVDKDSREHFETRTHRRIIDIYQPSSKTI DALMKLDLPSGVDIEVKLMARQPTKKTGSKKPKRNVPNGIAYIQSTFNNSIVTITDQKGDVISWASAGSSGFKGAKKGTPFAAQ TAAESAARRATDQGMRQIEVMVSGPGAGRETAIRALQGAGLEITLIRDITPIPHNGCRPPKRRRVIKRLVDIGCYRGRRHRMGLP VRGQRTRTNARTRRGRRQTVAGKKKAPGKMGRSLKKGPFIADHLLKKIEKLNAKNEKQVVKTWSRASTILPLMVGHTIAVHN GRQHVPVFVNEQMVGHKLGEFAPTRTYRGHGKSDKKSGRMSDKQSEGYKTICDNRQARFRYEILETYEAGIELTGTEVKSIRG GKANLQDGYALIRDGEAWLINVHISPYTSSGAYFNHEPRRTRKLLLHKQELRKLIGKVEQEGLTLVPLKMYLKRGWVKVVIAL GRGKKLHDKRESIKRRDDQRSMQRAMKRFMAEISAKLVQELRQKTGAGMMDCKKALKENDGNIEAATTWLRQKGIAKADK GSSRIAAEGLVDTYIQPGGQVGVLIEVNCQTDFVARNEAFKALVKNLAQQAATADSVESLLAQPYIENSSVTVEEFIKETIATLG ENIQVRRFVNFSLANGTPGVADSYIHTGGRVGVLLELTTESDSAVANEEFQGLAKNAAMQVAACPNVEYVSVDKIPAELVQKE KDIEMGKDDLANKPENIREKIVQGRIEKRLKEMTLLDQPYIRDQSILVEDLVRQVKSKIGEEVQVSRFVRYVLGEGIEKKEISFAE **EVAAQMGAK**

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MQIPRLHPDTIEEVKLRADIVDVVSEYVVLRKRGKDFVGLCPFHDEKSPSFTVSPNKQMYYCFGCQAAGNAIKFVMDLGKRQF ADVVLDLAKRYQVPVKTLEPEQRQELQRQISLRDQLYTVLASAAQFYQHTLRQSQGQKALEYLEKSRQFQQGTIQQFGLGYAP AGWETLYRYLVESKHHPVQLVEQAGLIKPRKEGGGYYDVFRDRLMIPIRDIQGRVIAFGGRTLTDEQPKYLNSPETELFSKGKT LYALDEAKDGISKVDQAVVVEGYFDAIALHAAGINNAVASLGTALSIEQVRLLLRYSESKQLILNFDADKAGTNATERAIGEIA NLAYAGEVQLKILNLPNGKDADEYLHSHTSADYQQLLVNAPLWLDWQIQKIIENRDLKQATDFQQVTQQIVKLLQNIVNSDTL NYYVSSCAEILSLGDTRLIPLRVENLLTQIKPGRIKSSPQQIRNQQPKTSKLSLVTTERSLLERAEALLLIIYLHSSRQRQIIIEDLET RNLEFSLSHHRFLWQQMAEFTVDEVDLISSVQNRYLELAEELEVVSHLFHLNEKNKTEILRTPHVIQAALACMERVFREKRYRY

FMEQWEKIDPETEPEKDKYFAEAIYIEKIHLQDLEKQRQFSITDLIMKLAEAQETMEKTVESTQRAFNTIRTGRANASLLDKVQV EYYGTPTALKSLASISTPDSSTILIQPYDKGSLNIIEKALSLSDVGLTPSNDGVVIRLNIPPLTSDRRKQFVKLAAKYAEEGRVAIR NIRRDAIESIRKQEKSAEISEDESRDQQDKLQKLTNKHTEKIDHLLVEKEKEISTVMPVIEKKRTRDLPQINERIRFPKIRVIDTDG AQLGIITPQEAIQLAEEKELDLVLISDKADPPVCRIMDYGKYKFEQEKKAREARKKQHTADVKEVKMRYKIEEHDYNVRVKQA ERFLKDGDKVKATVMFRGREIQHSDLAETLLKRMATDLEPFGELQQAPKKEGRNMMMLISPKKMSMVTLSGLKELIESISQDR NLPRLAVQAAIREALIKGYERYRRAQNLERRQFDEEYFNNFEVELDIDGEGFRVLSTKTIVEAVSNTDHQISLDEVQQVAPEAQL GDSVVLDVTPDQGEFGRMAAMQTKQVLAQKLRDQQRQMVQEEFQDLEGTVLQARVLRFERQSVVLAVSSGFGQSEVEAELP KREQLPNDNYRANATFKVYLKKVSQGQQRGPQLMVSRADAGLVVYLFANEVPEIEDEVVRIVAVAREANPPSRYVGPRTKIA VDTLDRDVDPVGACIGARGSRIQVVVNELRGEKIDVIRWSPDPATYIANALSPARVDEVRLMDPESRQTHVLVAEDQLSLAIGK EGONVRLAARLTGWKIDIKDQAKYDEAAENTKFAAVRAQYQSHNNENDRSNREDEIQEQLELDEDRFDSREEDMSKKSLASL SAAEISGKRALVRVDFNVPVDDQGNITDDTRIRAALPTIQDLTQKGAKVILASHFGRPKGVDEKLRLTPVAKRLSELLKQEVVK TDDCIGDDVAAKVAALQNGQVLLLENVRFYPEEEKNEPEFAKKLAANADFYVNDAFGTAHRAHASTEGVTKFLSPSVAGYLV EKELQYLQSAIESPQRPLVAIIGGSKVSSKIGVIETLLEKCDKLIIGGGMIFTFYKARGLSVGKSLVEEDKLELAKALEAKAKERG VALLLPTDIVSADKFSPDANATTVSIENIPADGMGLDIGPDSIKVFQAALADCKTVIWNGPMGVFEFDKFAAGTEAIAHTLADIS KTGAITIIGGGDSVAAVEKVGLADQMSHISTGGGASLELLEGKILPGIAALDEAMTKFIFVTGGVVSSIGKGIVAASLGRLLKSRD YSVSILKLDPYINVDPGTMSPFQHGEVFVTQDGAETDLDLGHYERFTDTSMSRLNSVTTGLIYQSVINKERRGDYNGGTVQVIP HITNEIKERILRVAKETNPSAVITEIGGTVGDIESLPFLEAIRQLRKEVGRRNVLYLHVTLLPWIAAAGEMKTKPTOHSVKELRSIG IQPDILVCRSDRPIPTGLKQKLSEFCDVPVECVITSPDARSIYEVPVLLEREGLAEQVLNLLQMEQRQPNMTQWEMMVDRMYNP KYTVEIAIVGKYVRLSDAYLSVVESLRHAAIATHGDLRLRWVNSEVLENEPPENYLSGVDGIIVPGGFGNRGIDGKIAAIKYARD RQIPFLGLCLGMQCSVIEWARNVEGLSNANSAEFDQYTKNPVINLLPEQQDVVDLGGTMRLGLYPCRVLPNTLAFQLYQEEVI YERHRHRYEFNNVYRSQLLNSGYLVSGTSPDGRLVEIIEYPKHPFFIACQFHPEFQSRPNAPHPLFKGFMTAALSQSHSTTTIPKP VEVSMAKKVSRRLQALLEKVEDRDYTPLEALALLKETATAKFPEAAEAHIRLGIDPKYTDQQLRTTVALPKGTGQIIRVAVIAR GEKVTEATNAGADLAGSEELIDQIQKGFMDFDKLIATPDVMPQVAKLGKLLGPRGLMPSPKGGTVTFDVASAIAEFKAGKLEY RADRTGIVHVMFGKTAFSPEDLLINLKALQESVDRNRPSGAKGRYWRSLYISSTMGPSIAIDISALRDLKLTDAAMGTRSYRPYT PSTRQVIISDFAEITKTEPEKSLTESVHRPKGRNNQGRITSRRRGGGHKQLYRIIDFKRDKRNISATVTAIEYDPNRNARIALLLYE DGEKRYILQPNGMTVGTKIIAGPESPIEDGNALPLSNIPLGTGVHNVEMIPGKGGQIVRAAGAVAQVVAKDGNYVTLKLPSGEV RLIRRDCYATIGQVGNTDARNLSAGKAGRNRWKGRRPKVRGSAMNPVDHPHGGGEGRAPIGRAGPVTPWGKPTLGAKTRKK KKASSKLIIMSVGILGTKLGMTQIFDEAGVAIPVTVIKAGPCTVTQVKTKQTDGYAAIQVGYGEVKPKALNRPLLGHLAKSSAP ALRHLNEYRTDNSGDYTLGQELKADLFSAGEIVDVAGTSIGRGFAGNQKRNNFARGPMSHGSKNHRAPGSIGAGTTPGRVYPG KRMAGRLGGTRVTIRKLTVIRVDVERNLILIKGAIPGKPGALVSIIPANLVGRKMVESVIKNWQGEQVGQTSFELRVAKETTAA HIVHRALVRQMTNSRQGTASTKTRAEVRGGGRKPWRQKGTGRARAGSIRSPLWRGGGVIFGPKPRDFNINMNRKERRLALRT AFIGRAEDLIVVEEFSNELQRPKTKDLVAALGRWGATPEQKTLLILSEIAENVLLSARNIENLKLIPADQLNVYDLLHADKIIVTS

