# Integrative genomic analyses of the RNA-binding protein, RNPC1, and its potential role in cancer prediction

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Abstract. The RNA binding motif protein 38 (RBM38, also known as RNPC1) plays a pivotal role in regulating a wide range of biological processes, from cell proliferation and cell cycle arrest to cell myogenic differentiation. It was originally recognized as an oncogene, and was frequently found to be amplified in prostate, ovarian and colorectal cancer, chronic lymphocytic leukemia, colon carcinoma, esophageal cancer, dog lymphomas and breast cancer. In the present study, the complete RNPC1 gene was identified in a number of vertebrate genomes, suggesting that RNPC1 exists in all types of vertebrates, including fish, amphibians, birds and mammals. In the different genomes, the gene had a similar 4 exon/3 intron organization, and all the genetic loci were syntenically conserved. The phylogenetic tree demonstrated that the RNPC1 gene from the mammalian, bird, reptile and teleost lineage formed a species-specific cluster. A total of 34 functionally relevant single nucleotide polymorphisms (SNPs), including 14 SNPs causing missense mutations, 8 exonic splicing enhancer SNPs and 12 SNPs causing nonsense mutations, were identified in the human RNPC1 gene. RNPC1 was found to be expressed in bladder, blood, brain, breast, colorectal, eye, head and neck, lung, ovarian, skin and soft tissue cancer. In 14 of the 94 tests, an association between RNPC1

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gene expression and cancer prognosis was observed. We found that the association between the expression of RNPC1 and prognosis varied in different types of cancer, and even in the same type of cancer from the different databases used. This suggests that the function of RNPC1 in these tumors may be multidimensional. The sex determining region Y (SRY)-box 5 (Sox5), runt-related transcription factor 3 (RUNX3), CCAAT displacement protein 1 (CUTL1), v-rel avian reticuloendotheliosis viral oncogene homolog (Rel)A, peroxisome proliferator-activated receptor  $\gamma$  isoform 2 (PPAR $\gamma$ 2) and activating transcription factor 6 (ATF6) regulatory transcription factor binding sites were identified in the upstream (promoter) region of the RNPC1 gene, and may thus be involved in the effects of RNPC1 in tumors.

## Introduction

RNA-binding proteins (RBPs) are known to play a crucial role in post-transcriptional regulation in gene expression, and regulate all aspects of RNA metabolism and function, such as polyadenylation, RNA splicing, transport, stability and translation; thus, they represent critical mechanisms for gene regulation in mammalian cells (1,2). They contain one or more RNA-binding motifs, such as the RNA recognition motif (RRM), the human heterogeneous nuclear ribonucleoprotein (hnRNP) K homology motif, the RGG box and the double-stranded RNA binding domain (dsRBD) motif. RRM is the most prevalent type of eukaryotic RNA-binding motif (3), which is composed of two submotifs, RNP1 and RNP2 (3). RBPs are involved in the expression of various genes responsible for regulating biological processes and cellular functions, and thus expected mutations or the aberrant production of RBPs can cause cancer progression (4,5).

The RNA binding motif protein 38 (RBM38, also known as RNPC1) gene is located on chromosome 20q13 and is expressed in a variety of tissues. It belongs to the RRM family of RBPs, is expressed as RNPC1a with 239 amino acids and as RNPC1b with 121 amino acids (6). RNPC1 plays pivotal roles in regulating a wide range of biological processes, ranging from cell proliferation and cell cycle arrest to cell myogenic differentiation (7,8). It is capable of regulating these biological processes by binding and stabilizing the mRNA of p21, p73, Hu antigen R (HuR) and macrophage inhibitory cytokine-1 (MIC-1) (6,7,9,10), or by binding to the mRNAs of p63, murine double minute-2 (MDM2) and p53 and mediating the decrease in the mRNA levels and the attenuation of the translation of these proteins (11-13).

RNPC1 was originally recognized as an oncogene, and was frequently found to be amplified in prostate (14,15), ovarian cancer (16), colorectal cancer (17,18), chronic lymphocytic leukemia (19), colon carcinoma (20), esophageal adenocarcinoma (21), dog lymphomas (13) and breast cancer (22-24). Recently, new evidence suggests that RNPC1 acts as a tumor suppressor. It has been reported that RNPC1 is part of a negative feedback loop, which restricts E2F transcription factor 1 (E2F1) activity by limiting cell cycle progression at the G1-S boundary (25). The expression of RNPC1 has been shown to highly correlate with increased survival in patients with ovarian cancer (25). In breast cancer, RNPC1 functions as a tumor repressor, possibly through promoter hypermethylation silencing (26). In the present study, we identified RNPC1 genes from mammalian genomes using comparative genomic analyses. We then searched for conserved transcription factorbinding sites within the promoter regions of the human RNPC1 gene. Analysis of the expression data and functionally relevant single nucleotide polymorphisms (SNPs), and comparative proteomic analyses were conducted. Furthermore, a metaanalysis of the prognostic value of the RNPC1 gene in various types of cancer was also performed.

### Materials and methods

Identification of the complete RNPC1 gene in vertebrate genomes and integrative genomic analyses. The RNPC1 gene and amino acid sequences were selected from the Ensembl database (http://www.ensembl.org/index.html), based on orthologous and paralogous associations. The selected RNPC1 sequences were applied as queries in order to search for the RNPC1 gene using the BLAST tool at the National Center for Biotechnology Information (NCBI), in order to confirm whether their best hit was an RNPC1 gene (27-33). The number, length and structure of the exons and introns in the RNPC1 gene in all species were collected from Ensembl. The number and length of the RNPC1 exons and introns in all sequences were then subjected to exon-intron conservation analyses. Conserved transcription factor-binding sites within the promoter region of the human RNPC1 gene were obtained from the SABiosciences' proprietary database, which combines Text Mining Application and data from the UCSC Genome Browser (http://genome.ucsc.edu/) (27-33).

*Comparative proteomic analyses of RNPC1 protein.* The protein-coding sequences of RNPC1 were aligned using the ClustalW program in MEGA 5.05. We constructed a maximum likelihood (ML) tree of RNPC1 amino acid sequences using MEGA 5.05 with the optimal model (Kimura 2-parameter). Relative support of the internal node was performed by bootstrap analyses with 1,000 replications for ML reconstructions (34). The CodeML program, implemented in the PAML 4.7 software package, was used to investigate whether the RNPC1 protein is under positive selection (35). The site-specific model was developed using the likelihood ratio test (LRT) to compare

the M7 (null model) with the M8 model. M7 is a null model that does not allow for any codons with  $\omega$ >1, whereas the M8 model allows for positively selected sites ( $\omega$ >1). When the M8 model fits the data significantly (P-value <0.05) better than the null model (M7), the presence of sites with  $\omega$ >1 is suggested. On the contrary, the results of P-value >0.05 are proof the absence of sites with  $\omega$ >1. Twice the log likelihood difference between the two compared models (2 $\Delta$ I) is compared against  $\chi^2$  with critical values being 5.99 and 9.21 at the 0.05 and 0.01 significance levels, respectively (36).

Identification of functionally relevant SNPs in the human RNPC1 gene and somatic mutations in human cancer. Functionally relevant SNPs of the human RNPC1 gene were identified as previously described (27-33). The SNPs were extracted from Ensembl (http://www.ensembl.org) and NCBI's SNPdb (http://www.ncbi.nlm.nih.gov). The SNPs that disrupted exonic splicing enhancer (ESE)/exonic splicing silencer (ESS) motifs and caused missence mutations were also identified. The identification of somatic mutations of the human RNPC1 gene in human cancer was conducted using COSMIC, a database for mining complete cancer genomes in the catalogue of somatic mutations in cancer (37).

Analysis of the expression of the human RNPC1 gene. The expression profiles of RNPC1 in normal human tissues were obtained from ArrayExpress (38). Virtual northern blot analysis of NCBI's UniGene dataset was also performed, as previously described (31-33).

Meta-analysis of the prognostic value of the RNPC1 gene in cancer. For meta-analysis, the PrognoScan database was used (39). This includes: i) a large collection of publicly available cancer microarray datasets with clinical annotation, and ii) a tool for assessing the biological association between gene expression and prognosis. PrognoScan employs the minimum P-value approach to group patients for survival analysis. PrognoScan provides a powerful platform for evaluating potential tumor markers and therapeutic targets, and is publicly accessible at http://www.prognoscan.org/. The human RNPC1 gene was inputted as a query, and the data were collected for analysis. PrognoScan displays a summary in table format of tests for RNPC1 with columns for dataset, cancer type, subtype, endpoint, cohort, contributor, array type, probe ID, number of patients, optimal cutpoint, Pmin and Pcor.

## Results

Comparative proteomic analysis of the RNPC1 protein identified in vertebrate genomes. All the RNPC1 nucleotide and protein sequences were collected from ENSEMBL and checked using BLAST at NCBI. The complete RNPC1 gene was identified in the human, bushbaby, chimpanzee, macaque, gorilla, olive baboon, vervet-AGM (vervet monkey), guinea pig, mouse, rat, cow, dog, ferret, hedgehog, armadillo, elephant, lesser hedgehog tenrec, anole lizard, chicken, Chinese softshell turtle, duck, Amazon molly, flycatcher, cave fish, Fugu, medaka, platyfish, spotted gar, stickleback, tilapia, *Tetraodon* and zebrafish genomes. The sequences and structural alignment of RNPC1 in these genomes are shown in Fig. 1. The phylogenetic tree A Human Bushbaby Chimpanze Gorilla Macaque Olive bal Orangutar Vervet-AG Suinea\_P Mouse Rat Cat Cow Dog Ferret Hedgehog Horse Microbat Pig Armadillo Elephant Lesser\_he Anole\_11 Chicken Chinese\_s Duck Flycatche Zebra Fin Amazon mo Amazon mo Cave\_fish Cave fish Fugu Fugu Medaka Placyfish Platyfish Spotted of Stickleba Tetraodor Tilapia-1 Tilapia-2 Zebrafish Consensus Human Bushbaby Chimpanze Gorilla Macaque Olive bab Orangutar Vervet-A Suinea\_P. Mouse Rat Cat Cow Dog Ferret Hedgehog Horse Microbat Pig Armadillo Elephant Lesser\_he