STLDKIQEVYSAMAKTRLKTVYQETITPKLITQFEYTNVHQVPKVTKITINRGLGEAAQNAKSLEASISEIALITGQKPVVTRAKK AIAGFKIRQGMPVGIMVTLRGERMYAFLDRLINLTLPRIRDFRGISPKSFDGRGNYTLGVREQLIFPEVEYDRIDQVRGLDISIITT AKTDEEGRALLKEMGMPFRDQMSRIGKRPITIPAKVQVAIDGLKVVVKGPKGELSRQLPRNVILSQEGETLLVTRRDETRTSRQ MHGLSRTLVANMVEGVSLGFQRRLEIQGVGYRAQLEGRNLVLNMGFSHKVQIEPPEGIQFAVEGTTNVIVSGYDKEIVGNTAA KIRAVRPPEPYKGKGIRYAGEVVRRMAKKVVAVIKLALNAGKANPAPPVGPALGQHGVNIMMFCKEYNAKTADQAGMVIPV EISVYEDRSFTFVLKTPPASVLIRKAAKIEKGSNEPNKTKVGSISRTQLREIAQTKLPDLNANDIDAAMNIVEGTAKNMGVTITEM SAATETILEQLKSLSLLEASELVKQIEEAFGVSAAPAAGGMMMMAAPGAVAEAVEEKVEFDAILDSVPADKKIAVLKIVREITG LGLKEAKDLVEAAPKAIKEAVTKDAAEDIKKRVEEAGGKVTVKTKTYLPPQASIERDWYLVDATDKRLGRLATEVAMILRGK KKPEFTPHMDTGDFVIIINAEKVAVTGKKRTQKLYRRHSGRPGGMKTETFAKLQQRLPERIIEHAVKGMLPKCSLGKQLFTKLK VYAGPTHPHAAQLPKEITINTIPGENMIQPQSYLNVADNSGAKKLMCIRVLGAGNRRYGGVGDKIIAVVKESTPNMAVKKSDV VEAVIVRTRKAISRDNGMCIRFDDNAAVIINKDGNPRGTRVFGPVARELRDKNFTKIVSLAPEVLMLSPRRTKFRKQQRGRMEG LASRGSTLNFGDFGLQAQEPSWITSRQIEASRRAMTRYIRRGGKIWIRIFPDKPITMRPAETRMGSGKGNPEFWVAVVKPGRIMF EIGGVTEEIAREAFRLADAKLPIKTKFMARSQPQEQEMNAQEIIRSIEAEQMKSDLPDIYVGDTVKVGVKIQEGTKFRVQPYEGV VIARRNGGINETITVRKVFQGVGVERVFLLHSPLVESIKVLRRGKVRRAKLYYLRDLVGKATRIKQRFDRPLMTRVKRGNVAR KRRNKILKLAKGFRGSHSTLFRTANQQVMKALRSAYRDRKKKKRDFRRLWIARINAASRQHGLSYSRLIGNLKKANVELNRK MLAOLAILDPASFAKIAELANSVNGMAHKKGTGSTRNGRDSNAORLGVKRYGGOTVRAGNILVRORGTKVHPGNNVGIGSDD TLFALIDGVVTFERRGKSQKKNDDKYMESAFLLPDLIEIQRSSFRWFLEEGLVEELNSFSPITDYTGKLELHFLGNNYKLKEPKY SVEESKRRDSTYAVQMYVPTRLLNKETGDIKEQEVFIGDLPLMTDRGTFIINGAERVIVNQIVRSPGVYYKSEIDKNGRRTYSAS LIPNRGAWLKFETDRNDLVWVRIDKTRKLSAQVLLKALGLSDNEIFDALRHPEYFQKTIEKEGQFSEEEALMELYRKLRPGEPP TVLGGQQLLDSRFFDPKRYDLGKVGRYKLNKKLRLSAPDTMRVLTPGDILAAVDYLINLEYDIGSIDDIDHLGNRRVRSVGELL QNQVRVGLNRLERIIRERMTVSDAESLTPASLVNPKPLVAAIKEFFGSSQLSQFMDQTNPLAELTHKRRLSALGPGGLTRERAGF AVRDIHPSHYGRICPIETPEGPNAGLIGSLATHARVNLYGFLETPFRAVENGKVLFNVAPVYMTADEEDDLRTATGDVPLDENG YIKGPSVPVRYRQDWTTTNPEQVDYVAVSPVQIISVATSMIPFLEHDDANRALMGSNMQRQAVPLLKPERPLVGTGLEAQAAR DSGMVIVSRTDGDVIYVDATEIRVRASGQLSAASGSQPIEKGQELKYKLSKYQRSNQDTCLNQKPLVRIGEKVVAGQVLADGS STEGGELALGONIVVAYMPWEGYNYEDAILISERLVQEDVYTSIHIEKYEIEARQTKLGPEEITREIPNVGEDALRQLDEQGIIRIG AWVDAGDILVGKVTPKGESDQPPEEKLLRAIFGEKARDVRDNSLRVPNGEKGRVVDVRLFTREQGDELPPGANMVVRVYVAQ KRKIQVGDKMAGRHGNKGIISRILPAEDMPYLADGSPVDIVLNPLGVPSRMNVGQVFECLLGWAGHNLGVRFKITPFDEMYGE ETSRRLVHGKLQEARDETSKDWIYNPDNAGKIMVYDGRTGEPFDRAITVGVAYMLKLVHLVDDKIHARSTGPYSLVTQQPLG GKAQQGGQRFGEMEVWALEAFGAAYTLQELLTVKSDDMQGRNEALNAIVKGKAIPRPGTPESFKVLMRELQSLGLDIAVHKV ETOADGSSLDVEVDLMADQAARRTPSRPTYESLSRESLEGEEMPVVSLAQMMESGVHFGHQTRRWNPKMAPYIYTSRNGVHII DLVQTAQLMDNAYNYMRTQSEQGKKFLFVGTKRQAAGIIAQEALRCGSHYINQRWLGGMLTNWATIKTRAERLKDLERREE TGALDLLPKKEASMLRREMTKLQKYLGGIKNMKKVPDIVVIVDQKREYNAVQECEKLGIPIVSMLDTNCDPDVVDIPIPANDD

AIRSIKLIVGKLADAIYEGRHGQLMGQKIHPVGFRLGITQEHQSRWFAEPDRYPELLQEDYKLRQYIEQKLGRYAQNNAGISEV RIERKADQIDLEVRTARPGVVVGRGGQGIESLRLGLQGALGGNRQIRINVVEIQRVDADAYLIAEYIAQQLERRVSFRRVVRQSI QRAQRAGVQGIKVQVGGRLNGAEIARSEWTREGRVPLHTLRADIDYSSCSAKTTYGILGIKVWVFKGEIIPGQEQAPEQPARDR DRDRDRDRDRDREPRRKQQRRRQQFEDRSNESMVTGRRKQARAKKEETTWQERVIQIRRVSKVVKGGKKLSFRAIVVVGNE RGQVGVGVGKASDVIGAVKKGVADGKKHLIDIPITKANSIPHPIDGIGGGAKVMMRPAAPGTGVIAGGAVRTVLELAGIKNILA KQLGSNNPLNNARAAVNALSTLRTLSEVAEDRGIAIEKLYVAETTSGRAVYWGTGRRKCSVASVRLVPGEGKMTVNGKDGDL YFQFNPNYLGAIKAPLETLGLESEYDILVKAEGGGLTGQADSIRLGVARALCQLDPDNRSPLKTEGYLTRDPRAKERKKYGLHK ARKAPQYSKRMATLQQQKIRIRLKAFDRRLLDTSCEKIVETANRTNATAIGPIPLPTKRKIYCVLRSPHVDKDSREHFETRTHRRI IDIYQPSSKTIDALMKLDLPSGVDIEVKLMARQPTKKSGSKKQKRNVPSGVAYIQSTFNNSIVTITDQNGDVISWASAGSSGFKG AKKGTPFAAQTAAESAARRATDQGMRQIEVMVSGPGAGRETAIRALQGAGLEITLIRDITPIPHNGCRPPKRRRVMARISGVDL PRDKRVEIGLTYIYGIGLTRSHQILAATGVNPDIRVKDLSDADVAALRGEIESNYQVEGDLRRLEGLNIKRLIDIGCYRGRRHRM GLPVRGQRTRTNARTRRGRRQTVAGKKKAPGKMGRSLKKGPFVADHLLKKIEKLNAKDEKQVVKTWSRASTILPLMVGHTIA VHNGRQHIPVFVNEQMVGHKLGEFAPTRTYRGHGKSDKKSGRMSDKQSDGYKVICDNRQARFLYEIIETYEVGIQLTGTEVKSI RAGKANLQDGYALLRDGEAWLINVHISPYASSGAYFNHEPRRTRKLLLHKQELRKLIGRVQQEGLTLVPLKMYLKRGWVKIVI ALGKGKKLHDKRESLKRRDDQRDMQRAMKRYMAEISAKLVQELRQKTGAGMMDCKKALKENDGNVDESIDWLRKKGIAK ADKGSSRIAAEGLVDTYIQPDGQVGVLIEVNCQTDFVARNEAFKALVKNLAQQAATTDSVESLLAQSYAEKPSVTVDEFIKETI ATLGENIQVRRFVNYSLTSTPGIADSYIHTGGRVGVLMELTAQSASAAANAEFQSLAKNAAMQVAACPNVEYVSVDQIPVEVV TKEKSIEMGKDDLGNKPENIKEKIVQGRIDKRLKEMTLLDQPYIRDQSISVEDLVKQVKSTVGEEIQVNRFVRYILGEGIEKNEM **SFADEVAAQIGAK**

>Dolichospermum sp DL01

MQIPRLHPDTIEEVKLRADIVDVVSEYVVLRKRGKDFLGLCPFHDEKSPSFSVSPNKQMYYCFGCQAAGNAIKFVMDLGKRQF ADVVLDLAKRYQVPVKTLEPEQRQELQRQISLRDQLYTVLATAAQFYQHTLRQSQGQKALEYLEQTRQFKQGTIQQFGLGYAP AGWATLYRYLVESKHYPVQLVEQAGLIKPRKEGGGYYDVFRDRLMIPIRDIQGRVIAFGGRTLTEEQPKYLNSPETELFSKGKM LFALDEAKDGISKVDQAVVVEGYFDAIALHAAGINNAVASLGTALSIEQVRLLLRYTESKQLILNFDADKAGTNATERAIGEIA NLAYAGEVQLKILNLPNGKDADEYLHSHTSADYQQLLTNAPLWLDWQIQNIIKNRDLKQATDFQKVTQQIVKLLQNIVNSDTL NYYVSSCAEILSLGDTRLIPLRVENLLTQIKPGRIKSLNPRTSNPATKTPKLSLVNTERSLLERAEALLLIIYLHSSQQRQIIIEDLEN RNLEFSLSHHRFLWQQMAEFTVDEVDLISSVQNRYLELAEELEIVSHIFHLNEKNKTEILRTPHVIQAALACMERVFREKRYRYF