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Human	MLLCPAPCAPSAGFPRPIAAPG.ABBGSCKDTFTKIFVGGLPYHTTDASLRKYFEGFGDIEEAVVIIDROTGKSRGY	77
Bushbaby	MULCPAPCAPSAGEPREEAAFGGAMEGS. CKDTTETKTEVGGLEVHTTEASLEKYFEGEGDIFFAVVITEROTOKSRGY	78
Chimana		
chimpanzee	RELEVANCAPSAGERFLAAFG.ABGS	"
Gorilla		0
Macamie	MULCHARCZESAGERSPEARG, ARROS, CROTTETRIFUGGERVETTRASI BRVETCEGD FFAUUTTROTORSPOY	77
Diive_baboon	MLLCPAPCAPSAGEPRPEAAFG.AMHGSCRDITETRIFVGGEPTHITDASLERTECEGDIEEAVVITORGIGRSRGT	77
Orangutan		0
Vervet-2GM	MULCPARCERSAGERSPEALEG, ARRES, ORDETETRIEVOGLEVHTTEASTERVEGEDTERAUUTEROTEKSPGV	77
Suinea_Pig	MLLCPAPCAPSAGFPRPFAAFG.AMEGSCKDTFTKIFVGGLPYHTTDASLRKYFEGFGDIEEAVVITDROTGKSRGY	77
Mouse	MLLCPACSPSVFFRFSAAFS.AHEGS.CKDTFTKIFVGGLPYHTTDASLRKYFEGFGDIEEAVVITEROTGKSRGY	75
0		
Hat		
Cat		0
Cov	MLLCPARCAPSAGESRPEAARG, ANHGS, CKD TETRIFUGGLPYHTTDASLPKY EGEGDIFEAUUITEROTOKSPGY	77
Dog		0
Ferret	MEGS QKDTIFIKIFVGGLPYHTIDASLRKYFEGFGDIEEAVVIIDRQTGKSRGY	54
Hedgehog	MILCPAPCAPSAGECRPEAAFG, ANHGS, HED TETRIFUGGEPUNTTEASLERVEIGEGDIFEAUUITERCTGESBGY	77
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Horse		0
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Elephant		0
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Duck	METIQKDTIFTKIFVGGLPYHTTCSSLRKYFEVFGDIEEAVVITDRQTCKSRGY	54
Flycatcher	METV., CKDTIFTKIFVGGLPYHTTESSLRKYFEVFGDIFFAVVITERCTGKSRGY	54
Tabus Frank		
Lebra rinch		
Amazon_molly-1	MLLHQYMN3SLEV#PPIFVQKDTTETKIFVGGLPYHTTDASLRKYFEAFGDICEAVVITDROTOKSRGY	69
Amazon molly-2	MSSPLFLGCLLGVPLEINEPI, MERCH TYTRIFVGGLPVHTSDASLERVEFTEGD LPAUUTTENOT	72
The first is		
Cave_fish-1	MIVHCSVSAPEMRAV.GRIDITETRIFVGGLPTHAIDASLEEIFGSFGEISEAVVIIDRUIGRSRGI	00
Cave fish-2	MILHQFENATICAHEPIGIQKOTTETKIFVGGLPYHINDASLEKYTEAYGDIDEAVVITDROTGKSRGY	69
Fuent	WERT WERT TYTETEUCCI PYRTURASI BRYTESEDT FRAUUTEROTORSDCY	55
Fugu	ALLH. CYMIGALEVMHFIAICKDIFFIKIFVGGLEYHTNCASLEKYFEAFGLICHA	55
Medaka	REPI.MEKDITYTKIFVGGLPYHISEASLEKYYEIFGDIDEAVVIIEKOTGKSRGY	55
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Platyfish	MSSPLFLGQLLGVPLEIMPPI.MEKDTYTKIFVGGLPYHTSDASLRKYFETFGDIDEAVVITDKQTGKSRGY	72
Spotted gar	MILHOFUNGSIEAWEPI, JORD TETRIFUGGI DYHTNDASI BKYFEVEGDI FEAUUITEDOTOKSDOV	69
Set also also also		
STICKLEDACK	HEFT. MEKOLIMIKIPVGGLPIHINDASLEKIPLIFGDILEAVVIIDKQIGKSKGI	23
Tetraodon	BEPIAFOKDITETKIFVGGLPYHINDASLEKYEAFGDIDEAVVIIDROTOKSRGY	56
Tilania-1	ASSET FLOAT UCULTET THE TATE TO TATE TO CE DANK TARA TO A TATE TO	72
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Tilapia-2	MILHQYMNGALCVMHFIALQKDTIFTKIFVGGLPYHINDASLRKYFEAFGDICEAVVIIDRQIGKSRGY	69
Zebrafish	MILHCFUNGTLETNYFS, ICKD TETKIFVGGLPYHTTDASLRKY ETFGDIDEAVVITEROTGKSRGY	68
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consensus		
Human	GEVTMADRAAAERACKDENPIIDGREANVNLAYIGAEPSICT	151
Human Bushbahu	GEVINADRAAAERACKUPNPIIDGRKANVNLAYIGAKERSLOTGEAIGVOOLHPILIGRINGLIPHVIYEPÄIV	151
Human Bushbaby	GEVINADRAAAERACKDENDIIDGRKANVNLAYLGAKERSLOIGEAIGVOOLHDIIDGRIYGLIPHYIYEDAIV GEVINADRAAAERACKDENDIIDGRKANVNLAYLGAKERSLOIGEAIGVOOLHDIIDGRIYGLIPHYIYEDAIV	151 152
Human Bushbaby Chimpanzee	GEVTNÄDRAABERACKDENPIIDGRKANVNLAVIGAKERSIGTGEAIGVOOLHPTLIGRTYGLTEHVIVEPÄIV GEVTNÄDRAABERACKDENPIIDGRKANVNLAVIGAKERSIGTGEAIGVOOLHPTLIGRTYGLTEHVIVEGAIV GEVTNÄDRAABERACKDENPIIDGRKANVNLAVIGAKERSIGTGEAIGVOOLHPTLIGRTYGLTEHVIVEPAIV	151 152 151
Human Bushbaby Chimpanzee Sorilla	GEVINÄD RAABERACKIENPI IDGRKANVNLAVLGAKERSIGIGEATGVOGLAPILIGRIVGITPHVIVEPÄIV GEVINÄD RAABERACKIENPI IDGRKANVNLAVLGAKERSIGIGEATGVOGLAPILIGRIVGITPHVIVEGAIV GEVINÄD RAABERACKIENPI IDGRKANVNLAVLGAKERSIGIGEATGVOGLAPILIGRIVGITPHVIVEPÄIV NADRAABERACKIENPI IDGRKANVNLAVLGAKERSIGIGEATGVOGLAPILIGRIVGITPHVIVEPÄIV	151 152 151 70
Human Bushbaby Chimpanzee Sorilla Vacenne	GEVINADRAAEBACKDENPIIDGRKANVNLAYIGAKERSLCTGEAIGVOQLEPTIQRTYGLTPHYIYEPÄIV GEVINADRAAEBACKDENPIIDGRKANVNLAYIGAKERSLCTGEAIGVOQLEPTLQRTYGLTPHYIYEPÄIV GEVINADRAAEBACKDENPIIDGRKANVNLAYIGAKERSLCTGEAIGVOQLEPTLQRTYGLTPHYIYEPÄIV NADRAAEBACKDENPIIDGRKANVNLAYIGAKERSLCTGEAIGVOQLEPTLQRTYGLTPHYIYEPÄIV	151 152 151 70
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Human Bushbaby Chimpanzee Sorilla Macaque Olive_baboon Orangutan Vervet-AGM Suinea_Pig Mouse	GEVINAD RAABERACKDENPIIDGRKANVNLAYIGAKERSLCTGEAIGVQQLHETLIQRIYGLIEHYIYEPÄIV GEVINAD RAABERACKDENPIIDGRKANVNLAYIGAKERSLCTGEAIGVQQLHETLIQRIYGLIEHYIYEPÄIV SKUTNAD RAABERACKDENPIIDGRKANVNLAYIGAKERSLCTGEAIGVQQLHETLIQRIYGLIEHYIYEPÄIV NAD RAABERACKDENPIIDGRKANVNLAYIGAKERSLCTGEAIGVQQLHETLIQRIYGLIEHYIYEPÄIV GEVINAD RAABERACKDENPIIDGRKANVNLAYIGAKERSLCTGEAIGVQQLHETLIQRIYGLIEHYIYEPÄIV GEVINAD RAABERACKDENPIIDGRKANVNLAYIGAKERSLCTGEAIGVQQLHETLIQRIYGIIEHYIYEPÄIV MAD RAABERACKDENPIIDGRKANVNLAYIGAKERSLCTGEAIGVQQLHETLIQRIYGIIEHYIYEPÄIV GEVINAD RAABERACKDENPIIDGRKANVNLAYIGAKERSLCTGEAIGVQQLHETLIQRIYGIIEHYIYEPÄIV GEVINAD RAABERACKDENPIIDGRKANVNLAYIGAKERSLCTGEAIGVQQLHETLIQRIYGIIEHYIYEPÄIV GEVINAD RAABERACKDENPIIDGRKANVNLAYIGAKERSLCTGEAIGVQQLHETLIQRIYGIIEHYIYEPÄIV GEVINAD RAABERACKDENPIIDGRKANVNLAYIGAKERSLCTGEAIGVQQLHETLIQRIYGIIEHYIYEPÄIV GEVINAD RAABERACKDENPIIDGRKANVNLAYIGAKERSLCTGEAIGVQQLHETLIQRIYGIIEHYIYEPÄIV	151 152 151 70 151 151 70 151 151
Human Bushbaby Chimpanzee Sorilla Macaque Olive_baboon Orangutan Vervet-AGM Guinea_Pig Mouse Par	GEVINAD RAABERACKDENFIIDGRKANVNLAYIGAKERSLCTGEAIGVQQLHFTLIQRTYGLTHHYIYPAIV GEVINAD RAABERACKDENFIIDGRKANVNLAYIGAKERSLCTGEAIGVQQLHFTLIQRTYGLTHHYIYPAIV NAD RAABERACKDENFIIDGRKANVNLAYIGAKERSLCTGEAIGVQQLHFTLIQRTYGLTHHYIYPAIV GEVINAD RAABERACKDENFIIDGRKANVNLAYIGAKERSLCTGEAIGVQQLHFTLIQRTYGLTHYIYPAIV GEVINAD RAABERACKDENFIIDGRKANVNLAYIGAKERSLCTGEAIGVQQLHFTLIQRTYGLTHYIYPAIV GEVINAD RAABERACKDENFIIDGRKANVNLAYIGAKERSLCTGEAIGVQQLHFTLIQRTYGLTHYIYPAIV GEVINAD RAABERACKDENFIIDGRKANVNLAYIGAKERSLCTGEAIGVQQLHFTLIQRTYGLTHYIYPAIV GEVINAD RAABERACKDENFIIDGRKANVNLAYIGAKERSLCT	151 152 151 70 151 151 151 151 151
Human Bushbaby Chimpanzee Sorilla Macaque Olive_baboon Orangutan Vervet-AGM Suinea_Pig Mouse Rat	GEVINAD RAAAERACKIENDI IIGRKANVNLAYIGAKERSIGIGEAIGVQQLHDTI IQRIYGITHHYIYPAIV GEVINAD RAAAERACKIENDI IIGRKANVNLAYIGAKERSIGIGEAIGVQQLHDTI IQRIYGITHHYIYPAIV KADRAAERACKIENDI IIGRKANVNLAYIGAKERSIGIGEAIGVQQLHDTI IQRIYGITHHYIYPAIV KADRAAERACKIENDI IIGRKANVNLAYIGAKERSIGIGEAIGVQQLHDTI IQRIYGITHHYIYPAIV GEVINAD RAAAERACKIENDI IIGRKANVNLAYIGAKERSIGIGEAIGVQQLHDTI IQRIYGITHHYIYPAIV GEVINAD RAAAERACKIENDI IIGRKANVNLAYIGAKERSIGIGEAIGVQQLHDTI IQRIYGITHHYIYPAIV GEVINAD RAAAERACKIENDI IIGRKANVNLAYIGAKERSIGIGEAIGVQQLHTI IQRIYGITHHYIYPAIV GEVINAD RAAAERACKIENDI IIGRKANVNLAYIGAKERSIGIGEAIGVQQLHTI IQRIYGITHHYIYPAIV GEVINAD RAAERACKIENDI IIGRKANVNLAYIGAKERSIGIGEAVGVQQLHTI IQRIYGITHHYIYPAIV GEVINAD RAAERACKIENDI IIGRKANVNLAYIGAKERSIGIGEAVGVQQLHTI IQRIYGITHYIYPAIV GEVINAD RAAERACKIENDI IIGRKANVNLAYIGAKERSIGIGEAVGVQQLHTI IQRIYGITHYIYPAIV GEVINAD RAAERACKIENDI IIGRKANVNLAYIGAKERSIGI	151 152 151 70 151 151 151 151 151 149 70
Human Bushbaby Chimpanzee Sorilla Macaque Olive_baboon Orangutan Vervet-AGM Suinea_Pig Mouse Rat Cat	GEVINAD RAABERACKDENFIIDGRKANVNLAYIGAKERSLCTGEAIGVQQLHFTLIQRTYGLTFHYIYEFAIV GEVINAD RAABERACKDENFIIDGRKANVNLAYIGAKERSLCTGEAIGVQQLHFTLIQRTYGLTFHYIYEFAIV GEVINAD RAABERACKDENFIIDGRKANVNLAYIGAKERSLCTGEAIGVQQLHFTLIQRTYGLTFHYIYEFAIV GEVINAD RAABERACKDENFIIDGRKANVNLAYIGAKERSLCTGEAIGVQQLHFTLIQRTYGLTFHYIYEFAIV GEVINAD RAABERACKDENFIIDGRKANVNLAYIGAKERSLCTGEAIGVQQLHFTLIQRTYGLTFHYIYEFAIV NAD RAABERACKDENFIIDGRKANVNLAYIGAKERSLCTGEAIGVQQLHFTLIQRTYGLTFHYIYEFAIV GEVINAD RAABERACKDENFIIDGRKANVNLAYIGAKERSLCTGEAIGVQQLHFTLIQRTYGLTFHYIYEFAIV GEVINAD RAABERACKDENFIIDGRKANVNLAYIGAKERSLCTGEAIGVQQLHFTLIQRTYGLTFHYIYEFAIV GEVINAD RAABERACKDENFIIDGRKANNLAYIGAKERSLCTGEAIGVQQLHFTLIQRTYGLTFHYIYEFAIV GEVINAD RAABERACKDENFIIDGRKANNLAYIGAKERSLCTGEAIGVQQLHFTLIQRTYGLTFHYIYEFAIV GEVINAD RAABERACKDENFIIDGRKANNLAYIGAKERSLCTGEAIGVQQLHFTLIQRTYGLTFHYIYEFAIV GEVINAD RAABERACKDENFIIDGRKANNLAYIGAKERSLCTGEAIGVQQLHFTLIQRTYGLTFHYIYEFAIV MAD RAABERACKDENFIIDGRKANNLAYIGAKERSLCTGEAIGVQQLHFTLIQRTYGLTFHYIYEFAIV MAD RAABERACKDENFIIDGRKANNLAYIGAKERSLCTGEAVGVQQLHFTLIQRTYGLTFHYIYEFAIV MAD RAABERACKDENFIIDGRKANNLAYIGAKERSLCTGEAVGVQLHFTLIQRTYGLTFHYIYEFAIV MAD RAABERACKDENFIIDGRKANNLAYIGAKERSLCTGEAVGVQLHFTLIQRTYGLTFHYIYEFAIV MAD RAABERACKDENFIIDGRKANNLAYIGAKERSLCTGEAVGVQLHFTLIQRTYGLTFHYIYEFAIV MAD RAABERACKDENFIIDGRKANNLAYIGAKERSLCTGEAVGVQLHFTLIQRTYGLTFHYIYEFAIV	151 152 151 70 151 151 151 151 149 70 70
Human Bushbaby Chimpanzee Sorilla Macaque Olive_baboon Orangutan Vervet-AGM Suinea_Pig Mouse Rat Cat Cay	GEVINAD RAABERACKDENPIIDGRKANVNLAYLGAKERSLCTGEAIGVQLHFTLQRTYGLTFHYIYEPAIV GEVINAD RAABERACKDENPIIDGRKANVNLAYLGAKERSLCTGEAIGVQLHFTLQRTYGLTFHYIYEPAIV KADRAABERACKDENPIIDGRKANVNLAYLGAKERSLCTGEAIGVQLHFTLQRTYGLTFHYIYEPAIV GEVINAD RAABERACKDENFIIDGRKANVNLAYLGAKERSLCTGEAIGVQLHFTLQRTYGLTFHYIYEPAIV GEVINAD RAABERACKDENFIIDGRKANVNLAYLGAKERSLCTGEAIGVQLHFTLQRTYGLTFHYIYEPAIV MADRAABERACKDENFIIDGRKANVNLAYLGAKERSLCTGEAIGVQLHFTLQRTYGLTFHYIYEPAIV GEVINAD RAABERACKDENFIIDGRKANVNLAYLGAKERSLCTGEAIGVQLHFTLQRTYGLTFHYIYEPAIV GEVINAD RAABERACKDENFIIDGRKANVNLAYLGAKERSLCTGEAIGVQLHFTLQRTYGLTFHYIYEPAIV GEVINAD RAABERACKDENFIIDGRKANVNLAYLGAKERSLCTGEAIGVQLHFTLQRTYGLTFHYIYEPAIV GEVINAD RAABERACKDENFIIDGRKANVNLAYLGAKERSLCTGEAIGVQLHFTLQRTYGLTFHYIYEPAIV GEVINAD RAABERACKDENFIIDGRKANVNLAYLGAKERSLCTGEAIGVQLHFTLQRTYGLTFHYIYEPAIV GEVINAD RAABERACKDENFIIDGRKANVNLAYLGAKERSLCTGEAVGVQLHFTLQRTYGLTFHYIYEPAIV GEVINAD RAABERACKDENFIIDGRKANVNLAYLGAKERSLCTGEAVGVQLHFTLQRTYGLTFHYIYEPAIV MADRAABRACKDENFIIDGRKANVNLAYLGAKERSLCTGEAVGVQLHFTLQRTYGLTFHYIYEPAIV NADRAABRACKDENFIIDGRKANVNLAYLGAKERSLCTGEAVGVQLHFTLQRTYGLTFHYIYEPAIV GEVINADRAABRACKDENFIIDGRKANVNLAYLGAKERSLCTGEAVGVQLHFTLQRTYGLTFHYIYEPAIV MADRAABRACKDENFIIDGRKANVNLAYLGAKERSLCTGEAVGVQLHFTLQRTYGLTFHYIYEPAIV NADRAABRACKDENFIIDGRKANVNLAYLGAKERSLCTGEAVGVQLHFTLQRTYGLTFHYIYEPAIV NADRAABRACKDENFIIDGRKANVNLAYLGAKERSLCTGEAVGVQLHFTLQRTYGLTFHYIYEPAIV NADRAABRACKDENFIIDGRKANVLAYLGAKERSLCTGEAVGVQLHFTLQRTYGLTFHYIYEPAIV	151 152 151 70 151 151 151 151 149 70 70 70
Human Bushbaby Chimpanzee Sorilla Macaque Olive_baboon Orangutan Vervet-AGM Suinea_Pig Mouse Rat Cat Cow	GEVINAD RAABERACKDENPIIDGRKANVNLAYLGAKERSLCTGEALGVQQLHFTLIQRIYGLIFHYIYEFAIV GEVINAD RAABERACKDENPIIDGRKANVNLAYLGAKERSLCTGEALGVQQLHFTLIQRIYGLIFHYIYEFAIV NADRAABERACKDENFIIDGRKANVNLAYLGAKERSLCTGEALGVQQLHFTLIQRIYGLIFHYIYEFAIV GEVINAD RAABERACKDENFIIDGRKANVNLAYLGAKERSLCTGEALGVQQLHFTLIQRIYGLIFHYIYEFAIV GEVINAD RAABERACKDENFIIDGRKANVNLAYLGAKERSLCTGEALGVQQLHFTLIQRIYGLIFHYIYEFAIV NADRAABERACKDENFIIDGRKANVNLAYLGAKERSLCTGEALGVQQLHFTLIQRIYGLIFHYIYEFAIV GEVINAD RAABERACKDENFIIDGRKANVNLAYLGAKERSLCTGEALGVQQLHFTLIQRIYGLIFHYIYEFAIV GEVINAD RAABERACKDENFIIDGRKANVNLAYLGAKERSLCTGEALGVQQLHFTLIQRIYGLIFHYIYEFAIV GEVINAD RAABERACKDENFIIDGRKANVNLAYLGAKERSLCTGEALGVQQLHFTLIQRIYGLIFHYIYEFAIV GEVINAD RAABERACKDENFIIDGRKANVNLAYLGAKERSLCTGEALGVQQLHFTLIQRIYGLIFHYIYEFAIV GEVINAD RAABERACKDENFIIDGRKANVNLAYLGAKERSLCTGEALGVQQLHFTLIQRIYGLIFHYIYEFAIV GEVINAD RAABERACKDENFIIDGRKANVNLAYLGAKERSLCTGEALGVQQLHFTLIQRIYGLIFHYIYEFAIV GEVINAD RAABERACKDENFIIDGRKANVNLAYLGAKERSLCTGEALGVQQLHFTLIQRIYGLIFHYIYEFAIV GEVINAD RAABERACKDENFIIDGRKANVNLAYLGAKERSLCTGEALGVQQLHFTLIQRIYGLIFHYIYEFAIV GEVINAD RAABERACKDENFIIDGRKANVNLAYLGAKERSLCTGEAUGVQQLHFTLIQRIYGLIFHYIYEFAIV GEVINAD RAABERACKDENFIIDGRKANVNLAYLGAKERSLCTGEAUGVQQLHFTLIQRIYGLIFHYIYEFAIV GEVINAD RAABERACKDENFIIDGRKANVNLAYLGAKERSLCTGEAUGVQQLHFTLIQRIYGLIFHYIYEFAIV GEVINAD RAABERACKDENFIIDGRKANVNLAYLGAKERSLCTGEAUGVQQLHFTLIQRIYGLIFHYIYEFAIV GEVINAD RAABERACKDENFIIDGRKANVNLAYLGAKERSLCTGEAUGVQQLHFTLIQRIYGLIFHYIYEFAIV GEVINAD RAABERACKDENFIIDGRKANVNLAYLGAKERSLCTGEAUGVQQLHFTLIQRIYGLIFHYIYEFAIV GEVINAD RAABERACKDENFIIDGRKANVNLAYLGAKERSLCTGEAUGVQQLHFTLIQRIYGLIFHYIYEFAIV GEVINAD RAABERACKDENFIIDGRKANVNLAYLGAKERSLCTGEAUGVQQLHFTLIQRIYGLIFHYIYEFAIV	151 152 151 70 151 151 151 151 151 151 151 151
Human Bushbaby Chimpanzee Sorilla Macaque Olive_baboon Orangutan Vervet-AGM Suinea_Pig Mouse Rat Cat Cow Dog	GEVINAD RAAAFRACKDENFIIDGRAANNLAYLGAKERSLGTGEAIGVQQLHFTLQRTYGLTFHYIYFGAIV GEVINAD RAAAFRACKDENFIIDGRAANNLAYLGAKERSLGTGEAIGVQQLHFTLQRTYGLTFHYIYFGAIV NAD RAAAFRACKDENFIIDGRAANNLAYLGAKERSLGTGEAIGVQQLHFTLQRTYGLTFHYIYFFAIV GEVINAD RAAAFRACKDENFIIDGRANNLAYLGAKERSLGTGEAIGVQQLHFTLQRTYGLTFHYIYFFAIV GEVINAD RAAAFRACKDENFIIDGRANNLAYLGAKERSLGTGEAIGVQQLHFTLQRTYGLTFHYIYFFAIV GEVINAD RAAAFRACKDENFIIDGRANNLAYLGAKERSLGTGEAIGVQQLHFTLQRTYGLTFHYIYFFAIV GEVINAD RAAAFRACKDENFIIDGRANNLAYLGAKERSLGTGEAIGVQQLHFTLQRTYGLTFHYIYFFAIV GEVINAD RAAAFRACKDENFIIDGRANNLAYLGAKERSLGTGEAIGVQQLHFTLQRTYGLTFHYIYFFAIV GEVINAD RAAAFRACKDENFIIDGRANNLAYLGAKERSLGTGEAIGVQQLHFTLQRTYGLTFHYIYFFAIV GEVINAD RAAAFRACKDENFIIDGRANNLAYLGAKERSLGTGEAIGVQQLHFTLQRTYGLTFHYIYFFAIV GEVINAD RAAAFRACKDENFIIDGRANNLAYLGAKERSLGTGEAIGVQQLHFTLQRTYGLTFHYIYFFAIV GEVINAD RAAAFRACKDENFIIDGRANNLAYLGAKERSLGTGEAIGVQQLHFTLQRTYGLTFHYIYFFAIV MAD RAAAFRACKDENFIIDGRANNNLAYLGAKERSLGTGEAVGVQQLHFTLQRTYGLTFHYIYFFAIV NAD RAAAFRACKDENFIIDGRANNNLAYLGAKERSLGTGEAVGVQQLHFTLQRTYGLTFHYIYFFAIV MAD RAAAFRACKDENFIIDGRANNNLAYLGAKERSLGTGEAVGVQQLHFTLQRTYGLTFHYIYFFAIV MAD RAAAFRACKDENFIIDGRANNNLAYLGAKERSLGTGEAVGVQQLHFTLQRTYGLTFHYIYFFAIV MAD RAAAFRACKDENFIIDGRANNNLAYLGAKERSLGTGEAVGVQQLHFTLQRTYGLTFHYIYFFAIV MAD RAAAFRACKDENFIIDGRANNNLAYLGAKERSLGTGEAVGVQQLHFTLQRTYGLTFHYIYFFAIV MAD RAAAFRACKDENFIIDGRANNNLAYLGAKERSLGTGEAIGVQQLHFTLQRTYGLTFHYIYFFAIV MAD RAAAFRACKDENFIIDGRANNNLAYLGAKERSLGTGEAIGVQQLHFTLQRTYGLTFHYIYFFAIV	151 152 151 70 151 151 151 149 70 70 151 70
Human Bushbaby Chimpanzee Sorilla Macaque Olive_baboon Orangutan Vervet-AGM Suinea_Pig Mouse Rat Cat Cox Dog Ferret	GEVINAD RAABERACKIERNE I IDGREANVNLAYIGAKERSIGTGERI GVOQLE PILIQRI YGLIPHYIY PAIV GEVINAD RAABERACKIERNE I IDGREANVNLAYIGAKERSIGTGERI GVOQLE PILIQRI YGLIPHYIY PAIV KADRAABERACKIERNE I IDGREANVNLAYIGAKERSIGTGERI GVOQLE PILIQRI YGLIPHYIY PAIV OGVINAD RAABERACKIERNE I IDGREANVNLAYIGAKERSIGTGERI GVOQLE PILIQRI YGLIPHYIY PAIV GEVINAD RAABERACKIERNE I IDGREANVNLAYIGAKERSIGTGERI GVOQLE PILIQRI YGLIPHYIY PAIV MADRAABARAKIERNE I IDGREANVNLAYIGAKERSIGTGERI GVOQLE PILIQRI YGLIPHYIY PAIV MADRAABERACKIERNE I DGREANVNLAYIGAKERSIGTGERI GVOQLE PILIQRI YGLIPHYIY PAIV MADRAABERACKIERNE I DGREANVNLAYIGAKERSIGTGERI GVOQLE PILIQRI YGLIPHYIY POIV MADRAABERACKIERNE I DGREANVNLAYIGAKERSIGTGERI GVOQLE PILI	151 152 151 70 151 151 151 151 151 151 151 151 70 70 151 70
Human Bushbaby Chimpanzee Sorilla Macaque Olive_baboon Orangutan Vervet-AGM Suinea_Pig Mouse Rat Cat Cow Dog Ferret Hedgehog	GEVINAD RAAFFACKDENPIIDGRAANNIAYIGAKEPSICTGEAIGVQLHETLIGRTYGLTEHYIYEPAIV GEVINAD RAAFFACKDENPIIDGRAANNIAYIGAKEPSICTGEAIGVQLHETLIGRTYGLTEHYIYEPAIV MAD RAAFFACKDENPIIDGRAANNIAYIGAKEPSICTGEAIGVQLHETLIGRTYGLTEHYIYEPAIV GEVINAD RAAFFACKDENPIIDGRAANNIAYIGAKEPSICTGEAIGVQLHETLIGRTYGLTEHYIYEPAIV GEVINAD RAAFFACKDENPIIDGRAANNIAYIGAKEPSICTGEAIGVQLHETLIGRTYGLTEHYIYEPAIV GEVINAD RAAFFACKDENPIIDGRAANNIAYIGAKEPSICTGEAIGVQLHETLIGRTYGLTEHYIYEPAIV GEVINAD RAAFFACKDENPIIDGRAANNIAYIGAKEPSICTGEAIGVQLHETLIGRTYGLTEHYIYEPAIV GEVINAD RAAFFACKDENPIIDGRAANNIAYIGAKEPSICTGEAIGVQLHETLIGRTYGLTEHYIYEPAIV GEVINAD RAAFFACKDENPIIDGRAANNIAYIGAKEPSICTGEAIGVQLHETLIGRTYGLTEHYIYEPAIV GEVINAD RAAFFACKDENPIIDGRAANNIAYIGAKEPSICTGEAIGVQLHETLIGRTYGLTEHYIYEPAIV GEVINAD RAAFFACKDENPIIDGRAANNIAYIGAKEPSICTGEAIGVQLHETLIGRTYGLTEHYIYEPAIV GEVINAD RAAFFACKDENPIIDGRAANNIAYIGAKEPSICTGEAIGVQLHETLIGRTYGLTEHYIYEPAIV MAD RAAFFACKDENPIDGRAANNIAYIGAKEPSICTGEAIGVQLHETLIGRTYGLTEHYIYEPAIV MAD RAAFFACKDENPIDGRAANNIAYIGAKEPSICTGEAIGVQLHETLIGRTYGLTEHYIYEPAIV	151 152 151 151 151 151 151 151 151 70 70 151 70 70 151
Human Bushbaby Chimpanzee Sorilla Macaque Olive_baboon Orangutan Vervet-AGM Suinea_Pig Mouse Rat Cat Cox Dog Ferret Hedgehog Mouse	GEVINAD RAAAERACKDENPIIDGRKANVNLAYIGAKERSIGTGEAIGVQQLHETLIGRIGITEHYIYEAIV GEVINAD RAAAERACKDENPIIDGRKANVNLAYIGAKERSIGTGEAIGVQQLHETLIGRIGITEHYIYEAIV GEVINAD RAAAERACKDENPIIDGRKANVNLAYIGAKERSIGTGEAIGVQQLHETLIGRIGITEHYIYEAIV KADRAAERACKDENPIIDGRKANVNLAYIGAKERSIGTGEAIGVQQLHETLIGRIGITEHYIYEAIV GEVINAD RAAAERACKDENPIIDGRKANVNLAYIGAKERSIGTGEAIGVQQLHETLIGRIGITEHYIYEAIV GEVINAD RAAAERACKDENPIIDGRKANVNLAYIGAKERSIGTGEAIGVQQLHETLIGRIGITEHYIYEAIV GEVINAD RAAAERACKDENPIIDGRKANVNLAYIGAKERSIGTGEAIGVQQLHETLIGRIGITEHYIYEAIV GEVINAD RAAAERACKDENPIIDGRKANVNLAYIGAKERSIGTGEAIGVQQLHETLIGRIGITEHYIYEAIV GEVINAD RAAERACKDENPIIDGRKANVNLAYIGAKERSIGTGEAIGVQQLHETLIGRIGITEHYIYEAIV GEVINAD RAAERACKDENPIIDGRKANVNLAYIGAKERSIGTGEAIGVQQLHETLIGRIGITEHYIYEAIV GEVINAD RAAERACKDENPIIDGRKANVNLAYIGAKERSIGTGEAIGVQQLHETLIGRIGITEHYIYEAIV GEVINAD RAAERACKDENPIIDGRKANVNLAYIGAKERSIGTGEAIGVQQLHETLIGRIGITEHYIYEAIV GEVINAD RAAERACKDENPIIDGRKANVNLAYIGAKERSIGTGEAVGVQQLHETLIGRIGITEHYIYEAIV GEVINAD RAAERACKDENPIIDGRKANVNLAYIGAKERSIGTGEAVGVQQLHETLIGRIGITEHYIYEAIV MADRAAABAACKDENPIIDGRKANVNLAYIGAKERSIGTGEAVGVQQLHETLIGRIGITEHYIYEAIV MADRAAABAACKDENPIIDGRKANVNLAYIGAKERSIGTGEAVGVQQLHETLIGRIGITEHYIYEAIV MADRAAABAACKDENPIIDGRKANVNLAYIGAKERSIGTGEAVGVQQLHETLIGRIGITEHYIYEAIV MADRAAABAACKDENPIIDGRKANVNLAYIGAKERSIGTGEAVGVQQLHETLIGRIGITEHYIYEAIV MADRAAABAACKDENPIIDGRKANVNLAYIGAKERSIGTGEAIGVQQLHETLIGRIGITEHYIYEAIV MADRAAABAACKDENPIIDGRKANVNLAYIGAKERSIGTGEAIGVQQLHETLIGRIGITEHYIYEAIV MADRAAABAACKDENPIIDGRKANVNLAYIGAKERSIGTGEAIGVQQLHETLIGRIGITEHYIYEAIV MADRAAABAACKDENPIIDGRKANVNLAYIGAKERSIGTGEAIGVQQLHETLIGRIGITEHYIYEAIV MADRAAABAACKDENPIIDGRKANVNLAYIGAKERSIGTGEAIGVQQLHETLIGRIGITEHYIYEAIV	151 152 151 151 151 151 151 151 151 151