MEQWEKIDPEAEPEKDKYYAEAIYIEKLHLQDLEKQRQFSITDLIMKLAEAESMMQKTVESTQRAFNTIRTGRANASLLDKVQ VEYYGTPTSLKALTNISTPDSSTILIOPYDKGSLNIIEKAISLSDVGLTPSNDGSVIRLNIPPLTSDRRKEFVKLAAKYAEEGRVAIR NIRRDANDSIRKQEKSAEISEDESRDQQDKLQKLTNKHTEKIDHLLVEKEKEITTVMPVIEKKRTRDLPQINERIRFPKIRVIDTDG AQLGIITPQEAIQLAEEKELDLVLISDKADPPVCRIMDYGKYKFEQEKKAREARKKQHTADVKEVKMRYKIEEHDYNVRVKQA ERFLKDGDKVKATVMFRGREIQHSDLAETLLKRMATDLEPFGELQQAPKKEGRNMMMLISPKKMVTLSGLKELIESISQERNL PRLAVQAAIREALIKGYERYRRAQNLERRQFDEEYFNNFEVELDIEGEGFRVLSTKTIVEAVANTDHQISLDEVQQVAPEAQLG DSVVLDVTPDQGEFGRMAAMQTKQVLAQKLRDQQRQMVQEEFQDLEGTVLQARVLRFERQSVVLAVSSGFGQSEVEAELPK REQLPNDNYRANATFKVYLKKVSQGQQRGPQLMVSRADAGLVVYLFANEVPEIEDEVVRIVAVAREANPPSRYVGPRTKIAV DTLDRDVDPVGACIGARGSRIQVVVNELRGEKIDVIRWSPDPATYIANALSPAKVDEVRLMDPESRQTHVLVAEDQLSLAIGKE GONVRLAARLTGWKIDIKDOAKYDEEAENTKFAAVRAQYOSONDRDDRSDREDAMAEELELDEDRFDNSEEDMSKKSLASL SAADISGKRALVRVDFNVPVDDQGNITDDTRIRAALPTIQDLTQKGAKVILTSHFRRPKGVDEKLRLTPVAKRLSELLGQEVIKT DDCIGDDVAAKVAALDNGQVLLLENVRFYKEEEKNDPEFAQKLAANADFYVNDAFGTAHRAHASTEGVTKFLSPSVAGYLV EKELQYLQSAIEEPKRPLAAIIGGSKVSSKIGVIETLLEKCDKLIIGGGMIFTFYKARGLNVGKSLVEEDKLELARELEAKAKERG VALLLPTDIISADKFAPDANATTVSIENIPADGMGLDIGPDSIKVFQAALADCQTVIWNGPMGVFEFDKFAAGTEAIAHTLAEIG KTGATTIIGGGDSVAAVEKVGLADQMSHISTGGGASLELLEGKVLPGIAALDEAMTKFIFVTGGVVSSIGKGIVAASLGRLLKSR DYSVSILKLDPYINVDPGTMSPFQHGEVFVTQDGAETDLDLGHYERFTDTSMSRLNSVTTGLIYQSVINKERRGDYNGGTVQVI PHITNEIKERILRVAKETNPAAVITEIGGTVGDIESLPFLEAIRQLRKEVGKRNVLYMHVTLLPWIAAAGEMKTKPTQHSVKELRS IGIQPDILVCRSDRPIPVGLKQKLSEFCDVPVECVITSPDARSIYEVPVILEREGLAEQVLNLLQMEQRQPNMTQWENMVDRMYN PKYTVEIAIVGKYVRLGDAYLSVVESLRHAAIATHGDLRLRWVNSEVLENEPPENYLAGVDGIIVPGGFGSRGIDGKIAAIKYAR DRQIPFLGLCLGMQCSVIEWARNVEGLSNANSAEFDPYTDNPVINLLPEQQDVVDLGGTMRLGLYPCRVLPNTLAFQLYQEEVI YERHRHRYEFNNVYRSQLLDSGYLVSGTSPDGRLVEIIEYPKHPFFIACQFHPEFQSRPNAPHPLFKGFMTAAISQFHSTTTTPKP VQVSMAKKVSRRLQALLEKVEDRDYTPLEALALLKETATAKFAEAAEAHIRLGIDPKYTDQQLRTTVALPKGTGQIIRVAVIAR GEKVTEATNAGADIAGSEELIEDIQKGMMDFDKLIATPDVMPQVAKLGKLLGPRGLMPSPKGGTVTFDVASAIAEFKAGKLEY RADRTGIVHVMFGKTAFSPEDLLINLKALQESVDRNRPSGAKGRYWRSLYISSTMGPSISIDISALRELKLTDAAMGTRSYRPYT SSTRQVIISDFAEITKTEPEKSLTESVHRPKGRNNQGRITSRRRGGGHKQLYRIIDFKRDKRNMPATVTAIEYDPNRNARIALVLY EDGEKRYILQTNGMTVGTKIIAGPESPIEDGNALPLSNMPLGTSVHNVEMTPGKGGQIVRAAGAVAQVVAKEGNYVTLKLPSG EVRLIRRDCYATIGQVGNTDARNLSAGKAGRNRWKGRRPKVRGSAMNPVDHPHGGGEGRAPIGRAGPVTPWGKPTLGAKTR NRKKASTKLIIMSVGILGTKLGMTQIFDEAGVSIPVTVIKAGPCTVTQVKTKQTDGYSAIQVGYGEVKPKSLNRPLLGHLAKSSA PPVRHLNEYRTDSTGDYALGQEIKADIFSAGEIVDVVGTSIGRGFAGNQKRNNFARGPMSHGSKNHRAPGSIGAGTTPGRVYPG KRMAGRLGGTRVTIRKLTVIRVDAERNLIIIKGAIPGKPGALVSVVPATIVGKKMVESVIKNWQGEQVGETSFDLRVAKETTAA HIVHRALVRQMTNSRQGTASTKTRAEVRGGGRKPWRQKGTGRARAGSIRSPLWRGGGVIFGPKPRDFDLKMNRKERRLALRT AFVGRAEDLIVVEEFSNELQRPKTKDLVAALARWGAAPEQKTLLILSEIAENVLLSARNIENLKLIPADQLNVYDLLHADKIIVT

SSTLDKIQEVYSAMAKTRLKTVYQETITPKLITQFEYTNVHQVPKVIKITINRGLGESAQNAKSLEASISEIALITGQKPVVTRAKK AIAGFKIRQGMPVGIMVTLRGERMYAFLDRLINLTLPRIRDFRGISPKSFDGRGNYTLGVREQLIFPEVEYDRIDQVRGLDISIITT AKTDEEGRALLKEMGMPFRDQMSRIGKRPITIPAKVQVAIDGVKVVVKGPKGELSRQLPKNVIVSQEGETLIVTRRDETRTSRQ MHGLSRTLVANMVEGVSQGFQRRLEIQGVGYRAQLQGSNLVLNMGYSHQVQIEPPAGVQFAVEGTTNVIVSGYDKEIVGNTA AKIRAVRPPEPYKGKGIRYAGEVVRRMAKKVVAVIKLALNAGKANPAPPVGPALGQHGVNIMMFCKEYNAKTADQAGMVIP VEISVYEDRSFTFVLKTPPASVLIRKAAKIERGSSEPNKTKVGRISRTQLREIAQTKLPDLNANDIDAAMNIVEGTAKNMGVTITD MSAATEQILEQLKSLTLLEASELVKQIEEAFGVSAAAPVGVAIAAPGAAAAEVVEEKTEFDAILDSVPADKKIAVLKIVREITGL GLKEAKDLVEAAPKAVKEAVTKEAAEDIKKRIEEAGGKVKVKMTSKTYLPPQQSIERDWYLVDATDKRLGRLATEVAMILRG KKKPEFTPHMDTGDFVIIINAEKVAVTGKKRTQKVYRRHSGRPGGMKTETFAKLQQRLPERILEHAIKGMLPKNSLGKQLFTKL KVYAGPTHPHAAQLPKEITISTIPGENMIQPQSYLNVADNSGAKKLMCIRVLGAGNRRYGGVGDRIIAVVKESSPNMAVKKSDV VEAVIVRTRKAISRDSGMAIRFDDNAAVIINKEGNPRGTRVFGPVARELRDKNFTKIVSLAPEVLMLSPRRTKFRKQQRGRMEG LASRGSTLNFGDFGLQAQEPSWITSRQIEASRRAMTRYIRRGGKIWIRIFPDKPITMRPAETRMGSGKGNPEFWVAVVKPGRIMF EIGGVTEEIAREAMRLADSKLPIKTKFITRSQPQEQEMNAQEIIRSIEAEQMKSDLPDIYVGDTVKVGIKIQEGTKFRVQPYEGVVI ARRNGGINETITVRKVFQGVGVERVFLLHSPLVESIKVLRRGKVRRAKLYYLRALVGKATRIKQRFDRPLMTRVKRGNVARKR RNKILKLAKGFRGSHSTLFRTANQQVMKALRSAYRDRKKKKRDFRRLWIARINAASRQHGLSYSRLIGNLKKANVELNRKML AOLAILDPASFAKIAELANSVNGMAHKKGTGSTRNGRDSNAORLGVKRYGGOTVRAGNILVRORGTKVHPGNNVGIGSDDTL FALIDGVVTFERRGKTQKKVSVYAVAAVEPVEANDDKYMESAFLLPDLIEIQRSSFRWFLEEGLIEELNSFSPITDYTGKLELHFL GNNYKLKEPKYSVEESKRRDSTYAVQMYVPTRLLNKETGDIKEQEVFIGDLPLMTDRGTFIINGAERVIVNQIVRSPGVYYKSEI DKNGRRTYSASLIPNRGAWLKFETDRNDLVWVRIDKTRKLSAQVLLKALGLSDNEIFDALRHPEYFQKTIEKEGQFSEEEALME LYRKLRPGEPPTVLGGQQLLDSRFFDPKRYDLGKVGRYKLNKKLRLSAPDTMRVLTPGDILAAIDYLINLEYDIGSIDDIDHLGN RRVRSVGELLONOVRVGLNRLERIIRERMTVSDAESLTPASLVNPKPLVAAIKEFFGSSOLSOFMDOTNPLAELTHKRRLSALGP GGLTRERAGFAVRDIHPSHYGRICPIETPEGPNAGLIGSLATHARVNLYGFLETPFRPVENGKVLFDVLPVYMTADEEDDLRTAT GDVPLDENGYIKGPHVPVRYRQDWTTTGPEQVDYVAVSPVQIVSVATSMIPFLEHDDANRALMGSNMQRQAVPLLRPERPLV GTGLEAQAARDSGMVIVSRTDGDVVYVDATEIRVRASGQLSAASGSQVIEKGQELKYKLSKYQRSNQDTCLNQKPLVRIGEKV VAGQVLADGSSTEGGELALGQNIVVAYMPWEGYNYEDAILISERLVQEDVYTSIHIEKYEIEARQTKLGPEEITREIPNVGEDAL RQLDEQGIIRIGAWVDAGDILVGKVTPKGESDQPPEEKLLRAIFGEKARDVRDNSLRVPNGEKGRVVDVRLFTREQGDELPPGA NMVVRVYVAQKRKIQVGDKMAGRHGNKGIISRILAAEDMPYLADGSPVDIVLNPLGVPSRMNVGQVFECLLGWAGHNLGVR FKITPFDEMYGEETSRRLVHGKLQEARDETTKDWIYNPDNAGKIMVYDGRTGEPFDRAITVGVAYMLKLVHLVDDKIHARSTG PYSLVTQQPLGGKAQQGGQRFGEMEVWALEAFGAAYTLQELLTVKSDDMQGRNEALNAIVKGKAIPRPGTPESFKVLMRELQ SLGLDIAVHKVETQADGSSLDVEVDLMADQAARRTPPRPTYESLSRESLEGEEMPVVSLAQMMESGVHFGHQTRRWNPKMAP YIYTSRNGVHIIDLVQTAQLMDNAYNYMRTQSEQGKKFLFVGTKRQAAGIIAQEALRCGSHYINQRWLGGMLTNWATIKTRA ERLKDLERREETGALDLLPKKEASMLRREMTKLQKYLGGIKNMRKVPDIVVIVDQKREYNAVQECEKLGIPIVSMLDTNCDPD

VVDIPIPANDDAIRSIKLIVGKLADAIYEGRHGQLMGQKIHPVGFRLGITQEHQSRWFAEPDRYPELLQEDYKLRQYIEQKLGRY AQNNAGISEVRIERKADQIDLEVRTARPGVVVGRGGQGIESLRLGLQGALGGNRQIRINVVEVQRVDADAYLIAEYIAQQLERR VSFRRVVRQAIQRAQRAGVQGIKVQVGGRLNGAEIARSEWTREGRVPLHTLRADIDYSGCTAKTVYGILGIKVWVFKGEIIPGQ EQAPAQPAMVTGRRKASRTKKEETTWQERVIQIRRVSKVVKGGKKLSFRAIVVVGNERGQVGVGVGKASDVIGAVKKGVAD GKKHLIDIPITKSNSIPHPIDGVGGGAKVMMRPAAPGTGVIAGGAVRTVLELAGIRNILAKQLGSNNPLNNARAAVNALSTLRTL SEVAEDRGIAIEKLYIVAETTSGRAVYWGTGRRKCSVASVRLVPGEGKMTVNGKDGDLYFQFNPNYLGAIKAPLETLGLESEY DILVKAEGGGLTGQADSIRLGVARALCQLDPDNRSPLKTEGYLTRDPRAKERKKYGLHKARKAPQYSKRMATLQQQKIRIRLK AFDRRLLDTSCEKIVDTANRTNATAIGPIPLPTKRKIYCVLRSPHVDKDSREHFETRTHRRIIDIYQPSSKTIDALMKLDLPSGVDI EVKLMARQPTKKSGSKKQKRNVPNGVAYIQSTFNNSIVTITDQNGDVISWASAGSSGFKGAKKGTPFAAQTAAESAARRATDQ GMRQIEVMVSGPGAGRETAIRALQGAGLEITLIRDITPIPHNGCRPPKRRRVMARISGVDLPRDKRVEIGLTYIYGIGLTRSHQILA ATGVNPDTRVKDLSDADVAALRGEIESNYQVEGDLRRLEGLNIKRLVDIGCYRGRRHRMGLPVRGQRTRTNARTRRGRRQTV AGKKKAPGKMGRSLKKSPFVADHLLKKIEKLNAKDEKQVVKTWSRASTILPLMVGHTIAVHNGRQHIPVFVNEQMVGHKLGE FAPTRTYRGHGKSDKKSGRMSDKQSEGYKVICDNRQARFLYEIIETYEAGVQLTGTEVKSIRAGKANLQDGYALLRDGEAWLI NVHISPYASSGAYFNHEPRRTRKLLLHKQELRKLIGRVQQEGLTLVPLKMYLKRGWVKIVIALGKGKKLHDKRESLKRRDDQR DMQRAMKRYMAEISAKLVQELRQKTGAGMMDCKKALKENNGDVEESITWLRQKGIAKADKGSARIAAEGLVDTYIQPGGQV GVLIEVNCQTDFVARNDAFKALVKNLAQQAATTDSVESLLAQPYLEKSSVTVDEFIKETIATLGENIQVRRFVNFSLTTDTPGIA DSYIHTGGRVGVLLELNSQTDAAATNEEFQNLARNAAMQVAACPNVEYVSVDQIPAEIVTKEKDIEMGKDDLGNKPENIKEKI VQGRIDKRLKEMTLLDQPYIRDQSISVEELVKQVKSKVGEEIQVSRFVRYVLGEGIEKNEMSFADEVAAQIGAK

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MQIPRLHPDTIEEIKQRADIVDVVSDHVVLRKRGKDFVGLCPFHDEKSPSFTVSQTKQMYYCFGCQAGGNAIKFLMDVGKHSF AEVVLDLARRYQVPVQTLAPEQRQELQRQISLREQLYEVLASTGQFYQHALRQSQGQKAYQYLQSERQLKEETIQQFGLGYAP AGWETLHRYLVEDKRYPVHLVEKAGLIKPRKEGGGYYDVFRDRLMIPICDIQGRVIAFGGRTLSDEQPKYLNSPETELFSKGKT LFALDHAKDGISKLDQAVVVEGYFDAIALHAAGINNAVASLGTALSIEQVRLILRYTESKQLVLNFDADKAGNIAAERAIGEIAA LAYKGEVQLKIVNIPDGKDADEYLHTHTPFDYEQLLANAPLWLNWQIDQIIQNRDLKQATDFQQVSQQLVKLLKNIDNSDTRN YYVSHCAEILSLGDTRLIPLRVENLLTQIAPTTATRNKPLSSKKKFTQSPVPGDKSLLELAEALLLRIYLHCPEQRQVIFNILEERN LEFSFSHHRLLWQKILGATGDELDFVSSLQDRYLELAEEIESVSHLFHVNEKSKQEMLRTPQVVQAAVACMERVLIEKRYRYFL

ELWEQTDSEAEPEKWQSYYQSFYNEKMRLQELDRQRQFSITDLIMKLSEAKSTMEKTVEATQRAFNSIRTGRANASLLDKVSV DYHGTPTSLKSLANISTPDATTILIOPYDKGSLNIVEKAISLSDIGLTPSNDGSVIRLNIPPLTSDRRKEFVKIAAKYAEEGRVAIRNI RRDVQDTIRKEEKASEISKDESKDQQDQLQKLTNKYTSRIDDLLAEKEKDITTVMPVIEKKRTRDLPQINERIRFPKIRVIDNDGA QLGIMPPQEALQLADEKELDLVLLSDKADPPVCRIMDYGKYKFEQEKKAREARKKQHTADVKEVKMRYKIEEHDYNVRVKQ AERFLKDGDKVKATVMFRGREIQHSDLAEHLLKRMAKDLEPLGELQQAPKKEGRNMMMLISPKKMSMVSLPGLKELIESISRE RNLPRLAVQSAIREALLKGYERYRRAQNLERRQFDEEYFDNFEVELDIEGEGFRVLSTKSIVEAVENSDHQISLEEVQQVAQEA QLGDSVVLDVTPDQGEFGRMAAMQTKQVLAQKLRDQQRQMVQEEFQDLEGTVLQARVLRFERQSVILAVASNFGQPEVEAE LPKREQLPNDNYRANATFKVYLKKVSQGQQRGPQLLVSRADAGLVVYLFANEVPEIEDEVVRIVAVAREANPPSRYVGPRTKI AVDTLDRDVDPVGACIGARGSRIQVVVNELRGEKIDVIRWSPDPSTYIANALSPARVDEVRLMDPETRQTHVLVAEDQLSLAIG KEGONVRLAARLTGWKIDIKDKAKYDYAGEDTKFAAARAKYQMSKKTLANLSAADISGKRALVRVDFNVPLDDQGNITDDT RIRAALPTIKDLMQKGAKVILASHFGRPKGVDDKLRLTPVAQRLSELLGQEVVKTDDCIGDAVAAQVGALQNGQVLLLENVRF YKEEEKNDPEFAKKLAANADFYVNDAFGTAHRAHASTEGVTHYLSPSVGGYLIEKELQYLQNAIENPQRPLVAIIGGSKVSSKI GVIETLLEKCDKLIIGGGMIFTFYKARGLSVGKSLVEEDKLELAKTLEAKAKERGVALLLPTDIVSADKFAPDANATTVSIENIPA DGMGLDIGPDSIKVFQAALADCKTVIWNGPMGVFEFDKFAAGTEAIAHTLAEISKTGTTTIIGGGDSVAAVEKVGLADQMSHIS TGGGASLELLEGKILPGIAALDEAMTKFIFVTGGVVSSIGKGIVAASLGRLLKSRDYSVSILKLDPYINIDPGTMSPFQHGEVFVTE DGAETDLDLGHYERFTDTSMSRLNSVTTGSIYOAVINKERRGDYNGGTVOVIPHITNEIKERILSVAOETNPSVLITEIGGTVGDI ESLPFLEAIRQLRKEVGRQNVLYMHVTLIPWIASAGEMKTKPTQHSVKELRSIGIQPDILVCRCDRAIPLGLKRKLSEFCDVPQEC VITAQDASSIYEVPLIVEREGLAEQVLDLLQMEQRQPNLVQWQTMVERLYSPKYTVEIAIVGKYVRLSDAYLSVVEALRHAAIS TYGDLRLRWVNSEDIENESPETYLAGVDGILVPGGFGVRGVDGKIAAIKYARDRQIPFLGLCLGMQCSVIEWARNVEGLIGANS AEFDSETQYPVINLLPEQQDVVDLGGTMRLGLYPCHLVPNTMAANLYQKEVVNERHRHRYEFNNTYRNMMLESGYVISGTSP DGRLVEIVEFPEHPFFLACQFHPEFHSRPSTPHPLFKGFMEAAINRTNPMSNLPTPVEVSMGKKISRRFQALLEKVEDRDYAPLD ALNLLKETATAKFAEAAEAHIRLGIDPKYTDQQLRTTVTLPKGTGQTVRVAVIARGEKVTEASNAGADIVGSDELINEIQQGML DFDKLIATPDVMPQVAKLGKLLGPRGLMPSPKGGTVTFDVASAIAEFKAGKLEFRADRTGIVHVMFGKASFSSEDLLVNLKAL QETIDRNRPSGAKGRYWRTIYVTSTMGPSIKVDINALRDLKLSELAMGTRSYRPYTPSTRQVTVSDFAEITKSKPEKSLTEYVHR PKGRNNQGRITSRRRGGGHKQMYRIIDFKRDKRNIPAQVIAIEYDPNRNARIALVLYQDGEKRYILHPNKLPVGATIIAGPDSPFE DGNALPLLNIPLGTSVHNVELTPGKGGQIVRAAGANAQVVAKEGQYVTLKLPSGEVRMIRRECYATIGQVGNTDARNLSAGK AGRNRWKGRRPKVRGSVMNPVDHPHGGGEGRAPIGRPGPVTPWGKPTLGAKTRKPKKASSKLIVMSVGILGTKLGMTQVFDE SGVSIPVTVVQAGPCTVTQVKTKQTDGYSAIQLGYGEVKPKALNRPLLGHLAKSSAPALRHLNEYHTDSPSDYALGQELKADIF TEGOIVDVVGTSIGRGFAGNOKRNNFSRGPMSHGSKNHRAPGSIGAGTTPGRVYPGKRMAGRLGGTRVTIRKLTVVRVDLERN LLLIKGAIPGKPGSLVNILPAKKVGMVESVVKNWQGEQVGETTFELRVAKESTASHIVHRALVRQMTNSRQGTASTKTRSEVR GGGRKPWRQKGTGRARAGSIRSPLWRGGGVIFGPKPRDYNQKLNRKERRLALRTALVSRAEDLIVVQDFSNELSRPKTKELVA ALARWGAAPENKALLIMPAISSEDNVYLSARNIQNLKLIAADQLNVYDLLHADKIVITASALAKIQEVYSAMPTTRLKNLYQET