Human Bushbaby Chimpanzee Sorilla Macaque Olive_baboon Orangutan Vervet-AGM Suinea_Pig Mouse Rat Cat Cow Dog Ferret Hedgehog Horse	GEVINAD RAAAERACKIENPIIIGRKANVNLAYIGAKERSLCTGEAIGVQQLBFILQRTYGLTEHYIYEPAIV GEVINAD RAAAERACKIENPIIIGRKANVNLAYIGAKERSLCTGEAIGVQQLBFILQRTYGLTEHYIYEPAIV NADRAAERACKIENPIIIGRKANVNLAYIGAKERSLCTGEAIGVQQLBFILQRTYGLTEHYIYEPAIV GEVINAD RAAAERACKIENFIIIGRKANVNLAYIGAKERSLCTGEAIGVQQLBFILQRTYGLTEHYIYEPAIV GEVINAD RAAERACKIENFIIIGRKANVNLAYIGAKERSLCTGEAIGVQQLBFILQRTYGLTEHYIYEPAIV MADRAAERACKIENFIIIGRKANVNLAYIGAKERSLCTGEAIGVQQLBFILQRTYGLTEHYIYEPAIV GEVINAD RAAERACKIENFIIIGRKANVNLAYIGAKERSLCTGEAIGVQQLBFILQRTYGLTEHYIYEPAIV MADRAAERACKIENFIIIGRKANVNLAYIGAKERSLCTGEAIGVQQLBFILQRTYGLTEHYIYEPAIV GEVINAD RAAERACKIENFIIIGRKANVNLAYIGAKERSLCTGEAIGVQQLBFILQRTYGLTEHYIYEPAIV GEVINAD RAAERACKIENFIIIGRKANVNLAYIGAKERSLCTGEAIGVQQLBFILQRTYGLTEHYIYEPAIV GEVINAD RAAERACKIENFIIIGRKANVNLAYIGAKERSLCTGEAIGVQQLBFILQRTYGLTEHYIYEPAIV GEVINAD RAAAERACKIENFIIIGRKANNLAYIGAKERSLCTGEAIGVQQLBFILQRTYGLTEHYIYEPAIV GEVINAD RAAAERACKIENFIIGGKANNLAYIGAKERSLCTGEAIGVQQLBFILQRTYGLTEHYIYEPAIV GEVINAD RAAAERACKIENFIIGGKANNLAYIGAKERSLCTGEAIGVQQLBFILQRTYGLTEHYIYEPAIV MADRAAAERACKIENFIIGGKANNLAYIGAKERSLCTGEAIGVQQLBFILQRTYGLTEHYIYEPAIV MADRAAERACKIENFIIGGKANNLAYIGAKERSLCTGEAIGVQQLBFILQRTYGLTEHYIYEPAIV MADRAAERACKIENFIIGGKANNLAYIGAKERSLCTGEAIGVQQLBFILQRTYGLTEHYIYEPAIV MADRAAERACKIENFIIGGKANNLAYIGAKERSLCTGEAIGVQQLBFILQRTYGLTEHYIYEQAIV GEVINAD RAAAERACKIENPIDIGRKANNLAYIGAKERSLCTGEAIGVQQLBFILQRTYGLTEHYIYEQAIV GEVINAD RAAAERACKIENPIDIGRKANNLAYIGAKERSLCTGEAIGVQQLBFILQRTYGLTEHYIYEQAIV MADRAAERACKIENNIDYIGAKANNLAYIGAKERSLCTGEAIGVQQLBFILQRTYGLTEHYIYEQAIV MADRAAERACKIENNIDAYIGAKERSLCTGEAIGVQLBFILQRTYGLTEHYIYEQAIV GEVINVD RAAAERACKIENNILAYIGAKERSLCTGEAIGVQLBFILQRTYGLTEHYIYEQAIV GEVINVD RAAERACKIENNILGGKANNNLAYIGAKERSLCTGEAIGVQLBFILQRTYGLTEHYIYEQAIV MADRAAERACKIENNILGGKANNNLAYIGAKERSLCTGEAIGVQLBFILQRTYGLTEHYIYEQAIV GEVINVD RAAERACKIENNILGGKANNNLAYIGAKERSLCTGEAIGVQLBFILQRTYGLTEHYIYEQAIV	151 152 151 70 151 151 151 151 151 70 70 151 70 128 151 70
Human Bushbaby Chimpanzee Sorilla Macaque Olive_baboon Orangutan Vervet-AGM Suinea_Pig Mouse Rat Cat Cow Dog Ferret Hedgehog Horse Microbat	GEVINAD RAAAERACKIENDIIDGRANVNLAYIGAKERSIGIGEAIGVQQLBETLIQRIYGITEHYIYEAIV GEVINAD RAAAERACKIENDIIDGRANVNLAYIGAKERSIGIGEAIGVQQLBETLIQRIYGITEHYIYEAIV GEVINAD RAAAERACKIENDIIDGRANVNLAYIGAKERSIGIGEAIGVQQLBETLIQRIYGITEHYIYEAIV NAD RAAAERACKIENDIIDGRANVNLAYIGAKERSIGIGEAIGVQQLBETLIQRIYGITEHYIYEAIV GEVINAD RAAAERACKIENDIIDGRANVNLAYIGAKERSIGIGEAIGVQQLBETLIQRIYGITEHYIYEAIV MAD RAAAERACKIENDIIDGRANVNLAYIGAKERSIGIGEAIGVQQLBETLIQRIYGITEHYIYEAIV GEVINAD RAAAERACKIENDIIDGRANVNLAYIGAKERSIGIGEAIGVQQLBETLIQRIYGITEHYIYEAIV MAD RAAAERACKIENDIIDGRANVNLAYIGAKERSIGIGEAIGVQQLBETLIQRIYGITEHYIYEAIV GEVINAD RAAAERACKIENDIIDGRANVNLAYIGAKERSIGIGEAIGVQQLBETLIQRIYGITEHYIYEAIV MAD RAAAERACKIENDIIDGRANVNLAYIGAKERSIGIGEAIGVQQLBETLIQRIYGITEHYIYEAIV GEVINAD RAAAERACKIENDIIDGRANVNLAYIGAKERSIGIGEAIGVQQLBETLIQRIYGITEHYIYEAIV GEVINAD RAAAERACKIENDIIDGRANVNLAYIGAKERSIGIGEAVGVQQLBETLIQRIYGITEHYIYEAIV GEVINAD RAAAERACKIENDIIDGRANVNLAYIGAKERSIGIGEAVGVQQLBETLIQRIYGITEHYIYEAIV GEVINAD RAAAERACKIENDIIDGRANVNLAYIGAKERSIGIGEAVGVQQLBETLIQRIYGITEHYIYEAIV MAD RAAABRACKIENDIIDGRANVNLAYIGAKERSIGIGEAVGVQQLBETLIQRIYGITEHYIYEAIV MAD RAAABRACKIENDIIDGRANVNLAYIGAKERSIGIGEAVGVQQLBETLIQRIYGITEHYIYEAIV GEVINAD RAAAERACKIENDIIGRKANVNLAYIGAKERSIGIGEAIGVQQLBETLIQRIYGITEHYIYEAIV MAD RAAABRACKIENDIIGRKANVNLAYIGAKERSIGIGEAIGVQQLBETLIQRIYGITEHYIYEAIV MAD RAAABRACKIENDIIGRKANVNLAYIGAKERSIGIGEAIGVQQLBETLIQRIYGITEHYIYEQIV GEVINAD RAAAERACKIENDIIGRKANVNLAYIGAKERSIGIGEAIGVQQLBETLIQRIYGITEHYIYEQIV NADRAAABRACKIENDIIGRKANVNLAYIGAKERSIGIGEAIGVQQLBETLIQRIYGITEHYIYEQIV NADRAAABRACKIENDIIGRKANVNLAYIGAKERSIGIGEAIGVQQLBETLIQRIYGITEHYIYEQIV GEVINAD RAAERACKIENDIIGRKANVNLAYIGAKERSIGIGEAIGVQQLBETLIQRIYGITEHYIYEQIV GEVINAD RAAERACKIENDIIGRKANVNLAYIGAKERSIGIGEAIGVQQLBETLIQRIYGITEHYIYEQIV GEVINAD RAAERACKIENDIIGRKANVNLAYIGAKERSIGIGEAIGVQLBETLIQRIYGITEHYIYEQIV GEVINAD RAAERACKIENDIIGRKANVNLAYIGAKERSIGIGEAIGVQLBETLIQRIYGITEHYIYEQIV	151 152 151 70 151 151 151 151 70 70 151 70 151 70 128 151 70
Human Bushbaby Chimpanzee Sorilla Macaque Olive_baboon Orangutan Vervet-AGM Suinea_Pig Mouse Rat Cat Cow Dog Ferret Hedgehog Horse Microbat Pic	GEVINAD RAABERACKIERNE I IDGRKANVNLAYIGAKERSIGTGERI GVQQL HETI IQRI YGLIEHYIYERAIV GEVINAD RAABERACKIERNE I IDGRKANVNLAYIGAKERSIGTGERI GVQQL HETI QRIYGIIEHYIYERAIV GEVINAD RAABERACKIERNE I IDGRKANVNLAYIGAKERSIGTGERI GVQQL HETI QRIYGIIEHYIYERAIV NADRAABERACKIERNE I IDGRKANVNLAYIGAKERSIGTGERI GVQQL HETI QRIYGIIEHYIYERAIV GEVINAD RAABERACKIERNE I IDGRKANVNLAYIGAKERSIGTGERI GVQQL HETI QRIYGIIEHYIYERAIV MADRAABERACKIERNE I IDGRKANVNLAYIGAKERSIGTGERI GVQQL HETI QRIYGIIEHYIYERAIV MADRAABERACKIERNE I IDGRKANVNLAYIGAKERSIGTGERI GVQQL HETI QRIYGIIEHYIYERAIV MADRAABERACKIERNE I IDGRKANVNLAYIGAKERSIGTGERI GVQQL HETI QRIYGIIEHYIYEQAIV MADRAABERACKIERNE I DGRKANVNLAYIGAKERSIGTGERI GVQQL HETI QRIYGIIEHYIYEQAIV MADRAABERACKIERNE I DGRKANVNLAYIGAKERSIGTGERI GVQQL HETI QRIYGIIEHYIYEQAIV MADRAABERACKIERNE I DGRKANVNLAYIGAKERSIGTGERI GVQQL HETI QRIYGIIEHYIYEQAIV MADRAABERACKIERNE I DGRKANVNLAYIGAKERSIGT	151 152 151 70 151 151 151 151 151 70 151 70 151 151
Human Bushbaby Chimpanzee Sorilla Macaque Olive_baboon Orangutan Vervet-AGM Suinea_Pig Mouse Rat Cat Cow Dog Ferret Hedgehog Horse Microbat Pig	GEVINAD RAABERACKDENPIIDGRANVNLAYLGAKERSLGTGEALGVQQLBETLQRTVGLTEHYLYEQAIV GEVINAD RAABERACKDENPIIDGRANVNLAYLGAKERSLGTGEALGVQQLBETLQRTVGLTEHYLYEQAIV NAD RAABERACKDENPIIDGRANVNLAYLGAKERSLGTGEALGVQQLBETLQRTVGLTEHYLYEQAIV GEVINAD RAABERACKDENEIDGRANVNLAYLGAKERSLGTGEALGVQQLBETLQRTVGLTEHYLYEQAIV MAD RAABERACKDENEIDGRANVNLAYLGAKERSLGTGEALGVQQLBETLQRTVGLTEHYLYEPAIV GEVINAD RAABERACKDENEIDGRANVNLAYLGAKERSLGTGEALGVQQLBETLQRTVGLTEHYLYEPAIV MAD RAABERACKDENEIDGRANVNLAYLGAKERSLGTGEALGVQQLBETLQRTVGLTEHYLYEPAIV GEVINAD RAABERACKDENEIDGRANVNLAYLGAKERSLGTGEALGVQQLBETLQRTVGLTEHYLYEPAIV MAD RAABERACKDENEIDGRANVNLAYLGAKERSLGTGEALGVQQLBETLQRTVGLTEHYLYEPAIV GEVINAD RAABERACKDENEIDGRANVNLAYLGAKERSLGTGEALGVQQLBETLQRTVGLTEHYLYEPAIV GEVINAD RAABERACKDENEIDGRANVNLAYLGAKERSLGTGEALGVQQLBETLQRTVGLTEHYLYEPAIV GEVINAD RAABERACKDENEIDGRANVNLAYLGAKERSLGTGEALGVQQLBETLQRTVGLTEHYLYEPAIV GEVINAD RAABERACKDENEIDGRANVNLAYLGAKERSLGTGEAUGVQQLBETLQRTVGLTEHYLYEPAIV GEVINAD RAABERACKDENEIDGRANVNLAYLGAKERSLGTGEAUGVQQLBETLQRTVGLTEHYLYEPAIV MAD RAABERACKDENEIDGRANVNLAYLGAKERSLGTGEAUGVQQLBETLQRTVGLTEHYLYEPAIV MAD RAABERACKDENEIDGRANVNLAYLGAKERSLGTGEAUGVQQLBETLQRTVGLTEHYLYEPAIV MAD RAABERACKDENEIDGRANVNLAYLGAKERSLGTGEAUGVQQLBETLQRTVGLTEHYLYEPAIV MAD RAABERACKDENEIDGRANVNLAYLGAKERSLGTGEALGVQQLBETLQRTVGLTEHYLYEPAIV MAD RAABERACKDENEIDGRANVNLAYLGAKERSLGTGEALGVQQLBETLQRTVGLTEHYLYEPAIV NAD RAABERACKDENEIDGRANVNLAYLGAKERSLGTGEALGVQQLBETLQRTVGLTEHYLYEPAIV MAD RAABERACKDENEIDGRANVNLAYLGAKERSLGTGEALGVQQLBETLQRTVGLTEHYLYEPAIV NAD RAABERACKDENEIDGRANVNLAYLGAKERSLGTGEALGVQQLBETLQRTVGLTEHYLYEPAIV GEVINAD RAABERACKDENEIDGRANVNLAYLGAKERSLGTGEALGVQQLBETLQRTVGLTEHYLYEPAIV NAD RAABERACKDENEIDGRANVNLAYLGAKERSLGTGEALGVQQLBETLQRTYGLTEHYLYEPAIV GEVINAD RAABERACKDENEIDGRANVNLAYLGAKERSLGTGEALGVQQLHETLQRTYGLTEHYLYEPAIV GEVINAD RAABERACKDENEIDGRANVNLAYLGAKERSLGTGEALGVQQLHETLQRTYGLTEHYLYEPAIV GEVINAD RAABERACKDENEIDGRANVNLAYLGAKERSLGTGEALGVQLHETLQRTYGLTEHYLYEPAIV GEVINAD RAABERACKDENEIDGRANVNLAYLGAKERSLF	151 152 151 70 151 151 151 151 151 70 151 70 128 151 70 151
Human Bushbaby Chimpanzee Sorilla Macaque Olive_baboon Orangutan Vervet-AGM Suinea_Pig Mouse Rat Cat Cat Cow Dog Ferret Hedgehog Horse Microbat Pig Armadillo	GEVINAD RAAAERACKIENPIILORKANVNLAYLGAKERSLOTGEALGVQQLHETLIQKTYGLIEHYLYPÄIV GEVINAD RAAAERACKIENPIILORKANVNLAYLGAKERSLOTGEALGVQQLHETLIQKTYGLIEHYLYPÄIV NADRAAERACKIENPIILORKANVNLAYLGAKERSLOTGEALGVQQLHETLIQKTYGLIEHYLYPÄIV GEVINAD RAAAERACKIENPIILORKANVNLAYLGAKERSLOTGEALGVQQLHETLIQKTYGLIEHYLYPÄIV GEVINAD RAAAERACKIENPIILORKANVNLAYLGAKERSLOTGEAUGVQQLHETLIQKTYGLIEHYLYPÄIV MADRAAAERACKIENPIILORKANVNLAYLGAKERSLOTGEAUGVQQLHETLIQKTYGLIEHYLYPÄIV MADRAAAERACKIENPIILORKANVNLAYLGAKERSLOTGEALGVQQLHETLIQKTYGLIEHYLYPÄIV MADRAAAERACKIENPIILORKANVNLAYLGAKERSLOTGEALGVQQLHETLIQKTYGLIEHYLYPÄIV MADRAAAERACKIENPIILORKANVNLAYLGAKERSLOT	151 152 151 70 151 151 151 151 151 70 70 151 70 128 151 70 151 128