IVPKLTNQFQYTNVHQVPKVIKITINRGLGEAAQNAKSLEASLNEIAVITGQKPVVTRAKKAIAGFKIREGMPVGIMVTLRGERM YAFLDRLISLSLPRIRDFRGISPKSFDGRGNYTLGVREQLIFPEVEYDSIDQIRGMDISIITTAKNDEEGRALLKEMGMPFRDQMSR IGKQPITIPAKVEVTIDGPKVLVKGPKGQLSRTLSANVIVSQEGEILNVTRRDETRVSRQMHGLSRTLVANMVEGVSQGFKRRLE IOGVGYRAOLOGRNLVLNIGYSHOVHIVPPDGVEFVVETNTSIVVSGYDKEIVGNTAAKIRAVRPPEPYKGKGIRYAGEVVRRK AGKTGKSGKKMAKKVVAVIKLALNAGKANPAPPVGPALGQHGVNIMMFCKEYNAKTADQAGMVIPVEISVFEDRSFTFVLKT PPASVLIRKAAKIERGSNEPNKKKVGSITKAQLQEIAQTKMPDLNANDIEAAMRIVEGTANNMGVTISDMSATTDQILEQLKTLS LLEASELVKQIEEAFGVSAAAPAGGMMMMAPGAAAAAEPVEEKTEFDVVLDSVPADKKIAVLKIVRELTGLGLKEAKDLVEA APKAVKEAITKDAAEDAKKRIEEAGGKVTIKMTTKTYLPPQATLEREWYVVDATDKRLGRLATEIAMILRGKKKAEFTPHMDT GDFVIVINAEKIAVTGKKRTQKLYRRHSGRPGGMKTETFAKLQQRLPERILEHAVKGMLPKNSLGKQLFTKLKVYAGPTHPHE AQQPKELKINTIPGEMIQTQTYLNVADNSGAKKIMCIRVLGGGNRRYGFIGDRIIAVVKDAIPNMAVKKSDVIEAVIVRTRHSIR RDSGMTIRFDDNAAVIINKDGNPRGTRVFGPVARELREKSFTKIVSLAPEVLMLSPRRTKFRKQQRGRMQGLATRGCNIDFGDF ALQAQEPSWITARQIEASRRAMTRYIRRGGQIWIRIFPDKPITMRAAETRMGSGKGNPEYWVAVVKPGRIMFEIAGVTEEIAREA MRLAANKLPIKTKFIVRSQPKEQEMSAQEIIRSIEAEQLKSDLPIIYVGDTVKVGVKIKEGEKFRVQPYEGVVIAKRNGGINETITV RRVFQGIGVERVFLLHSPRIDNIKILRRGKVRRAKLYYLRGRVGKATRIKQRFDRALMTRVKRGNVARKRRNKILKLAKGFRGS HSTLFRTANQQVMKALRSSYRDRKKKKRDFRRLWIARINAAARQHGLSYSQLIGNLKKADIQLNRKMLAQLAVLDPASFGKV AELALOAKGMAHKKGTGSTRNGRDSNAORLGVKRFGGOKVIAGNILVRORGTKVHPGNNVGIGSDDTLFALIEGVVTFERKG KSRKKVSVYMTTDTYNMESAFLLPDLIEIQRASFRWFLEEGLIEELNSFSPITDYTGKLELHFLGNNYKLKEPKYSVEESKRRDS TYAVQMYVPTRLLNKETGDIKEQEVFIGDLPLMTDRGTFIINGAERVIVNQIVRSPGVYYKSEIDKNGRRTYSASLIPNRGAWLK FETDRNDLVWVRIDKTRKLSAQVLLKALGLSDNEIFDALRHPEYFQKTIEKEGQFSEEEALMELYRKLRPGEPPTVLGGQQLLD SRFFDPKRYDLGRVGRYKLNKKLRLSVPDTMRVLTPGDILAAVDYLINLEYDIGNIDDIDHLGNRRVRSVGELLQNQVRVGLN RLERIIRERMTVSDAEVLTPASLVNPKPLVAAIKEFFGSSQLSQFMDQTNPLAELTHKRRLSALGPGGLTRERAGFAVRDIHPSH YGRICPIETPEGPNAGLIGSLATHARVNLYGFLETPFRPVENGRVRFDLPPVYMTADEEDDLRTATGDIPVDENGYIKGPQVPVR YRQDWATTTPEQVDYVAVSPVQIVSVATSMIPFLEHDDANRALMGSNMQRQAVPLLKPERPLVGTGLEAQGARDSGMVVVS RTDGDVTYVDATEIRVRPKGGNSETRYRLSKYQRSNQDTCLNQKPLVRIGERVVAGQVLADGSATEGGELALGQNIVLAYMP WEGYNYEDAILISERLVQDDVYTSIHIEKYEIEARQTKLGPEEITREIPNVGEDALRQLDEQGIIRIGAWVEAGDILVGKVTPKGE SDQPPEEKLLRAIFGEKARDVRDNSLRVPNGEKGRVVDVRLFTREQGDELPPGANMVVRVYVAQKRKIQVGDKMAGRHGNK GIISRILPVEDMPYLADGSTVDIVLNPLGVPSRMNVGQVFECMLGWAAHTLGVRFKITPFDEMYGEETSRSIVHGKLQEARDET GKDWVYNPDNPGKIMVFDGRTGEAFDRPITVGVAYILKLVHLVDDKIHARSTGPYSLVTQQPLGGKAQQGGQRFGEMEVWA LEAFGAAYTLQELLTVKSDDMQGRNEALNAIVKGKSIPRPGTPESFKVLMRELQSLGLDIAVHKVETQTDGSSLDVEVDLMAD QSARRTPPRPTYESLSRDSLEEEEMPVVSLAQMMESGVHFGHQTRRWNPKMSPYIYTSRNGVHIIDLVQTAQLMDNAYNYMR SQSEQGKKFLFVGTKRQAAGIIAQEAARCGSHYINQRWLGGMLTNWATIKTRADRLKDLERREENGALDLLPKKEASMLRRE MTKLQKYLGGIKNMRKVPDVVVIVDQRREYNAVQECQKLGLPIVSMLDTNCDPDVVDIPIPANDDAIRSIKLIVGKLADAIYEG

RGGKLEGEDDYEDYDGSEYDDEYDDGEYAQASTSDEEMGQKIHPVGFRLGITREHQSRWFAIPERYPELLQEDYKLRQYIEQK LGKLAQNNAGISEVRIERKADQIDLEVRTARPGVVVGRGGQGIESLRIGLQEVLGGNRQIRINVVEVQKVDADASLIGEYIAQQL ERRVSFRRVVRQAIQRAQRAGVQGIKIQVSGRLNGAEIARTEWTREGRVPLHTLRADIDYAYCTAKTIYGILGIKVWVFKGEIIP GQEETPAPPSTMATGRRKANRTKKEETTWQERVIQIRRVSKVVKGGKKLSFRAIVVVGNERGQVGVGVGKASDVIGAVKKGV ADGKKHLIDIPMTKSNSIPHPIDGVGGGAKVMMRPAAPGTGVIAGGAVRTVLELAGVRNILAKQLGSNNPLNNARAAVNALST LRTLSEVAEDRGIPIEKLYIVVADSNSGRAVYWGTGRRKCAVARVRLVPGEGKLTVNGKDGELYFQFNANYLGVIKNPLETLG LENEYDILVKAEGGGLTGQADSIRLGVARALCQLDPDNRPPLKTEGYLTRDPRAKERKKYGLHKARKAPQYSKRMATLQQQK IRIRLQAFDRRLLDTSCEKIVDTANRTNATAIGPIPLPTKRKIYCVLRSPHVDKDAREHFETRTHRRIIDIYQPSSKTIDALMKLDLP SGVDIEVKLMARQPTKKGGSKKQKRNVPNGMAYIQSTFNNSIVTITDQNGDVISWASAGSSGFKGAKKGTPFAAQTAAESAAR RAMDQGMRQIEVMVSGPGAGRETAIRAIQGAGLEITLIRDITPIPHNGCRPPKRRRVMARISGVDLPRDKRVEIGLTYIYGIGLTR SLEILAATGVNPDTRVKDLSDADVAALRGEIESNYQVEGDLRRLEAMSIKRLVDIGCYRGRRHRMGLPVRGQRTRTNARTRRG RRQTVAGKKKAPGKMGRSLKKGPFVADHLLTKIEKLNAKNEKQVIKTWSRASTILPLMIGHTIAVHNGRQHVPVFVNEQMVG HKLGEFAPTRTYRGHGKSDKKAGRMSEKSQSYKVISDNRQARYLYEILETFEAGVELVGTEVKSIRAGRVNLQDGYALIRNGE AWLINVHISPYNASGQYFNHEPRRTRKLLLHRQEIRKLIGKVEQEGLTLVPLKMYLKRGWVKVSIALGKGKKLHDKRESLKRR QDQRDMQRAMKSYMAEISAKLVQELRQKTGAGMMDCKKALKENDGDIEKGIEWLRQKGIASAGKKSDRIAAEGLVDTYIQP GGRVGVLIEVNCQTDFVARNEAFKVLVKNLAQQAATADSVESLLAQPYIEETSVTVDQFIKQTIAQLGENIQVRRFINFALEGK QGIVDSYIHTGGRVGVLVEVNAQTESPAQNEEFQTLAKNAAMQVAACPNVEYVSVDEIPAEFAQKETEIEMGRDDLGNKPQNI KEKIVQGRIEKRLKELTLLDQPFIRDQSISVEDLVKQVKGKVGEEIKVNRFVRYILGEGIEKQESNFAEEVAAQMG

>Nodularia spumigena CCY9414

MQIPRLHPDTIEEIKQRADIVDVVSDHVVLRKRGKDFVGLCPFHDEKTPSFTVSQTKQMYYCFGCQAGGNAIKFLMDLGKHSF AEVVLDLARRYQVPVQTLAPEQRQELQRQISLREQLYEVLASTGQFYQHALRQSQGQKAYQYLQSERQLKEETIQQFGLGYAP AGWETLHRYLVEDKRYPVQLVEKAGLIKPRKEGGGYYDVFRDRLMIPIRDIQGRVIAFGGRTLSEEQPKYLNSPETELFSKGKT LFALDIAKDGISQLDQAVVVEGYFDAIALHAAGINNAVASLGTALSIEQVRLILRYTESKQLVLNFDADKAGNIAAERAIGEIAT LAYKGEVQLKILNIPDGKDADEYLYTHTPFDYEQLLANAPLWLNWQIEQIIQNRDLKQATDFQQVSQQVVKLLKNIDNSDTRN YYVSYCAEILSLGDARLIPLRVENLLTQIAPTTATRNKPLSSKKKFTQSPIPGDKSLLELAEALLLRIYLHCPEQRQIIFNTLEERNL EFSLSHHRLLWQKILGSTGEEVDFVSSLQDRYLELSEEIASISHLFHLNEKSQKEILRTPQAVQAAVACMERVLIEKRYRYFLEL

WEKTDSQAEPEKWQSYYQSFYHEKMRLQELDRQRQFSITDLLMKLSEAESTMQKTVEATQRAFNTIRTGRANASLLDKVSVD YYGSPTPLKSLANISTPDASTILIOPYDKGSLNVVEKAISLSDVGLTPSNDGSVIRLNIPPLTSDRRKEFVKMASKYAEEGRVAIRN IRRDVQDTIRKEEKASEISEDESKDQQDQLQKLTNKYTARIDDLLAEKEKDISTVMPVIEKKRTRDLPQINERIRFPKIRVIDTDGA QLGIMPPQEALQLAEEKELDLVLLSDKADPPVCRIMDYGKYKFEQEKKAREARKKQHTADVKEVKMRYKIEEHDYNVRVKQ AERFLKDGDKVKATVMFRGREIQHSDLAEHLLKRMAKDLEPLGELQQAPKKEGRNMMMLISPKKMSMVSLPGLKELIESISRE RNLPRLAVQTAIREALLKGYERYRRAQNLEKRQFDEEYFDNFEVELDIEGEGFRVLSTKSIVEAVDNTDHQISLEEVQQVAPEA QLGDSVVLDVTPDQGEFGRMAAMQTKQVLAQKLRDQQRQMVQEEFQDLEGTVLQARVLRFERQSVILAVASGFGQPEVEAE LPKREQLPNDNYRANATFKVYLKKVSQGQQRGPQLLVSRADAGLVVYLFANEVPEIEDEVVRIVAVAREANPPSRYVGPRTKI AVDTLDRDVDPVGACIGARGSRIQVVVNELRGEKIDVIRWSPDPSTYIANALSPARVDEVRLMDPETRQTHVLVAEDQLSLAIG KEGONVRLAARLTGWKIDIKDKAKYDYAGEDTKFAAARAKYOMSKKTLANLSAADISGKRALVRVDFNVPVDDNGNITDDT RIRAALPTIQDLMEKGAKVILASHFGRPKGVDDKLRLTPVAQRLSELLGQEVVKTDDCIGDAVTAQVGALQNGQVLLLENVRF YKEEEKNDPEFAKKLAANADFYVNDAFGTAHRAHASTEGVTHYLSPSVGGYLIEKELQYLQSAIENPQRPLAAIIGGSKVSSKI GVIETLLDKCDKLIIGGGMIFTFYKARGLSVGKSLVEEDKLELAKTLEAKAKERGVALLLPTDIVSADKFAPDANATTVSIENIPA DGMGLDIGPDSIKVFQAALADCKTVIWNGPMGVFEFDKFAAGTEAIAHTLAEIGKTGTTTIIGGGDSVAAVEKVGLADQMSHIS TGGGASLELLEGKTLPGIAALDEAMTKFIFVTGGVVSSIGKGIVAASLGRLLKSRDYSVSILKLDPYINIDPGTMSPFQHGEVFVT EDGAETDLDLGHYERFTDTSMSRLNSVTTGSIYOAVINKERRGDYNGGTVOVIPHITNEIKERILRVAODTNPSVLITEIGGTVGD IESLPFLEAIRQLRKEVGRQNVLYMHVTLIPWIASAGEMKTKPTQHSVKELRSIGIQPDILVCRCDRAIPLGLKRKLSEFCDVPQE CVITAQDASSIYEVPLIVEREGLAEQALDLLQMEQRQPNLVQWQTMVERLYSPKYTVEIAIVGKYVRLSDAYLSVVEALRHAAI STYGDLRLRWVNSEDLENESAETYLAGVDGILVPGGFGIRGVDGKIAAIKYARDRQIPFLGLCLGMQCSVIEWARNVEGLNGA NSAEFDPETKYPVINLLPEQQDVVDLGGTMRLGLYPCHLLPNTLAANLYQQEVVDERHRHRYEFNNNYRNLLLESGYVISGTS PDGRLVEIVEFPQHPFFLACQFHPEFHSRPSTPHPLFKGFMEASINRTHSISNLPTPVEVSMGKKISRRFQALLEKVEDRDYTPLEA LNLLKETATAKFPEAAEAHIRLGIDPKYTDQQLRTTVTLPKGTGQTVRVAVIARGEKVTEASNAGADVVGSDELINEIQQGMM DFDKLIATPDVMPQVAKLGKLLGPRGLMPSPKGGTVTFDVASAIAEFKAGKLEFRADRTGIVHVMFGKASFSPEDLLVNLKAL QETIDRNRPSGAKGRYWRTIYVTSTMGPSIKVDINALRDLKLSELAMGTRSYRPYTPSTRQVTVSDFAEITKSKPEKSLTEYVHR PKGRNNQGRITSRRRGGGHKQMYRIIDFKRDKRNIPAQVIAIEYDPNRNARIALVLYQDGEKRYILHPNKLPVGATIIAGPDSPFE DGNALPLLNIPLGTSVHNVELTPGKGGQIVRAAGANAQVVAKEGQYVTLKLPSGEVRMIRRECYATIGQVGNTDARNLSAGK AGRNRWKGRRPKVRGSVMNPVDHPHGGGEGRAPIGRPGPVTPWGKPTLGAKTRKPKKASSKLIVMSVGILGTKLGMTQVFDE AGVSIPVTVVQAGPCTVTQVKTKQTDGYSAIQLGYGEVKPKALNRPLLGHLAKSSAPALRHLNEYHTDSPSDYALGQELKADI FSEGQIVDVVGTSIGRGFAGNQKRNNFGRGPMSHGSKNHRAPGSIGAGTTPGRVYPGKRMAGRLGGTRVTIRKLTVVRVDLER NLLLIKGAIPGKPGSLVNILPAKKVGMVESVVKNWQGEQVGETTFELRVAKESTASHIVHRALVRQMTNSRQGTASTKTRSEV RGGGRKPWRQKGTGRARAGSIRSPLWRGGGVIFGPKPRDYNQKLNRKERRLALRTAFVSRADDLIVVQDFSNELSRPKTKELV AALARWGAAPENKALLIMPIISSEDNVYLSARNIQNLKLIAADQLNVYDLLHADKIVITASALAKIQEVYSAMPTTRLKNLYQE

TIVPKLTNQFQYTNVHQVPKVIKITINRGLGEAAQNAKSLEASLNEIAVITGQKPVVTRAKKAIAGFKIREGMPVGIMVTLRGER MYAFLDRLISLSLPRIRDFRGISPKSFDGRGNYTLGVREQLIFPEVEYDSIDQIRGMDISIITTAKNDEEGRALLKEMGMPFRDQM SRIGKQPITIPAKVEVTIDGPKVVVKGPKGQLSRTLSANVIVSQEGGILNVTRRDETRVSRQMHGLSRTLVANMVEGVSQGFKR RLEIOGVGYRAOLOGRNLVLNIGYSHOVNIVPPDGVEFLVETNTNIVVSGYDKEIVGNTAAKIRAVRPPEPYKGKGIRYAGEVV RRKAGKTGKSGKKMAKKVVAVIKLALNAGKANPAPPVGPALGQHGVNIMMFCKEYNAKTADQAGMVIPVEISVFEDRSFTF VLKTPPASVLIRKAAKIERGSNEPNKKKVGSITKAQLQEIAQTKMPDLNANDIEAAMRIVEGTANNMGVTISDMSATTDQILEQ LKTLSLLEASELVKOIEEAFGVSAAAPAGGMMMMAPGAAAAAEPVEEKTEFDVILDSVPADKKIAVLKIVRELTGLGLKEAKD LVEAAPKAVKEGIAKDAAEDAKKRIEEAGGKVTVKMTTKTYLPPQATLEREWYVVDATDKRLGRLATEIAMILRGKKKAEFT PHMDTGDFVIVINAEKIAVTGKKRTQKLYRRHSGRPGGMKTETFAKLQQRLPERILEHAVKGMLPKNSLGKQLFTKLKVYAGP THPHEAQQPKELKINTIPGEMIQTQTYLNVADNSGAKKIMCIRVLGGGNRRYGFIGDRIIAVVKDAIPNMAVKKSDVIEAVIVRT RHSIRRDSGMTIRFDDNAAVIINKDGNPRGTRVFGPVARELREKSFTKIVSLAPEVLMLSPRRTKFRKQQRGRMQGLATRGCNI DFGDFALQAQEPSWITARQIEASRRAMTRYIRRGGQIWIRIFPDKPITMRAAETRMGSGKGNPEYWVAVVKPGRIMFEIAGVTE EIAREAMRLAANKLPIKTKFIVRSQPKEQEMSAQEIIRSIEAEQLKSDLPIIYVGDTVKVGVKIKEGQKFRVQPYEGVVIAKRNGG INETITVRRVFOGIGVERVFLLHSPRIDNIKIIRRGKVRRAKLYYLRGRVGKATRIKORFDRALMTRVKRGNVARKRRNKILKLA KGFRGSHSTLFRTANQQVMKALRSSYRDRKKKKRDFRRLWIARINAAARQHGLSYSQLIGNLKKADIQLNRKMLAQLAVLDP ASFGKVAELALOAKGMAHKKGTGSTRNGRDSNAORLGVKRYGGOTVLAGNILVRORGTKVHPGNNVGIGSDDTLFALIEGV VTFERKGKSRKKVSVYMTTDTYMESAFLLPDLIEIQRSSFRWFLEEGLIEELNSFSPITDYTGKLELHFLGNNYKLKEPKYSVEES KRRDSTYAVQMYVPTRLLNKETGDIKEQEVFIGDLPLMTDRGTFIINGAERVIVNQIVRSPGVYYKSEIDKNGRRTYSASLIPNR GAWLKFETDRNDLVWVRIDKTRKLSAQVLLKALGLSDNEIFDALRHPEYFQKTIEKEGQFSEEEALMELYRKLRPGEPPTVLGG QQLLDSRFFDPKRYDLGRVGRYKLNKKLRLSVPDTMRVLTPGDILAAVDYLINLEYDIGNIDDIDHLGNRRVRSVGELLQNQV RVGLNRLERIIRERMTVSDAEVLTPASLVNPKPLVAAIKEFFGSSQLSQFMDQTNPLAELTHKRRLSALGPGGLTRERAGFAVRD IHPSHYGRICPIETPEGPNAGLIGSLATHARVNLYGFLETPFRPVENGRVRFDLPPVYMTADEEDDLRTATGDIPLDENGYIKGPQ VPVRYRQDWATTTPEQVDYVAVSPVQIVSVATSMIPFLEHDDANRALMGSNMQRQAVPLLKPERPLVGTGLEAQGARDSGM VIVSRTDGDVTYVDATEIRVRPKDGNSEIRYRLSKYQRSNQDTCLNQKPLVRIGERVVAGQVLADGSSTEGGELALGQNIVIAY MPWEGYNYEDAILISEKLVQDDVYTSIHIEKYEIEARQTKLGPEEITREIPNVGEDALRQLDEQGIIRIGAWVEAGDILVGKVTPK GESDQPPEEKLLRAIFGEKARDVRDNSLRVPNGEKGRVVDVRLFTREQGDELPPGANMVVRVYVAQKRKIQVGDKMAGRHG NKGIISRILPVEDMPYLADGSTVDIVLNPLGVPSRMNVGQVFECMLGWAAHTLGVRFKITPFDEMYGEETSRSIVHGKLQEARD ETGKDWVYNPDNPGKIMVFDGRTGEPFDRPITVGVAYILKLVHLVDDKIHARSTGPYSLVTQQPLGGKAQQGGQRFGEMEVW ALEAFGAAYTLQELLTVKSDDMQGRNEALNAIVKGKSIPRPGTPESFKVLMRELQSLGLDIAVHKVETQTDGSSLDVEVDLMA DQSARRTPPRPTYMPVVSLAQMMESGVHFGHQTRRWNPKMSPYIYTSRNGVHIIDLVQTAQLMDNAYNYMRSQSEQGKKFLF VGTKRQAAGIIAQEAARCGSHYINQRWLGGMLTNWATIKTRADRLKDLERREENGALDLLPKKEASMLRREMTKLQKYLGGI KNMRKVPDVVVIVDQRREYNAVQECQKLGLPIVSMLDTNCDPDVVDIPIPANDDAIRSIKLIVGKLADAIYEGRGGTLEGEDDY