Human Bushbaby Chimpanzee Sorilla Macaque Olive_baboon Orangutan Vervet-AGM Suinea_Pig Mouse Rat Cat Cow Dog Ferret Hedgehog Horse Microbat Pig Armadillo Elephant	GEVINAD RAAAFRACKIENPIIDGRAAVVLAYLGAKEPSLOTGEALGVQLAPILQRTYGLIPHYIYPAIV GEVINAD RAAAFRACKIENPIIDGRAAVVLAYLGAKEPSLOTGEALGVQLAPILQRTYGLIPHYIYPAIV MAD RAAAFRACKIENPIIDGRAAVVLAYLGAKEPSLOTGEALGVQLAPILQRTYGLIPHYIYPAIV GEVINAD RAAAFRACKIENPIIDGRAAVVLAYLGAKEPSLOTGEALGVQLAPILQRTYGLIPHYIYPAIV GEVINAD RAAAFRACKIENPIIDGRAAVVLAYLGAKEPSLOTGEALGVQLAPILQRTYGLIPHYIYPAIV GEVINAD RAAAFRACKIENPIIDGRAAVVLAYLGAKEPSLOTGEALGVQLAPILQRTYGLIPHYIYPAIV MAD RAAAFRACKIENPIIDGRAAVVLAYLGAKEPSLOTGEALGVQLAPILQRTYGLIPHYIYPAIV GEVINAD RAAAFRACKIENPIIDGRAAVVLAYLGAKEPSLOTGEALGVQLAPILQRTYGLIPHYIYPAIV MAD RAAAFRACKIENPIIDGRAAVVLAYLGAKEPSLOTGEALGVQLAPILQRTYGLIPHYIYPAIV GEVINAD RAAAFRACKIENPIIDGRAAVVLAYLGAKEPSLOTGEALGVQLAPILQRTYGLIPHYIYPAIV GEVINAD RAAAFRACKIENPIIDGRAAVVLAYLGAKEPSLOTGEALGVQLAPILQRTYGLIPHYIYPAIV GEVINAD RAAAFRACKIENPIIDGRAAVVLAYLGAKEPSLOTGEALGVQLAPILQRTYGLIPHYIYPAIV MAD RAAAFRACKIENPIIDGRAAVVLAYLGAKEPSLOTGEALGVQLAPILQRTYGLIPHYIYPAIV MAD RAAAFRACKIENPIIDGRAAVVLAYLGAKEPSLOTGEALGVQLAPILQRTYGLIPHYIYPAIV MAD RAAAFRACKIENPIIDGRAAVVLAYLGAKEPSLOTGEALGVQLAPILQRTYGLIPHYIYPAIV MAD RAAAFRACKIENPIIDGRAAVVLAYLGAKEPSLOTGEALGVQLAPILQRTYGLIPHYIYPAIV MAD RAAAFRACKIENPIDGRAAVVLAYLGAKEPSLOTGEALGVQLAPILQRTYGLIPHYIYPAIV MAD RAAAFRACKIENPIDGRAAVVLAYLGAKEPSLOTGEALGVQLAPILQRTYGLIPHYIYPQIV MAD RAAAFRACKIENPIDGRAAVVLAYLGAKEPSLOTGEALGVQLAPILQRTYGLIPHYIYPQIV MAD RAAAFRACKIENPIDGRAAVVLAYLGAKEPSLOTGEALGVQLAPILQRTYGLIPHYIYPQIV GEVINAD RAAAFRACKIENPIDGRAAVVLAYLGAKEPSLOTGEALGVQLAPILQRTYGLIPHYIYPQIV MAD RAAAFRACKIENPIDGRAAVVLAYLGAKEPSLOTGEALGVQLAPILQRTYGLIPHYIYPQIV MAD RAAAFRACKIENPIDGRAAVVLAYLGAKEPSLOTGEALGVQLAPILQRTYGLIPHYIYPQIV MAD RAAAFRACKIENPIDGRAAVVLAYLGAKEPSLOTGEALGVQLAPILQRTYGLIPHYIYPQIV GEVINAD RAAAFRACKIENPIDGRAAVVLAYLGAKEPSLOTGEALGVQLAPILQRTYGLIPHYIYPQIV MAD RAAFRACKIENPIDGRAAVVLAYLGAKEPSLOTGEALGVQLAPILQRTYGLIPHYIYPQIV MAD RAAFRACKIENPIDGRAAVVLAYLGAKEPSLOTGEALGVQLAPILQRTYGLIPHYIYPQIV GEVINAD RAAFRACKIENPIDGRAAVVLAYLGAKEPSLOTGEALGVQLAPILQRTYGLIPHYIYPQIV MAD RAAFRACKIENPIDGRAAVVL	151 152 151 151 151 151 151 151 151 151
Human Bushbaby Chimpanzee Sorilla Macaque Olive_baboon Orangutan Vervet-AGM Suinea_Pig Mouse Rat Cat Cox Dog Ferret Hedgehog Morse Microbat Pig Armadillo Elephant	GEVINAD RAAAERACKIENPIIDGRKANVNLAYIGAKERSICTGEAIGVQQLBETLIQKTYGITEHYIYEQAIV GEVINAD RAAAERACKIENPIIDGRKANVNLAYIGAKERSICTGEAIGVQQLBETLIQKTYGITEHYIYEQAIV KADRAAERACKIENPIIDGRKANVNLAYIGAKERSICTGEAIGVQQLBETLIQKTYGITEHYIYEQAIV GEVINAD RAAAERACKIENPIIDGRKANVNLAYIGAKERSICTGEAIGVQQLBETLIQKTYGITEHYIYEQAIV GEVINAD RAAAERACKIENPIIDGRKANVNLAYIGAKERSICTGEAIGVQQLBETLIQKTYGITEHYIYEQAIV MADRAAERACKIENPIIDGRKANVNLAYIGAKERSICTGEAIGVQQLBETLIQKTYGITEHYIYEQAIV MADRAAERACKIENPIIDGRKANVNLAYIGAKERSICTGEAIGVQQLBETLIQKTYGITEHYIYEQAIV GEVINAD RAAAERACKIENPIIDGRKANVNLAYIGAKERSICTGEAIGVQQLBETLIQKTYGITEHYIYEQAIV GEVINAD RAAAERACKIENPIIDGRKANVNLAYIGAKERSICTGEAIGVQQLBETLIQKTYGITEHYIYEQAIV GEVINAD RAAAERACKIENPIIDGRKANVNLAYIGAKERSICTGEAIGVQQLBETLIQKTYGITEHYIYEQAIV GEVINAD RAAAERACKIENPIIDGRKANVNLAYIGAKERSICTGEAIGVQQLBETLIQKTYGITEHYIYEQAIV GEVINAD RAAAERACKIENPIIDGKKANVNLAYIGAKERSICTGEAIGVQQLBETLIQKTYGITEHYIYEQAIV GEVINAD RAAAERACKIENPIIDGKKANVNLAYIGAKERSICTGEAVGVQQLBETLIQKTYGITEHYIYEQAIV MADRAAABAACKIENPIIDGKKANVNLAYIGAKERSICTGEAVGVQQLBETLIQKTYGITEHYIYEQAIV MADRAAABAACKIENPIIDGKKANVNLAYIGAKERSICTGEAVGVQQLBETLIQKTYGITEHYIYEQAIV MADRAAABAACKIENPIIDGKANVNLAYIGAKERSICTGEAIGVQQLBETLIQKTYGITEHYIYEQAIV MADRAAABAACKIENPIIDGKANVNLAYIGAKERSICTGEAIGVQQLBETLIQKTYGITEHYIYEQAIV MADRAAABAACKIENPIIDGKANVNLAYIGAKERSICTGEAIGVQQLBETLIQKTYGITEHYIYEQAIV MADRAAABAACKIENPIIDGKANVNLAYIGAKERSICTGEAIGVQQLBETLIQKTYGITEHYIYEQAIV MADRAAABAACKIENPIIDGKANVNLAYIGAKERSICTGEAIGVQQLBETLIQKTYGITEHYIYEQAIV MADRAAABAACKIENPIIDGKANVNLAYIGAKERSICTGEAIGVQQLBETLIQKTYGITEHYIYEQAIV GEVINADRAAABAACKIENPIIDGKANVNLAYIGAKERSICTGEAIGVQQLBETLIQKTYGITEHYIYEQAIV MADRAAABAACKIENPIIDGKANVNLAYIGAKERSICTGEAIGVQQLBETLIQKTYGITEHYIYEQAIV GEVINADRAAABAACKIENPIIDGKANVNLAYIGAKERSICTGEAIGVQQLBETLIQKTYGITEHYIYEQAIV MADRAAABACKIENPIIDGKANVNLAYIGAKERSICFGEAIGVQQLBETLIQKTYGITEHYIYEQAIV MADRAAABACKIENPIIDGKANVNLAYIGAKERSICF	151 152 151 151 151 151 151 151 151 151
Human Bushbaby Chimpanzee Sorilla Macaque Olive_baboon Orangutan Vervet-AGM Suinea_Pig Mouse Rat Cat Cow Dog Ferret Hedgehog Horse Microbat Pig Armadillo Elephant Lesser_hedgehog_tenres	GEVINAD RAABERACKIENPIIDGRKANVNLAYIGAKERSIGTGERIGVQQLHETIQRIYGITHYIYPAIV GEVINAD RAABERACKIENPIIDGRKANVNLAYIGAKERSIGTGERIGVQQLHETIQRIYGITHYIYPAIV GEVINAD RAABERACKIENPIIDGRKANVNLAYIGAKERSIGTGERIGVQQLHETIQRIYGITHYIYPAIV NADRAABERACKIENPIIDGRKANVNLAYIGAKERSIGTGERIGVQQLHETIQRIYGITHYIYPAIV GEVINAD RAABERACKIENPIIDGRKANVNLAYIGAKERSIGTGERIGVQQLHETIQRIYGITHYIYPAIV GEVINAD RAABERACKIENPIIDGRKANVNLAYIGAKERSIGTGERIGVQQLHETIQRIYGITHYIYPAIV GEVINAD RAABERACKIENPIIDGRKANVNLAYIGAKERSIGTGERIGVQQLHETIQRIYGITHYIYPAIV GEVINAD RAABERACKIENPIIDGRKANVNLAYIGAKERSIGTGERIGVQQLHETIQRIYGITHYIYPAIV GEVINAD RAABERACKIENPIIDGRKANVNLAYIGAKERSIGTGERIGVQQLHETIQRIYGITHYIYPAIV GEVINAD RAABERACKIENPIIDGRKANVNLAYIGAKERSIGTGERIGVQQLHETIQRIYGITHYIYPAIV GEVINAD RAABERACKIENPIIDGRKANVNLAYIGAKERSIGTGERIGVQQLHETIQRIYGITHYIYPAIV GEVINAD RAABERACKIENPIIDGRKANVNLAYIGAKERSIGTGERIGVQQLHETIQRIYGITHYIYPAIV GEVINAD RAABERACKIENPIIDGRKANVNLAYIGAKERSIGTGERIGVQQLHETIQRIYGITHYIYPAIV GEVINAD RAABERACKIENPIIDGRKANVNLAYIGAKERSIGTGERIGVQQLHETIQRIYGITHYIYPAIV MADRAABERACKIENPIIDGRKANVNLAYIGAKERSIGTGERIGVQQLHETIQRIYGITHYIYPAIV MADRAABERACKIENPIIDGRKANVNLAYIGAKERSIGTGERIGVQQLHETIQRIYGITHYIYPAIV MADRAABERACKIENPIIDGRKANVNLAYIGAKERSIGTGERIGVQQLHETIQRIYGITHYIYPAIV MADRAABERACKIENPIIDGRKANVNLAYIGAKERSIGTGERIGVQQLHETIQRIYGITHYIYPAIV MADRAABERACKIENPIIDGRKANVNLAYIGAKERSIGTGERIGVQQLHETIQRIYGITHYIYPAIV MADRAABERACKIENPIIDGRKANVNLAYIGAKERSIGTGERIGVQQLHETIQRIYGITHYIYPAIV MADRAABERACKIENPIIDGRKANVNLAYIGAKERSIGTGERIGVQQLHETIQRIYGITHYIYPAIV MADRAABERACKIENPIIDGRKANVNLAYIGAKERSIGTGERIGVQQLHETIQRIYGITHYIYPAIV MADRAABERACKIENPIIDGRKANVNLAYIGAKERSIGTGERIGVQQLHETIQRIYGITHYIYPAIV MADRAABERACKIENPIIDGRKANVNLAYIGAKERSIGTGERIGVQQLHETIQRIYGITHYIYPAIV MADRAABERACKIENPIIDGRKANVNLAYIGAKERSIGTGERIGVQQLHETIQRIYGITHYYPAIV NADRAABERACKIENPIIDGRKANVNLAYIGAKERSIGTGERIGVQQLHETIQRIYGITHYYPAIV MADRAABERACKIENPIIDGRKANVNLAYIGAKERSIGTGERIGVQQLHETIQRIYGITHYYPAIV NADRAABERACKIENPIIDGRKANVNLAYIGAKERSIGTGERIGVQQLHETIQRIYGITHYYPA	151 152 151 151 151 151 151 151 151 151
Human Bushbaby Chimpanzee Sorilla Macaque Olive_baboon Orangutan Vervet-AGM Suinea_Pig Mouse Rat Cat Cat Cow Dog Ferret Hedgehog Horse Microbat Pig Armadillo Elephant Lesser_hedgehog_tenrec Anole_lizard	GEVINAD RAAAERACKIENPIIDGRAANNIAYIGAKERSICIGEAIGVQQLBETIQRIYGITEHYIYEAIV GEVINAD RAAAERACKIENPIIDGRAANNIAYIGAKERSICIGEAIGVQQLBETIQRIYGITEHYIYEAIV CEVINAD RAAAERACKIENPIIDGRAANNIAYIGAKERSICIGEAIGVQQLBETIQRIYGITEHYIYEAIV NA RAAAERACKIENPIIDGRAANNIAYIGAKERSICIGEAIGVQQLBETIQRIYGITEHYIYEAIV GEVINAD RAAAERACKIENPIIDGRAANNIAYIGAKERSICIGEAIGVQQLBETIQRIYGITEHYIYEAIV MA RAAAERACKIENPIIDGRAANNIAYIGAKERSICIGEAIGVQQLBETIQRIYGITEHYIYEAIV GEVINAD RAAAERACKIENPIIDGRAANNIAYIGAKERSICIGEAIGVQQLBETIQRIYGITEHYIYEAIV MA RAAAERACKIENPIIDGRAANNIAYIGAKERSICIGEAIGVQQLBETIQRIYGITEHYIYEAIV GEVINAD RAAAERACKIENPIIDGRAANNIAYIGAKERSICIGEAIGVQQLBETIQRIYGITEHYIYEAIV NAD RAAAERACKIENPIIDGRAANNIAYIGAKERSICIGEAIGVQQLBETIQRIYGITEHYIYEAIV GEVINAD RAAAERACKIENPIIDGRAANNIAYIGAKERSICIGEAIGVQQLBETIQRIYGITEHYIYEAIV GEVINAD RAAAERACKIENPIIDGRAANNIAYIGAKERSICIGEAVGVQQLBETIQRIYGITEHYIYEAIV GEVINAD RAAAERACKIENPIIDGRAANNIAYIGAKERSICIGEAVGVQQLBETIQRIYGITEHYIYEAIV GEVINAD RAAAERACKIENPIIDGRAANNIAYIGAKERSICIGEAVGVQQLBETIQRIYGITEHYIYEAIV GEVINAD RAAAERACKIENPIIDGRAANNIAYIGAKERSICIGEAVGVQQLBETIQRIYGITEHYIYEAIV MAD RAAAERACKIENPIIDGRAANNIAYIGAKERSICIGEAVGVQQLBETIQRIYGITEHYIYEAIV MAD RAAAERACKIENPIIDGRAANNIAYIGAKERSICIGEAIGVQQLBETIQRIYGITEHYIYEAIV MAD RAAAERACKIENPIIDGRAANNIAYIGAKERSICIGEAIGVQQLBETIQRIYGITEHYIYEAIV GEVINAD RAAAERACKIENPIIDGRAANNIAYIGAKERSICIGEAIGVQQLBETIQRIYGITEHYIYEAIV GEVINAD RAAERACKIENPIIDGRAANNIAYIGAKERSICIGEAIGVQQLBETIQRIYGITEHYIYEAIV GEVINAD RAAERACKIENPIIDGRAANNIAYIGAKERSICIGEAIGVQQLBETIQRIYGITEHYIYEAIV MARAAAERACKIENPIIDGRAANNIAYIGAKERSICIGEAIGVQQLBETIQRIYGITEHYIYEAIV GEVINAD RAAERACKIENPIIDGRAANNIAYIGAKERSICIGEAIGVQQLBETIQRIYGITEHYIYEAIV MARAAAERACKIENPIIDGRAANNIAYIGAKERSICIGEAIGVQQLBETIQRIYGITEHYIYEAIV MARAAAERACKIENPIIDGRAANNIAYIGAKERSICIGEAIGVQQLBETIQRIYGITEHYIYEAIV MARAAAERACKIENPIIDGRAANNIAYIGAKERSICIGEAIGVQQLBETIQRIYGITEHYIYEAIV MARAAAERACKIENPIIDGRAANNIAYIGAKERSICIGEAIGVQQLBETIQRIYGITEHYIYEAIV MARAAERACKIENPIIDGRAANNIAYIGAKERSICIGEAIGVQLBETIQRIYGIT	151 152 151 70 151 151 151 151 151 151 151 151 151 15