EDYDGSEYDDDYDESEYAQGSSDESSDEMGQKIHPVGFRLGITREHQSRWFAVPERYPELLQEDYKLRQYIEKKLGKLAQNNA GISEVRIERKADQIDLEVRTARPGVVVGRGGQGIESLRLGLQEVLGGNRQIRINVVEVQKVDADASLIGEYIAQQLERRVSFRRV VRQAIQRAQRAGVQGIKIQVSGRLNGAEIARTEWTREGRVPLHTLRADIDYAYCTAKTIYGILGIKVWVFKGEIIPGOEEIPAPPS TMATGRRKANRTKKEETTWQERVIQIRRVSKVVKGGKKLSFRAIVVVGNERGQVGVGVGKASDVIGAVKKGVADGKKHLIDI PMTKSNSIPHPIDGVGGGAKVMMRPAAPGTGVIAGGAVRTVLELAGVRNILAKQLGSNNPLNNARAAVNALSTLRTLSEVAED RGIPIEKLYIVVAQSNSGRAVYWGTGRRKSAVARVRLVPGEGKLTVNGKDGELYFQFNANYLGVIKNPLETLGLENEYDILVK AEGGGLTGQADSIRLGVARALCQLDPDNRPPLKTEGYLTRDPRAKERKKYGLHKARKAPQYSKRMATLQQQKIRIRLQAFDR RLLDTSCEKIVDTANRTNATAIGPIPLPTKRKIYCVLRSPHVDKDAREHFETRTHRRIIDIYQPSSKTIDALMKLDLPSGVDIEVKL MARQPTKKGGSKKQKRNVPNGMAYIQSTFNNSIVTITDQNGDVISWASAGSSGFKGAKKGTPFAAQTAAESAARRAMDQGM RQIEVMVSGPGAGRETAIRAIQGAGLEITLIRDITPIPHNGCRPPKRRRVMARISGVDLPRDKRVEIGLTYIYGIGLTRSLEILAATG VNPDTRVKDLSDAEVAALRGEIESNYQVEGDLRRLEAMSIKRLVDIGCYRGRRHRMGLPVRGQRTRTNARTRRGRRQTVAGK KKAPGKMGRSLKKGPFVADHLLTKIEKLNAKNEKQVIKTWSRASTILPLMIGHTIAVHNGRQHVPVFVNEQMVGHKLGEFAPT RTYRGHGKSDKKAGRMSEKSQSYKVISDNRQARYLYEILETFEAGVELTGTEVKSIRAGRVNLQDGYALIRNGEAWLINVHISP YNASGQYFNHEPRRTRKLLLHRQEIRKLIGKVEQEGLTLVPLKMYLKRGWVKVSIALGKGKKLHDKRESLKRRQDQRDMQRA MKNYMAEISAKLVQELRQKTGAGMMDCKKALKENDGDIEKAIEWLRQKGIASAGKKSDRIAAEGLVDTYIQPGGRVGVLIEV NCQTDFVARNEAFKALVKNLAQQATTADSVESLLAQPYIEETSVTVDQFIKQTIAQLGENIQVRRFINFALPEGQQGVVDSYIHT GGRVGVLVELNAQTETAAQNEEFQTLAKNAAMQVAACPNVEYVSVDEIPAEFAQKETEIEMGRDDLGNKPQNIKEKIVQGRIE KRLKELTLLDQPFIRDQSISVEDLVKQVKTKVGEDIKVNRFVRYILGEGIEKQEISFAEEVAAQMGSK

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RLHPDTIQEIKQRIDIVEIIGDYVVLKKRGRDHLGLCPFHDEKSPSFSVSPAKQMYYCFGCGAGGNAFNFLMELGKRSFTDVALD LARRYQIQIQTLEPAQKQELQRQLSLREQLYEIMAVAAGFYHHTLFQPQGQEALTYLDQKRCLSSATIQEFQLGYAPAGWETLY RYLVEQKRYPVAAVEQAGLIKARQSGTGYYDQFRHRLMIPIRDVQGKTIAFGSRTLGNDEPKYLNSPETPLFHKSKTLFGLDQA KTAIQKVDEAILVEGYFDVIALHESGIKQTVAALGIALSRDQVQSLMRFSQSKQIIFNFDADKAGINATQRAIQEIEPLVYSGQVN LRILNLPAGKDADEFIHSSAENKEIYQTLVKQAPLWVDWQIQQLLKQKNLKDPLDFEQVARGMVDILKRLTDQNKRAYYLQLC GEILSQGDSRLISLQVNNLSSQLTYGDRPGKNGSRHWQAKDPTSSLLEKAEALLLKIYLHCPQERPTIDQILTENDLLFSFAHHRL LWQKIDQVREYFNLDSDPDNQLPLLVQLAYLEQEGDFNSVESLFQLTETSAEDLFRANLRIPEAIAIMEKVPWESYQKHCFGKL

QQLDPRTQAEDFRYYQEQWQKAHQEIQRLESQRMKLAELKDHMQKSVEATQRSFNTIRTGRANASLLDRITVEYYGAETPLKS LATIGTPDASTIVIOPFDMGSIGTIEKAISLSDLGLTPNNDGKVIRLNIPPLTAERRKELVKVAGKLAEEGKVAIRNIRRDAVDEVR KQEKNSDISEDEARDLQEEIQKLTDQSTKRIDELLAAKEKDITTVRDLPQINERIRFPEIRVIDSDGAQLGIITPNEAMEIADERGLD LVLVSETADPPVCRIMDYGKYKFEQEKKAREAKKKQHTADVKEVKMRYKIDEHDYQVRINQAKRFLKAGDKVKATVNFRGR EIQHAHLAKELLDRMATDLATEADIQQAPKREGRNMMMFLSPKKMSLVSLPGLPAMISEISKRNNLPTTAVEEALREALLKGY ERFRRSQLMGHQFPEEYFNNFEVELDTEEEGFRVLSTKRIVEEVENSDQQISLKEVLEVAEEAQLGDEVVLDVTPEQKDFGRMA AIQTKQVLLQKLRDQQRKIIQEEFQDLEGTVLNARALRFERQSIIVAVQSSFGQPEVEAELPKREQLPNDNYRANSTFRVYLKRV REGSQRGPQLVVSRAAAGLVVDLFSVEVPEIEEEVVRIVAVAREAKPPSPSVGPRTKIAVDTLERDVDPVGACIGARGSRIHAVV NELRGEKIDVIRWSPDPATYIAQALSPARVDQVYLIHAEERHALVIVAEDQLSLAIGKEGQNVRLAARLTGWKIDIKDPETYMS KQSIANLTEADLAGKRVFVRVDFNVPLDNGSITDDTRIRAALPTIKDLLSKGAKVILGSHFGRPKGKVVDSMRLTPVGDRLGEL LGQPVVKCDDCIGAEVTAKIASLPNGGVALLENLRFHAGEEGNDAEFAKALAANADLYVNDAFGTAHRAHASTEGVTHFLSP NVAGYLIEKELQFLQGAIEAPKRPLVAIVGGSKVSSKIGVIETLLDKCDKLIIGGGMIFTFYKAQGLNTGKSLVEEDKLDLAKSL MAKAKEKGVEFLLPTDVVVADNFAPDANAQTVGVDAIPDGWMGLDIGPDSVKTFQDALAGCGTVIWNGPMGVFEFDKFAVG TEAIACSLAELTASGTVTIIGGGDSVAAVEKVGVAEKMSHISTGGGASLELLEGKVLPGIAALDDMSKFVFVTGGVVSSIGKGIV AASLGRLLKSRHYSVSILKLDPYINVDPGTMSPFQHGEVFVTEDGAETDLDLGHYERFTDTSMSRLNSVTTGSIYQAVINKERR GAYMGGTVOVIPHITNEIKERILRVAONTNPDVVITEIGGTVGDIESLPFLEAIROFRKEVGRHNVIYMHVTLIPWIPAAKEMKTK PTQHSVKELRSIGIQPDILVCRCDRPLHPGMKEKLSEFCDVPVESVITCQDASSIYEVPLILEKEGLAHQTLELLRMENRSPDLSQ WOSLVEKMOSPHHDITVALVGKYVQLSDAYLSVVEALGHAAIASDSKLHLRWISAEEIEAQGAATFLKDVDGVLVPGGFGIRG VDGKVQAIEYARENQLPFLGLCLGMQCSVIEWARNVAKLPEANSAEFETETPNPVINLLPEQQDVVDLGGTMRLGLYPCRIAP DTLAFSLYQKEVVYERHRHRYEFNNSYRTQFTDTGFVVSGTSPDGRLVEIVEYPHHPFFIACQFHPEFHSRPNQAHPLFSGFINA VLKRRNAPAKIAMTKKLSKRMQAAIAKVDDSKLYSPLEAMELLKETATAKFDETAEAHIRLGIDPKYSDQQIRTTVSLPKGTGQ TVRVAVLARGEKVKEATDAGADIAGSEELIEEIQKGMMDFDVLIATPDMMPKIARLGKQLGPRGLMPSPKGGTVTADLAAAV NEFKAGKLEFRADRTGIVHVMFGKASFSADDLLANLKALQETIDRNRPSGAKGRFWRTVFVSSSMGPSIPVDINALRDLKFEDM GIRNYRPMTPGTRQASVSDFTEITKSKPEKSLTTNRHDQKGRNNRGVITSRHRGGGHKKLYRIIDFKRNKQNIPARVAAIEYDPN RNARIALLFYTDGEKRYILAPAGLQVGMTVIAGEEAPFEIGNTLPLSRIPLGSEIHNVELVAGRGGQMVRSAGAFAOVVAKEGD YVTIKLPSKEVRMVRKECVATLGRVSNAEFRNLKLGKAGRKRHLGRRPHVRGSVMNPCDHPHGGGEGRAPIGRSGPVSPWGK PALGAKTRNKKKRSSALIVRRRTKMSIGILGTKLGMTQIFDQESGISIPVTVVQAGPCPVTQVKTQDTDGYNAIQVGFLPVKEKA LSKPELGHLKKSNTDPMRHLKEYRLTDAPNLQPGDAVTADIFQAGDLVDVAGQSMGRGFAGYQKRHNFRRGNMTHGSKNHR LPGSTGAGTTPGRVYPGKRMAGQYGASQVTVRRLTVVRVDAERNLLIIKGALPGKPGTLLNITPAKTVGMVDCIVKNWQGEE VGNASLTLRVAKEENAAHIVHRALVRQQNNARQGNASAKTRAEVRGGGRKPWKQKGTGRARAGSIRSPLWRGGGVIFGPKP RDYSQKMNRKERRLALRTAIASRADNMVVVEAFGDQFSQPKTKELATALTRWGAKPEKRVLLILDEIPENVFLSGRNIPYLKIL RADNLNIYDVLVADTIVATATALEKIQEVYTQRLKTLYQETILPKLQEEFGYKNIHQVPKLTKVTVNRGLGEASQNAKALESSL