Human Bushbaby Chimpanzee Sorilla Macaque Olive_baboon Orangutan Vervet-AGM Suinea_Pig Mouse Rat Cat Cat Cat Cat Cow Dog Ferret Hedgehog Horse Microbat Pig Armadillo Elephant Lesser_hedgehog_tenrec Anole_lizard Chicken	GEVINAD RAAAERACKIENPIIDGRKANVNLAYIGAKERSIGTGEAIGVQQLHETLIQKTYGITEHYIYEAIV GEVINADRAAERACKIENPIIDGRKANVNLAYIGAKERSIGTGEAIGVQQLHETLIQKTYGITEHYIYEAIV GEVINADRAAERACKIENPIIDGRKANVNLAYIGAKERSIGTGEAIGVQQLHETLIQKTYGITEHYIYEAIV OGVINADRAAERACKIENPIIDGRKANVNLAYIGAKERSIGTGEAIGVQQLHETLIQKTYGITEHYIYEAIV GEVINADRAAERACKIENPIIDGRKANVNLAYIGAKERSIGTGEAIGVQQLHETLIQKTYGITEHYIYEAIV GEVINADRAAERACKIENPIIDGRKANVNLAYIGAKERSIGTGEAIGVQQLHETLIQKTYGITEHYIYEAIV GEVINADRAAERACKIENPIIDGRKANVNLAYIGAKERSIGTGEAIGVQQLHETLIQKTYGITEHYIYEAIV GEVINADRAAERACKIENPIIDGRKANVNLAYIGAKERSIGTGEAIGVQQLHETLIQKTYGITEHYIYEAIV GEVINADRAAERACKIENPIIDGRKANVNLAYIGAKERSIGTGEAIGVQQLHETLIQKTYGITEHYIYEAIV GEVINADRAAERACKIENPIIDGRKANVNLAYIGAKERSIGTGEAIGVQQLHETLIQKTYGITEHYIYEAIV GEVINADRAAERACKIENPIIDGRKANVNLAYIGAKERSIGTGEAIGVQQLHETLIQKTYGITEHYIYEAIV GEVINADRAAERACKIENPIIDGRKANVNLAYIGAKERSIGTGEAIGVQQLHETLIQKTYGITEHYIYEAIV GEVINADRAAERACKIENPIIDGRKANVNLAYIGAKERSIGTGEAVGVQQLHETLIQKTYGITEHYIYEAIV MADRAAAERACKIENPIIDGRKANVNLAYIGAKERSIGTGEAVGVQQLHETLIQKTYGITEHYIYEQAIV GEVINADRAAAERACKIENPIIDGRKANVNLAYIGAKERSIGTGEAIGVQQLHETLIQKTYGITEHYIYEQAIV MADRAAAERACKIENPIIDGRKANVNLAYIGAKERSIGTGEAIGVQQLHETLIQKTYGITEHYIYEQAIV MADRAAAERACKIENPIIDGRKANVNLAYIGAKERSIGTGEAIGVQQLHETLIQKTYGITEHYIYEQAIV MADRAAAERACKIENPIIDGRKANVNLAYIGAKERSIGTGEAIGVQQLHETLIQKTYGITEHYIYEQAIV MADRAAERACKIENPIIDGRKANVNLAYIGAKERSIGTGEAIGVQQLHETLIQKTYGITEHYIYEQAIV MADRAAERACKIENPIIDGRKANVNLAYIGAKERSIGTGEAIGVQQLHETLIQKTYGITEHYIYEQAIV MADRAAERACKIENPIIDGRKANVNLAYIGAKERSIGTGEAIGVQQLHETLIQKTYGITEHYIYEQAIV MADRAAERACKIENPIIDGRKANVNLAYIGAKERSIGTGEAIGVQQLHETLIQKTYGITEHYIYEQAIV MADRAAERACKIENPIIDGRKANVNLAYIGAKERSIGTGEAIGVQQLHETLIQKTYGITEHYIYEQAIV MADRAAERACKIENPIIDGRKANVNLAYIGAKERSIGTGEAIGVQQLHETLIQKTYGITEHYIYEQAIV MADRAAERACKIENPIIDGRKANVNLAYIGAKERSIGTGEAIGVQLHETLIQKTYGITEHYIYEQAIV MADRAAERACKIENPIIDGRKANVNLAYIGAKERSIGTGEAIGVQLHETLIQKTYGITEHYIYEQAIV MADRAAERACKIENPIIDGRKANVNLAYIGAKERSIGTGEAIGVQLHETIYGYITEHYIYEQAIV MADRAAERACKIENPIIDGRKANVNLA	151 152 151 152 151 151 151 151 151 151
Human Bushbaby Chimpanzee Sorilla Macaque Olive_baboon Orangutan Vervet-AGM Suinea_Pig Mouse Rat Cat Cat Cow Dog Ferret Hedgehog Horse Microbat Pig Armadillo Elephant Lesser_hedgehog_tenrec Anole_lizard Chicken	GEVINAD RAABERACKIENDI I DORFANVNLAYI GAKERSI CIGEAT GVQL HETL QRT YGLTHWYY PO IV GEVINAD RAABERACKIENDI I DORFANVNLAYI GAKERSI CIGEAT GVQL HETL QRTYGLTHWYY PO IV NAD RAABERACKIENDI I DORFANVNLAYI GAKERSI CIGEAT GVQL HETL QRTYGLTHWYY PO IV NAD RAABERACKIENDI I DORFANVNLAYI GAKERSI CIGEAT GVQL HETL QRTYGLTHWYY PA IV GEVINAD RAABERACKIENDI I DORFANVNLAYI GAKERSI CIGEAT GVQL HETL QRTYGLTHWYY PA IV NAD RAABERACKIENDI I DORFANVNLAYI GAKERSI CIGEAT GVQL HETL QRTYGLTHWYY PA IV NAD RAABERACKIENDI I DORFANVNLAYI GAKERSI CIGEAT GVQL HETL QRTYGLTHWYY PA IV NAD RAABERACKIENDI I DORFANVNLAYI GAKERSI CIGEAT GVQL HETL QRTYGLTHWYY PA IV NAD RAABERACKIENDI I DORFANVNLAYI GAKERSI CIGEAT GVQL HETL QRTYGLTHWYY PA IV GEVINAD RAABERACKIENDI I DORFANVNLAYI GAKERSI CIGEAT GVQL HETL QRTYGLTHWY PA IV MAD RAABERACKIENDI I DORFANVNLAYI GAKERSI CIGEAT GVQL HETL QRTYGLTHWYY PA IV GEVINAD RAABERACKIENDI I DORFANVNLAYI GAKERSI CIGEAT GVQL HETL QRTYGLTHWY PA IV GEVINAD RAABERACKIENDI I DORFANVNLAYI GAKERSI CIGEAV GVQL HETL QRTYGLTHWY PA IV NAD RAABERACKIENDI I DORFANVNLAYI GAKERSI CIGEAV GVQL HETL QRTYGLTHWY PA IV NAD RAABERACKIENDI I DORFANVNLAYI GAKERSI CIGEAT GVQL HETL QRTYGLTHWY I Y PA IV NAD RAABERACKIENDI I DORFANVNLAYI GAKERSI CIGEAT GVQL HETL QRTYGLTHWY I Y PA IV NAD RAABERACKIENDI DORFANVNLAYI GAKERSI CIGEAT GVQL HETL QRTYGLTHWY Y PA IV NAD RAABERACKIENDI DORFANVNLAYI GAKERSI CIGEAT GVQL HETL QRTYGLTHWY Y PA IV NAD RAABERACKIENDI DORFANVNLAYI GAKERSI CIGEAT GVQL HETL QRTYGLTHWY Y PA IV NAD RAABERACKIENDI DORFANVNLAYI GAKERSI CI	151 152 151 152 151 151 151 151 151 151
Human Bushbaby Chimpanzee Sorilla Macaque Olive_baboon Orangutan Vervet-AGM Suinea_Pig Mouse Rat Cat Cat Cow Dog Ferret Hedgehog Horse Microbat Pig Armadillo Elephant Lesser_hedgehog_tenres Anole_lizard Chicken	GEVINAD RAAAERACKIENPIILORKANVNLAYLGAKERSLOTGEALGVQQLBETLIQKTVGLTEHYLYPPAIV GEVINAD RAAAERACKIENPIILORKANVNLAYLGAKERSLOTGEALGVQQLBETLIQKTVGLTEHYLYPPAIV KADRAAERACKIENPIILORKANVNLAYLGAKERSLOTGEALGVQQLBETLIQKTVGLTEHYLYPPAIV OCVINAD RAAAERACKIENPIILORKANVNLAYLGAKERSLOTGEALGVQQLBETLIQKTVGLTEHYLYPPAIV GEVINAD RAAAERACKIENPIILORKANVNLAYLGAKERSLOTGEALGVQQLBETLIQKTVGLTEHYLYPPAIV GEVINAD RAAAERACKIENPIILORKANVNLAYLGAKERSLOTGEALGVQQLBETLIQKTVGLTEHYLYPPAIV GEVINAD RAAAERACKIENPIILORKANVNLAYLGAKERSLOTGEALGVQQLBETLIQKTVGLTEHYLYPPAIV GEVINAD RAAAERACKIENPIILORKANVNLAYLGAKERSLOTGEALGVQQLBETLIQKTVGLTEHYLYPPAIV GEVINAD RAAAERACKIENPIILORKANVNLAYLGAKERSLOTGEALGVQQLBETLIQKTVGLTEHYLYPPAIV GEVINAD RAAERACKIENPIILORKANVNLAYLGAKERSLOTGEALGVQLBETLIQKTVGLTEHYLYPPAIV GEVINAD RAAERACKIENPIILORKANVNLAYLGAKERSLOTGEALGVQLBETLIQKTVGLTEHYLYPPAIV GEVINAD RAAERACKIENPIILORKANVNLAYLGAKERSLOTGEAUGVQQLBETLIQKTVGLTEHYLYPPAIV GEVINAD RAAERACKIENPIILORKANVNLAYLGAKERSLOTGEAUGVQQLBETLIQKTVGLTEHYLYPPAIV GEVINAD RAAERACKIENPIILORKANVNLAYLGAKERSLOTGEAUGVQQLBETLIQKTVGLTEHYLYPPAIV MADRAAADRACKIENPIILORKANVNLAYLGAKERSLOTGEAUGVQQLBETLIQKTVGLTEHYLYPAIV MADRAAABRACKIENPIILORKANVNLAYLGAKERSLOTGEAUGVQQLBETLIQKTVGLTEHYLYPAIV MADRAAABRACKIENPIILORKANVNLAYLGAKERSLOTGEAUGVQQLBETLIQKTVGLTEHYLYPAIV MADRAAABRACKIENNILORKANVNLAYLGAKERSLOT	151 152 151 152 151 151 151 151 151 151
Human Bushbaby Chimpanzee Sorilla Macaque Olive_baboon Orangutan Vervet-AGM Suinea_Pig Mouse Rat Cat Cow Dog Ferret Hedgehog Morse Microbat Pig Armadillo Elephant Lesser_hedgehog_tenred Anole_lizard Chinese_softshell_turtle Duck	GEVINAD RAAAERACKDENPIIDGRANVNLAYLGAKERSLGTGEALGVQLHETLIGRTYGLIEHYIYEGAIV GEVINAD RAAAERACKDENPIIDGRANVNLAYLGAKERSLGTGEAVGVQLHETLIGRTYGLIEHYIYEGAIV GEVINAD RAAAERACKDENPIIDGRANVNLAYLGAKERSLGTGEAVGVQLHETLIGRTYGLIEHYIYEGAIV MAD RAAAERACKDENPIIDGRANVNLAYLGAKERSLGTGEALGVQLHETLIGRTYGLIEHYIYEGAIV MAD RAAAERACKDENPIIDGRANVNLAYLGAKERSLGTGEALGVQLHETLIGRTYGLIEHYIYEGAIV GEVINAD RAAAERACKDENPIIDGRANVNLAYLGAKERSLGTGEALGVQLHETLIGRTYGLIEHYIYEGAIV GEVINAD RAAAERACKDENPIIDGRANVNLAYLGAKERSLGTGEALGVQLHETLIGRTYGLIEHYIYEGAIV GEVINAD RAAAERACKDENPIDGRANVNLAYLGAKERSLGTGEALGVQLHETLIGRTYGLIEHYIYEGAIV GEVINAD RAAAERACKDENPIDGRANVNLAYLGAKERSLGTGEALGVQLHETLIGRTYGLIEHYIYEGAIV GEVINAD RAAAERACKDENPIDGRANVNLAYLGAKERSLGTGEALGVQLHETLIGRTYGLIEHYIYEGAIV GEVINAD RAAAERACKDENPIDGRANVNLAYLGAKERSLGTGEALGVQLHETLIGRTYGLIEHYIYEGAIV GEVINAD RAAAERACKDENPIDGRANVNLAYLGAKERSLGTGEALGVQLHETLIGRTYGLIEHYIYEGAIV GEVINAD RAAERACKDENPIDGRANVNLAYLGAKERSLGTGEALGVQLHETLIGRTYGLIEHYIYEGAIV GEVINAD RAAERACKDENPIDGRANVNLAYLGAKERSLG PGEALGVQLHETLIGRTYGLIEHYIYEGAIV GEVINAD RAAERACKDENPIDGRANVNLAYLGAKERSLG PGEALGVQLHETLIGRTYGLIEHYIYEGAIV GEVINAD RAAERACKDENPIDGRANVNLAYLGAKERSLG PGEALGVQLHETLI	151 152 151 152 151 151 151 151 151 151
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Human Bushbaby Chimpanzee Sorilla Macaque Olive_baboon Orangutan Vervet-AGM Suinea_Pig Mouse Rat Cat Cat Cow Dog Ferret Hedgehog Horse Microbat Pig Armadillo Elephant Lesser_hedgehog_tenrec Anole_lizard Chicken Chicken Chicken Schicken Chicken Schicken C	GEVINAD RAABERACKDENPIIDGRANVNLAYLGAKERSLGTGERIGVQLHETLIGRTYGLTEHYIYEGAIV GEVINAD RAABERACKDENPIIDGRKANVNLAYLGAKERSLGTGERIGVQLHETLIGRTYGLTEHYIYEGAIV NAD RAABERACKDENPIIDGRKANVNLAYLGAKERSLGTGERIGVQLHETLIGRTYGLTEHYIYEGAIV GEVINAD RAABERACKDENPIIDGRKANVNLAYLGAKERSLGTGERIGVQLHETLIGRTYGLTEHYIYEGAIV NAD RAABERACKDENPIIDGRKANVNLAYLGAKERSLGTGERIGVQLHETLIGRTYGLTEHYIYEGAIV GEVINAD RAABERACKDENFIIDGRKANVNLAYLGAKERSLGTGERIGVQLHETLIGRTYGLTEHYIYEGAIV NAD RAABERACKDENFIIDGRKANVNLAYLGAKERSLGTGERIGVQLHETLIGRTYGLTEHYIYEGAIV GEVINAD RAABERACKDENFIIDGRKANVNLAYLGAKERSLGTGERIGVQLHETLIGRTYGLTEHYIYEGAIV GEVINAD RAABERACKDENFIIDGRKANVNLAYLGAKERSLGTGERIGVQLHETLIGRTYGLTEHYIYEGAIV GEVINAD RAABERACKDENFIIDGRKANVNLAYLGAKERSLGTGERIGVQLHETLIGRTYGLTEHYIYEGAIV GEVINAD RAABERACKDENFIIDGRKANVNLAYLGAKERSLGTGERIGVQLHETLIGRTYGLTEHYIYEGAIV GEVINAD RAABERACKDENFIIDGRKANVNLAYLGAKERSLGTGERIGVQLHETLIGRTYGLTEHYIYEGAIV GEVINAD RAABERACKDENFIIDGRKANVNLAYLGAKERSLGTGERIGVQLHETLIGRTYGLTEHYIYEGAIV NAD RAABERACKDENFIIDGRKANVNLAYLGAKERSLGTGERIGVQLHETLIGRTYGLTEHYIYEGAIV NAD RAABERACKDENENIDGRKANVNLAYLGAKERSLGTGERIGVQLHETLIGRTYGLTEHYIYEGAIV NAD RAABERACKDENENIDGRKANVNLAYLGAKERSLGTGERIGVQLHETLIGRTYGLTEHYIYEGAIV GEVINAD RAABERACKDENENIDGRKANVNLAYLGAKERSLGTGERIGVQLHETLIGRTYGLTEHYIYEGAIV NAD RAABERACKDENENIDGRKANVNLAYLGAKERSLGTGERIGVQLHETLIGRTYGLTEHYIYEGAIV GEVINAD RAABERACKDENENIDGRKANVNLAYLGAKERSLGTGERIGVQLHETLIGRTYGLTEHYIYEGAIV NAD RAABERACKDENENIDGRKANVNLAYLGAKERSLGTGERIGVQLHETLIGRTYGLTEHYIYEGAIV GEVINAD RAABERACKDENENIDGRKANVNLAYLGAKERSLGTGERIGVQLHETLIGRTYGLTEHYIYEGAIV NAD RAABERACKDENENIDGRKANVNLAYLGAKERSLGTGERIGVQLHETLIGRTYGLTEHYIYEGAIV GEVINAD RAABERACKDENENIDGRKANVNLAYLGAKERSLGTGERIGVQLHETLIGRTYGLTEHYIYEGAIV GEVINAD RAABERACKDENENIDGRKANVNLAYLGAKERSLGTGERIGVQLHETLIGRTYGLTEHYIYEGAIV GEVINAD RAABERACKDENENIDGRKANVNLAYLGAKERSLGTGERIGVQLHETLIGRTYGLTEHYIYEGAIV GEVINAD RAABERACKDENENIDGRKANVNLAYLGAKERSLGTGERIGVQLHETLIGRTYGLTEHYIYEGAIV MAD RAABERACKDENENIDGRKANVNLAYLGAKERSLGTGERIGVQLHETL	151 152 151 152 151 151 151 151 151 151
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Human Bushbaby Chimpanzee Sorilla Macaque Olive_baboon Orangutan Vervet-AGM Guinea_Pig Mouse Rat Cat Cat Cat Cow Dog Ferret Hedgehog Horse Microbat Pig Armadillo Elephant Lesser_hedgehog_tenrec Anole_lizard Chinese_softshell_turtle Duck Flycatcher Zebra_Finch Amazon_molly-1 Cave_fish-1 Cave_fish-2	GEVINADRAAFERACKIENPIIDGRAAVNIAYLGAKERSLOTGEALGVQLHETLIGTVGLTEHYLYFAIV GEVINADRAAFERACKIENPIIDGRAAVNIAYLGAKERSLOTGEALGVQLHETLIGTVGLTEHYLYFAIV NADRAAFERACKIENPIIDGRAAVNIAYLGAKERSLOTGEALGVQLHETLIGTVGLTEHYLYFAIV GEVINADRAAFERACKIENPIIDGRAAVNIAYLGAKERSLOTGEALGVQLHETLIGTVGLTEHYLYFAIV GEVINADRAAFERACKIENFIIDGRAAVNIAYLGAKERSLOTGEALGVQLHETLIGTVGLTEHYLYFAIV GEVINADRAAFERACKIENFIIDGRAAVNIAYLGAKERSLOTGEALGVQLHETLIGTVGLTEHYLYFAIV GEVINADRAAFERACKIENFIIDGRAAVNIAYLGAKERSLOTGEALGVQLHETLIGTVGLTEHYLYFAIV MADRAAFERACKIENFIIDGRAAVNIAYLGAKERSLOTGEALGVQLHETLIGTVGLTEHYLYFAIV GEVINADRAAFERACKIENFIIDGRAAVNIAYLGAKERSLOTGEALGVQLHETLIGTVGLTEHYLYFAIV GEVINADRAAFERACKIENFIIDGRAAVNIAYLGAKERSLOTGEALGVQLHETLIGTVGLTEHYLYFAIV MADRAAFERACKIENFIIDGRAAVNIAYLGAKERSLOTGEALGVQLHETLIGTVGLTEHYLYFAIV GEVINADRAAFERACKIENFIIDGRAAVNIAYLGAKERSLOTGEALGVQLHETLIGTVGLTEHYLYFAIV MADRAAFERACKIENFIIDGRAAVNIAYLGAKERSLOTGEALGVQUHETLIGTVGLTEHYLYFAIV MADRAAFERACKIENFIIDGRAAVNIAYLGAKERSLOTGEALGVQUHETLIGTVGLTEHYLYFAIV MADRAAFERACKIENFIIDGRAAVNIAYLGAKERSLOTGEALGVQUHETLIGTVGLTEHYLYFAIV MADRAAFERACKIENFIIDGRAAVNIAYLGAKERSLOTGEALGVQUHETLIGTVGLTEHYLYFQAIV MADRAAFERACKIENFIIDGRAAVNIAYLGAKERSLOTGEALGVQUHETLIGTVGLTEHYLYFQAIV MADRAAFERACKIENFIIDGRAAVNIAYLGAKERSLOTGEALGVQUHETLIGTVGLTEHYLYFQAIV MADRAAFERACKIENFIIDGRAAVNIAYLGAKERSLOTGEALGVQUHETLIGTVGLTEHYLYFQAIV MADRAAFERACKIENFIIDGRAAVNIAYLGAKERSLOTGEALGVQUHETLIGTVGLTEHYLYFQAIV MADRAAFERACKIENFIIDGRAAVNIAYLGAKERSLOT	151 152 151 151 151 151 151 151 151 151
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Human Bushbaby Chimpanzee Sorilla Macaque Olive_baboon Orangutan Vervet-AGM Suinea_Pig Mouse Rat Cat Cat Cow Dog Ferret Hedgehog Horse Microbat Pig Armadillo Elephant Lesser_hedgehog_tenrec Anole_lizard Chicken Chicken Chicken Chicken Schiese_softshell_turtle Duck Flycatcher Zebra_Finch Amazon_molly-1 Amazon_molly-2 Cave_fish-1 Cave_fish-2 Fugu Fugu	GEVINADRAABERACKIENFIIDGRKANVNLAVIGAKERSLOT. FRIGVOOL HELIGRIGITEHVIYERIV GEVINADRAABERACKIENFIIDGRKANVNLAVIGAKERSLOT. FRIGVOOL HELIGRIGITEHVIYERIV MADRAABERACKIENFIIDGRKANVNLAVIGAKERSLOT. FRIGVOOL HELIGRIGITEHVIYERIV MADRAABERACKIENFIIDGRKANVNLAVIGAKERSLOT. FRIGVOOL HELIGRIGITEHVIYERIV MADRAABERACKIENFIDGRKANVNLAVIGAKERSLOT. FRIGVOOL HELIGRIG	151 152 151 152 151 151 151 151 151 151
Human Bushbaby Chimpanzee Sorilla Macaque Olive_baboon Orangutan Vervet-AGM Suinea_Pig Mouse Rat Cat Cow Dog Ferret Hedgehog Horse Microbat Pig Armadillo Elephant Lesser_hedgehog_tenrec Anole_lizard Chicken Chinese_softshell_turtle Duck Flycatcher Zebra_Finch Amazon_molly-1 Amazon_molly-2 Cave_fish-1 Cave_fish-2 Fugu Fugu Sugu States	GEVINADRAAAERACKDENFIIDGRKANVNLAVIGAKERSLOT. FAIGVQQLEFTLIGRTGITEHVIYEAIV GEVINADRAAERACKDENFIIDGRKANVNLAVIGAKERSLOT. FAIGVQQLEFTLIGRTGITEHVIYEAIV MADRAAERACKDENFIIDGRKANVNLAVIGAKERSLOT. FAIGVQQLEFTLIGRTGITEHVIYEAIV MADRAAERACKDENFIIDGRKANVNLAVIGAKERSLOT. FAIGVQQLEFTLIGRTGITEHVIYEFAIV GEVINADRAAERACKDENFIIDGRKANVNLAVIGAKERSLOT. FAIGVQQLEFTLIGRTGITEHVIYEFAIV GEVINADRAAERACKDENFIIDGRKANVNLAVIGAKERSLOT. FAIGVQQLEFTLIGRTGITEHVIYEFAIV GEVINADRAAERACKDENFIIDGRKANVNLAVIGAKERSLOT. FAIGVQQLEFTLIGRTGITEHVIYEFAIV MADRAAERACKDENFIIDGRKANVNLAVIGAKERSLOT. FAIGVQQLEFTLIGRTGITEHVIYEFAIV GEVINADRAAERACKDENFIIDGRKANVNLAVIGAKERSLOT. FAIGVQQLEFTLIGRTGITEHVIYEFAIV GEVINADRAAERACKDENFIIDGRKANVNLAVIGAKERSLOT. FAIGVQQLEFTLIGRTGITEHVIYEFAIV GEVINADRAAERACKDENFIIDGRKANVNLAVIGAKERSLOT. FAXGVQQLEFTLIGRTGITEHVIYEFAIV GEVINADRAAAERACKDENFIIDGRKANVNLAVIGAKERSLOT. FAXGVQQLEFTLIGRTGITEHVIYEFAIV MADRAAAERACKDENFIIDGRKANVNLAVIGAKERSLOT. FAXGVQQLEFTLIGRTGITEHVIYEFAIV MADRAAAERACKDENFIIDGRKANVNLAVIGAKERSLOT. FAXGVQQLEFTLIGRTGITEHVIYEFAIV MADRAAAERACKDENFIIDGRKANVNLAVIGAKERSLOT. FAXGVQQLEFTLIGRTGITEHVIYEFAIV MADRAAERACKDENFIIDGRKANVNLAVIGAKERSLOT. FTIGVQQLEFTLIGRTGITEHVIYEFAIV MADRAAERACKDENFIIDGRKANVNLAVIGAKERSLOT. FTIGVQQL	151 152 151 151 151 151 151 151 151 151
Human Bushbaby Chimpanzee Sorilla Macaque Olive_baboon Orangutan Vervet-AGM Suinea_Pig Mouse Rat Cat Cat Cow Dog Ferret Hedgehog Horse Microbat Pig Armadillo Elephant Lesser_hedgehog_tenrec Anole_lizard Chicken Chinese_softshell_turtle Duck Flycatcher Zebra_Finch Amazon_molly-1 Amazon_molly-2 Cave_fish-1 Cave_fish-2 Fugu Medaka Platyfish Platyfish Platyfish	GEVINADRAABERACKIENPIIDGRANVNLAVIGARERSLT. FRIGVQLEPTIGRIGITENVIPFAIV GEVINADRAABERACKIENPIIDGRANVNLAVIGARERSLT. FRIGVQLEPTIGRIGITENVIPFAIV GEVINADRAABERACKIENPIIDGRANVNLAVIGARERSLT. FRIGVQLEPTIGRIGITENVIPFAIV GEVINADRAABERACKIENPIIDGRANVNLAVIGARERSLT. FRIGVQLEPTIGRIGITENVIPFAIV GEVINADRAABERACKIENFIIDGRANVNLAVIGARERSLT. FRIGVQLEPTIGRIGITENVIPFAIV GEVINADRAABERACKIENFIIDGRANVNLAVIGARERSLT. FRIGVQLEPTIGRIGITENVIPFAIV GEVINADRAABERACKIENFIIDGRANVNLAVIGARERSLT. FRIGVQLEPTIGRIGITENVIPFAIV GEVINADRAABERACKIENFIIDGRANVNLAVIGARERSLT. FRIGVQLEPTIGRIGITENVIPFAIV GEVINADRAABERACKIENFIIDGRANVNLAVIGARERSLT. FRIGVQLEPTIGRIGITENVIPFAIV GEVINADRAABERACKIENFIIDGRANVNLAVIGARERSLT. FRIGVQLEPTIGRIGITENVIPFAIV GEVINADRAABERACKIENFIIDGRANVNLAVIGARERSLT. FRIGVQLEPTIGRIGITENVIPFAIV GEVINADRAABERACKIENFIIDGRANVNLAVIGARERSLT. FRIGVQLEPTIGRIGITENVIPFAIV MADRAABERACKIENFIDGRANVNLAVIGARERSLT. FRIGVQLEPTIGRIGITENVIPFAIV MADRAABERACKIENFIDGRANVNLAVIGARERSLT. FRIGVQLEPTIGRIGITENVIPFAIV MADRAABERACKIENFIDGRANVNLAVIGARERSLT. FRIGVQLEPTIGRIGITENVIPFAIV MADRAABERACKIENFIDGRANVNLAVIGRERSLT. FRIGVQLEPTIGRIGITENVIPFAIV MADRAABERACKIENFIDGRANVNLAVIGRERSLT. FRIGVQLEPTIGRIGITENVIPFAIV MADRAABERACKIENFIDGRANVNLAVIGRERSLT. FRIGVQLEPTIGRIGITENVIPFAIV MADRAABERACKIENFIDGRANVNLAVIGRERSLT. FRIGVQLEPTIGRIGITENVIPFAIV MADRAABERACKIENFIDGRANVNLAVIGRERSLT. FRIGVQLEPTIGRIGITENVIPFAIV MADRAABERACKIENFIDGRANVNLAVIGRERSLT. FRIGVQLEPTIGRIGITENVIPFAIV MADRAABERACKIENFIDGRANVNLAVIGRERSLT. FRIGVQLEPTIGRIGITENVIPFAIV MADRAABERACKIENFIDGRANVNLAVIGRERSLT. FRIGVQLEPTIGRIGITENVIPFAIV GEVINDERAABERACKIENFIDGRANVNLAVIGRERSLT. FRIGVQLEPTIGRIGITENVIPFAIV MADRAABERACKIENFIDGRANVNLAVIGRERSLT. FRIGVQLEPTIGRIGITENVIPFAIV GEVINDERAABERACKIENFIDGRANVNLAVIGRERSSLT. FRIGVQLEPTIGRIGITENVIPFAIV GEVINDERAABERACKIENFIDGRANVNLAVIGRERSSLT. FRIGVQLEPTIGRIGTENVIPFAIV MADRAABERACKIENFIDGRANVNLAVIGRERSSLT. FRIGVQLEPTIGRIGTENVIPFAIV GEVINDERAABERACKIENFIDGRANVNLAVIGRERSSTT. FRIGVQLEPTIGRYGUPPHIVPFAIV MADRAABERACKIENFIDGRANVNLAVIGRERSSTT. FRIGVQLEPTIGRYGUPHEAVIG GEVINDERAABERACKIENFIDGRANVNLAVIGAR	151 152 151 152 151 151 151 151 151 151