TELATITGQKPVVTRARKAIAGFKIREGMPVGVMVTLRSERMYAFLDRLINLALPRIRDFRGISPNSFDGRGNYSLGIREQLIFPEI DYDTIDQIRGMDVSIITSAQTDEEGRALLKALGMPFRMSRIGKRPIPLPAKVSVDIQGSHLSVKGPKGSLERQLPEKVIVAQEGET ITVTRQDESRTARERHGLVRTLVANMVDGVAQGFERRLEIQGVGYRAQAQGNKLTLNVGYSKPVEMTMPQGIEVKVENNTQ VIVSGIDKELLGNTAAKIRAVRPPEPYKGKGIRYQGEYVRRKAGKTGKKMAKKVVALIKLALPAGKANPAPPVGPALGQHGV NIMAFCKEYNAKTADKPGMIIPVEISVFEDRSFTFILKTPPASVLIRKAAGVEKGSSEPNKNKVASITREQLREIAQTKLPDLNAN DIDAAMNIIEGTARNMGITVMSAATDQILEQLKSLSLLEASELVKQIEEAFGVSAAAPVGGMVMAAAAAAAAAAEKTEFDVI LEEVPADKKIAVLKVVRTITGLGLKEAKELVESTPKAIKEATGKDDAEAIKKQIEEAGGKAAVKNKTVLPTIDNLDHKWYVIDA EGQRLGRLATEVATILRGKNKPTFTPHMDTGDFVIIINAEKIEVTGRKREQKLYRRHSGRPGGMKEETFEKLQVRLPERIVESAV RGMLPKNSLGRKLFTKLKVYAGPSHPHAAQQPETLVINTIPAMIQQQTYLNVADNSGARKLMCLRVLGTGNCTYGGIGDQIIA VVKDALPNMPIKKSDVVRAVIVRTKQPLRRASGMSIRFDDNAAVIINAEGNPRGTRVFGPVARELRDKNFTKIVSLAPEVLMLS PRRTKFRKQQRGRMRGLAERGSTLNFGDYALQATEPCWITSRQIEAARRAMTRYIRRGGKIWIRIFPDKPVTMRPAETRMGSG KGSPEYWVAVVKPGRVMFELAGVSEEVAREAMRLAAQKLPIKTKFISRQEMNAQAIINSIEAEFLKEDLPTIHVGDTIKVGVKIV EGGKERIQPYEGTVIAKRNGGISETITVRKIFQGVGVERVFLLHSPRVASIKVLRRGKVRRAKLYYLRDRVGKATRIKQRFDRAL MTRVKRGNVARKRRKKILKLAKGFRGSHSKLFRTANQQVMKALRNAYRDRRKRKRDFRRLWITRINAAARQEGMSYSKLTG QLKKANIEINRKMLAQLAVLDPAAFSEVVKVAATAKMAHKKGTGSTRNGRDSNAQRLGVKRYGGQTVTAGSIIVRQRGTQV HPGNNVGRGKDDTLFALIDGVVKFEHKTRSRRKVSVYPATAEMLPDLIEIOHASFHWFLEEGLIEELNSFSPISDYTGKLELHFL GKDYKLKQPKYDVDESKRRDASYSVQMYVPTRLINKETGEIKEQEVFIGDLPLMTERGTFIINGAERVIVNQIVRSPGVYYKKE LDKNGRRTYSASLIPNRGAWLKFETDKNGLVYVRIDKTRKLSAQVLLKAIGLSDNEILDSLSHPEFYQKTLDKEGNPTEEEALV ELYKKLRPGEPPTVSGGQQLLESRFFDPKRYDLGRVGRYKLNKKLRLNEADTTRVLTPQDILAAINYLINLEFDVGTTDDIDHL GNRRVRSVGELLQNQIRVGLNRLERIIRERMTVSESDALTPASLVNPKPLVAAIKEFFGSSQLSQFMDQTNPLAELTHKRRISAL GPGGLTRERAGFAVRDIHPSHHGRICPVETPEGPNAGLIGSLATCARVNDYGFIETPYFRVESGRVRKDLDPVYLTADEEDDMR VAPGDIPTDEEGNIIGESVPIRYRQEFSTTSPEQVDYVAVSPVQIISVATSMIPFLEHDDANRALMGSNMQRQAVPLLRPERPLVG TGLEAQAARDSGMVIVSRTHGIVTYVDATEIRVQPHSPDNPAEKGEEIVYPIQKYQRSNQDTCLNQRPLVYAGEDVVPGQVLA DGSATEGGELALGQNILVAYMPWEGYNYEDAILISERLVYDDVYTSIHIEKFEIEARQTKLGPEEITREIPNVGEDALRNLDEHGI IRIGAWVESGDILVGKVTPKGEADQPPEEKLLRAIFGEKARDVRDNSLRVPNGEKGRVVDVRVFTREKGDELPPGANMVVRIY VAQKRKIQVGDKMAGRHGNKGIISRILPIEDMPYLPDGRPIDIALNPLGVPSRMNVGQVFECLLGWAGENLGVRFKITPFDEMY GEEASRDTVHGLLEEASQRPNKDWVFNENHPGKIQVFDGRTGEPFDRPITVGQAYMLKLVHLVDDKIHARSTGPYSLVTQQPL GGKAQQGGQRFGEMEVWALEAYGAAYILQELLTVKSDDMQGRNEALNAIVKGKSIPRPGTPESFKVLMRELQSLGLDIAAHK VQLSEDGESADAEVDLMIDSQRRAPNRPTYESLMPVVSLADLLESGVHFGHQTRRWNPRMDQYIYTARNGVHIIDLVQTAQL MEDAYEYVRSSTINGKKFLFVGTKRQAAGIISQEAQRCGAHYVNQRWLGGMLTNWETIRKRVDRLKELEALEASGGIDRRGK KEGSMLRRELGKLQKYLGGIKNMRKLPDVVVIVDQRREHNAIHECQKLGIPIIAMLDTNCDPDVVDVPIPANDDAIRSIKLIVGK LADAIYEGRHGQPDVSDDYEEFDEGMGQKIHPVGFRLGITKDHKSCWYADPKRYPELLQEDHKIRQYIEKTLNNAGISDIRIER

KAEQIELGIHTARPGVVVGRGGSGIEQLREGLQKLLGSARQIRVNVIEVPNADADAALMAEYIGQQLERRVSFRRVVRQALQR AERAEVKGIKIQVSGRLNGAEIARTEWVREGRVPLHTLRADIDYAYRTALTTYGILGIKVWIFKGEVIPGQEAAIVAPPSQPRRK SRRQQFDDRSQDRRKTSREKKEDTNWQERVIQIRRVSKVVKGGKKLSFRAIVVVGNETGQVGVGVGKAGDVIGAVRKGVAD GKKQLIEVPLTKSNSITHITNGVSGGAKVVVRPAAPGTGVIAGGAVRTVLELAGVKNILAKQLGSNNPLNNARAAINALETLRT FSEVAEERGVSVEHLYANDSSNKVVYWGTGRRKAAIARVRLVPGQGEVIVNGKPGEIYFNRIANYIQSLKAPLETLGLEGEYNI LVNAHGGGLTGQADAVKLGVARALCQLSPENRQPLKAEGYLTRDPRAKERKKYGLHKARKAPQYSKRMATLQQQKIRIRLK AFDRRLLDTSCDKIVDTANRTNAAAVGPIPLPTKRKIYCVLRSPHVDKDSREHFETRTHRRIIDIYQPSSKTIDALMKLDLPAGVD IEVKLMARPTRKTGPKKAKKNVPSGVAHIQSTFNNTIVTISDIRGDVISWASAGSSGFKGAKKGTPYAAQTAADSAARRAMEQ GMRQLEVMVSGPGAGRETAIRALQGAGLEITLIRDVTPIPHNGCRPPKRRVMARIAGVDLPRDKRVEIALTYLYGIGLSRSHEI LDATGVSPDVRVKDLSDEDALKLRTYIDENYEIEGDLRRWEAMNIKRLGDIGTYRGRRHRQGLPVRGQRTRTNARTRRGRRLT VAGKKKTPAKMGRSLKKGPFVAASLLRKIDKLNDKGDKQVVKTWSRASTILPQMVGHTIAVHNGRQHVPVFVSEQMVGHKL GEFAPTRTFRSHSKSDKKAMAKEKERIKVVSDNRQARFLYEILETYEAGIELQGTEVKSIRAGKVNLRDGFALLRDGEVWLMN VHISPYDKSSLFFNHDPRRTRRLLMHNWEIRKLIGQVEQKGLTLVPLKMYFKGSWVKVALGLGKGKKLHDKRETLKRRQDDR DMARAMKAEGLVHSYIHFGGRIGVLVEVNCETDFVARGDRFKDLVNDVAMQIAACPNVEYVSVADIPQEMVAKEKEIEMGR DDLGKKPANIKEKIVQGRIDKRLKELSLLDQPYIKDQNLTIEELVKQAIAELGENIQVRRFIRFNLGEGIEKAETNFAEEVAA