Human Bushbaby Chimpanzee Sorilla Macaque Olive_baboon Orangutan Vervet-AGM Guinea_Pig Mouse Rat Cat Cat Cow Dog Ferret Hedgehog Horse Microbat Pig Armadillo Elephant Lesser_hedgehog_tenred Anole_lizard Chicken Chi	GEVINADERAAEERACKIENFIIDGKRANVNLAVIGKEFSLOT. FRIGVOOLPELIORTGITEHVIYERIV GEVINADERAAEERACKIENFIIDGKRANVNLAVIGKEFSLOT. FRIGVOOLPELIORTGITEHVIYERIV GEVINADERAAEERACKIENFIIDGKRANVNLAVIGKEFSLOT. FRIGVOOLPELIORTGITEHVIYERIV KRERAAEERACKIENFIIDGKRANVNLAVIGKEFSLOT. FRIGVOOLPELIORTGITEHVIYERIV KRERAAEERACKIENFIIDGKRANVNLAVIGKEFSLOT. FRIGVOOLPELIORTGITEHVIYERIV KRERAAEERACKIENFIIDGKRANVNLAVIGKEFSLOT. FRIGVOOLPELIORTGITEHVIYERIV KRERAAEERACKIENFIIDGKRANVNLAVIGKEFSLOT. FRIGVOOLPELIORTGITEHVIYERIV KRERAAEERACKIENFIIDGKRANVNLAVIGKEFSLOT. FRIGVOOLPELIORTGITEHVIYERIV KRERAAEERACKIENFIIDGKRANVNLAVIGKEFSLOT. FRIGVOOLPELIORTGITEHVIYERIV KRERAAEERACKIENFIIDGKRANVNLAVIGKEFSLOT. FRIGVOOLPELIORTGITEHVIYERIV GEVINADERAAEERACKIENFIIDGKRANVNLAVIGKEFSLOT. FRIGVOOLPELIORTGITEHVIYERIV MADERAAEERACKIENFIIDGKRANVNLAVIGKEFSLOT. FRIGVOOLPELIORTGITEHVIYERII MADERAAEERACKIENFIIDGKRANVNLAVIGKEFSLOT. FRIGVOOLPELIORTGITEHVIYERII GEVTINDERAAEERACKIENFIIDGKRANVNLAVIGKEFSLOT. FRIGVOOLPELIORYGONEFSII MIDERAAEERACKIENFIIDGKRANVNLAVIGKEFS	151 152 151 152 151 151 151 151 151 151
Human Bushbaby Chimpanzee Sorilla Macaque Olive_baboon Orangutan Vervet-AGM Suinea_Pig Mouse Rat Cat Cow Dog Ferret Hedgehog Horse Microbat Pig Armadillo Elephant Lesser_hedgehog_tenred Anole_lizard Chinese_softshell_turtle Duck Flycatcher Zebra_Finch Amazon_molly=1 Amazon_molly=2 Cave_fish=1 Cave_fish=2 Fugu Medaka Platyfish Platyfish Platyfish Platyfish Spotted_gar Stickleback	GEVITADRAARRACKIENE I IDGERANVNLAYIGAKERSLET. GEALGVOLHETLIGE YGLIEHTINGE GEVITADRAARRACKIENE I IDGERANVNLAYIGAKERSLET. GEALGVOLHETLIGE YGLIEHTINGE MADRAARDRACKIENE I IDGERANVNLAYIGAKERSLET. GEALGVOLHETLIGE YGLIEHTINGE MADRAARDRACKIENE I IDGERANVNLAYIGAKERSLET. GEALGVOLHETLIGE YGLIEHTINGE MADRAARRACKIENE I IDGERANVNLAYIGAKERSLET. GEALGVOLHETLIGE YGLIEHTINGE MADRAARRACKIENE I IDGERANVNLAYIGAKERSLET. GEALGVOLHETLIGE YGLIEHTINGE WADRAARRACKIENE I IDGERANVNLAYIGAKERSLET. GEALGVOLHETLIGE YGLIEHTINGE WADRAARACKIENE I IDGERANVNLAYIGAKERSLET. GEALGVOLHETLIGE YGLIEHTINGE WADRAARACKIENE I IDGERANVNLAYIGAKERSLET. GEALGVOLHETLIGE YGLIEHTINGE WADRAARACKIENE I IDGERANVNLAYIGAKERSLET. GEALGVOLHETLIGE YGLIEHTINGE WADRAARACKIENE I IDGERANVNLAYIGAKERSLET. GETTGVOLHETLIGE YGUIGEFGITEHTINGE WADRAARACKIENE I IDGERANVNLAYIGAKERSLET. GETTGVOLHETLIGE YGUIGEFGITEHTINGE WADRAARACKIENE I IDGERANVNLAYIGAKERSLET. GETTGVOLHETALGEFGGITEHTINGEFGIT WADRAARACKIENE I IDGER	151 152 151 152 151 151 151 151 151 151
Human Bushbaby Chimpanzee Sorilla Macaque Olive_baboon Orangutan Vervet-AGM Suinea_Pig Mouse Rat Cat Cat Cat Cow Dog Ferret Hedgehog Horse Microbat Pig Armadillo Elephant Lesser_hedgehog_tenred Anole_lizard Chicken	GEVITADRAABERACKIENE I IDGRAAVNLAYIGAKERSIGTGEATGVQLEETLIGKIYGIIEHIIYERGIV GEVITADRAABERACKIENE I IDGRAAVNLAYIGAKERSIGTGEATGVQLEETLIGKIYGIIEHIIYERGIV KADRAABERACKIENE I IDGRAAVNLAYIGAKERSIGTGEATGVQLEETLIGKIYGIIEHIIYERGIV GEVITADRAABERACKIENE I IDGRAAVNLAYIGAKERSIGTGEATGVQLEETLIGKIYGIIEHIIYERGIV GEVITADRAABAERACKIENE I IDGRAAVNLAYIGAKERSIGTGEATGVQLEETLIGKIYGIIEHIIYERGIV MADRAADRACKIENE I IDGRAAVNLAYIGAKERSIGTGEATGVQLEETLIGKIYGIIEHIIYEGIV MADRAADRACKIENE I IDGRAAVNLAYIGAKERSIGTGEATGVQLEETLIGKIYGIIEHIIYEGIV MADRAADRACKIENE I IDGRAAVNLAYIGAKERSIGTGEATGVQUEETLIGKIYGIIEHIIYEGIV MADRAADRACKIENE I IDGRAAVNLAYIGAKERSIGTGEATGVQUEETLIGKIYGIIEHIIYEGIV MADRAADRACKIENE I IDGRAAVNLAYIGAKERSIGT	151 152 151 152 151 151 151 151 151 151
Human Bushbaby Chimpanzee Sorilla Macaque Olive_baboon Orangutan Vervet-AGM Suinea_Pig Mouse Rat Cat Cow Dog Ferret Hedgehog Horse Microbat Pig Armadillo Elephant Lesser_hedgehog_tenret Anole_lizard Chinese_softshell_turtle Duck Flycatcher Zebra_Finch Amazon_molly-1 Amazon_molly-2 Cave_fish-1 Cave_fish-2 Fuqu Fuqu Medaka Platyfish Platyfish Platyfish Platyfish Cetacoon Stickleback Fetacoon Stickleback Flycatches	GEVITADRAABERACKTENE I IDGERANVNLAYIGAKERSLOTGERI GVQLEBETLIGE YGLEBENIYE PATV GEVITADRAABERACKTENE I IDGERANVNLAYIGAKERSLOTGERI GVQLEBETLIGE YGLEBENIYE PATV KADRAAEERACKTENE I IDGERANVNLAYIGAKERSLOTGERI GVQLEBETLIGE YGLEBENIYE PATV KADRAAEERACKTENE I IDGERANVNLAYIGAKERSLOTGERI GVQLEBETLIGE YGLEBENIYE PATV GEVITADRAAEERACKTENE I IDGERANVNLAYIGAKERSLOTGERI GVQLEBETLIGE YGLEBENIYE PATV GEVITADRAAEERACKTENE I IDGERANVNLAYIGAKERSLOTGERI GVQLEBETLIGE YGLEBENIYE PATV GEVITADRAAEERACKTENE I IDGERANVNLAYIGAKERSLOTGERI GVQLEBETLIGE YGLIEBENIYE PATV KADRAAEERACKTENE I IDGERANVNLAYIGAKERSLOTGERI GVQLEBETLIGE YGLIEBENIYE PATV GEVITADRAAEERACKTENE I IDGERANVNLAYIGAKERSLOTGERI GVQLEBETLIGE YGLIEBENIYE PATV MADRAAEBACKTENE I IDGERANVNLAYIGAKERSLOT	151 152 151 151 151 151 151 151 151 151
Human Bushbaby Chimpanzee Sorilla Macaque Olive_baboon Orangutan Vervet-AGM Suinea_Pig Mouse Rat Cat Cat Cow Dog Ferret Hedgehog Horse Microbat Pig Armadillo Elephant Lesser_hedgehog_tenrec Anole_lizard Chicken Softshell_turtle Duck Flycatcher Zebra_Finch Amazon_molly-1 Cave_fish-1 Cave_fish-2 Fugu Fugu Medaka Platyfish Platyfish Platyfish Platyfish Chicken Chicke	GEVITAD RAABERACKIENE I IDGRAAVNLAYLGAKERSLET. GEALGVOLEETLIGK YGLIENTYKERIV GEVITAD RAABERACKIENE I IDGRAAVNLAYLGAKERSLET. GEALGVOLEETLIGK YGLIENTYKERIV KADRAAERACKIENE I IDGRAAVNLAYLGAKERSLET. GEALGVOLEETLIGK YGLIENTYKERIV KADRAAERACKIENE I IDGRAAVNLAYLGAKERSLET. GEALGVOLEETLIGK YGLIENTYKERIV KADRAAERACKIENE I IDGRAAVNLAYLGAKERSLET. GEALGVOLEETLIGK YGLIENTYKERIV MADRAAERACKIENE I IDGRAAVNLAYLGAKERSLET. GEALGVOLEETLIGK YGLIENIYKERIV MADRAAERACKIENEN I IDGRAAVNLAYLGAKERSLET. GEALGVOLEETLIGK YGLIENIYKERIV MADRAAERACKIENEN I IDGRAAVNLAYLGAKERSLET. GEALGVOLEETLIGK YGLIENIYKEGIV MADRAAERACKIENEN IDGRAAVNLAYLGAKERSLET. GEALGVOLEETLIGK YGLIENIYKEGIV MADRAAERACKIENEN IDGRAAVNLAYLGAKERSLET. GEALGVOLEETLIGK YGLIENIYKEGIV GEVITAD RAAERACKIENEN IDGRAAVNLAYLGAKERSLET. GEALGVOLEHATLOG YGLIENIYKEGIV MADRAAERACKIENEN IDGRAAVNLAYLGAKERSLET. GETTGVOLEHATLOG YGLIENIYKEGIV MADRAAERACKIENEN IDGRAAVNLAYLGAKERSLET. GETTGVOLEHATLOG YGLIENIYKEGIV GEVITNE GAAERACK	151 152 151 152 151 151 151 151 151 151
Human Bushbaby Chimpanzee Sorilla Macaque Olive_baboon Orangutan Vervet-AGM Suinea_Pig Mouse Rat Cat Cow Dog Ferret Hedgehog Horse Microbat Pig Armadillo Elephant Lesser_hedgehog_tenrec Anole_lizard Chicken Chinese_softshell_turtle Duck Flycatcher Zebra_Finch Amazon_molly-1 Amazon_molly-2 Cave_fish-1 Cave_fish-1 Cave_fish-2 Fuqu Fuqu Medaka Platyfish Platyfish Spotted_gar Stickleback Ietraodon Ilapia-1 Filapia-2	GEVITADRAAFERACKIEPPIIDGRAAVNLAVIGAKERSLOT. GEALGVQLEPELIGETUGETUGIEPHINEPPIV GEVITADRAAFERACKIEPPIIDGRAAVNLAVIGAKERSLOT. GEALGVQLEPELIGETUGETUGIEPHINEPPIV MARGAAFERACKIEPPIIDGRAAVNLAVIGAKERSLOT. GEALGVQLEPELIGETUGETUGIEPHINEPPIV MARGAAFERACKIEPPIIDGRAAVNLAVIGAKERSLOT. GEALGVQLEPELIGETUGETUGIEPHINEPPIV MARGAAFERACKIEPPIIDGRAAVNLAVIGAKERSLOT. GEALGVQLEPELIGETUGETUGIEPHINEPPIV GEVITADRAAFERACKIEPPIIDGRAAVNLAVIGAKERSLOT. GEALGVQLEPELIGETUGETUGIEPHINEPPIV GEVITADRAAFERACKIEPPIIDGRAAVNLAVIGAKERSLOT. GEALGVQLEPELIGETUGIEPHINEPPIV GEVITADRAAFERACKIEPPIIDGRAAVNLAVIGAKERSLOT. GEALGVQLEPELIGETUGIEPHINEPPIV GEVITADRAAFERACKIEPPIIDGRAAVNLAVIGAKERSLOT. GEALGVQLEPELIGETUGIEPHINEPPIV GEVITADRAAFERACKIEPPIIDGRAAVNLAVIGAKERSLOT. GEALGVQLEPELIGETUGIEPHINEPPIV GEVITADRAAFERACKIEPPIIDGRAAVNLAVIGAKERSLOT. GEALGVQLEPELIGETUGIEPHINEPPIV GEVITADRAAFERACKIEPPIIDGRAAVNLAVIGAKERSLOT. GEALGVQLEPELIGETUGIEPHINEPPIV GEVITADRAAFERACKIEPPIIDGRAAVNLAVIGAKERSLOT. GEALGVQLEPELIGETUGIEPHINEPPIV GEVITADRAAFERACKIEPPIIDGRAAVNLAVIGAKERSLOT. GEALGVQLEPELIGETUGIEPHINEPPIV KADRAAFERACKIEPPIIDGRAAVNLAVIGAKERSLOT. GEALGVQLEPELIGETUGIEPHINEPPIV KADRAAFERACKIEPPIIDGRAAVNLAVIGAKERSLOT. GEALGVQLEPELIGETUGIEPHINEPPIV KADRAAFERACKIEPPIDGRAAVNLAVIGAKERSLOT. GEALGVQLEPELIGETUGIEPHINEPPIV GEVITADRAAFERACKIEPPIDGRAAVNLAVIGAKERSLOT. GEALGVQLEPELIGETUGIEPHINEPPIV GEVITADRAAFERACKIEPPIDGRAAVNLAVIGAKERSLOT. GEALGVQLEPELIGETUGIEPHINEPPIV GEVITADRAAFERACKIEPPIDGRAAVNLAVIGAKERSLOT. GEALGVQLEPELIGETUGIEPHINEPPIV GEVITADRAAFERACKIEPPIDGRAAVNLAVIGAKERSLOT. GEALGVQLEPELIGETUGIEPHINEPPIV MADRAAFERACKIEPPIDGRAAVNLAVIGAKERSLOT. GEALGVQLEPELIGETUGIEPHINEPPIV GEVITADRAAFERACKIEPPIDGRAAVNLAVIGAKERSLOT. GEALGVQLEPELIGETUGIEPHINEPPIV MADRAAFERACKIEPPIDGRAAVNLAVIGAKERSLOT. GEALGVQLEPELIGETUGIEPHINEPPIV MADRAAFERACKIEPPIDGRAAVNLAVIGAKERSLOT. GEALGVGLEPELIGETUGIEPHINEPPIV MADRAAFERACKIEPPIDGRAAVNLAVIGAKERSLOT. GEALGVGLEPELIGETUGIEPHINEPPI MADRAAFERACKIEPPIDGRAAVNLAVIGAKERSLOT. GEALGVGLEPHINEPPIVEGII MADRAAFERACKIEPPIDGRAAVNLAVIGAKERSLOT. GEALGVGLEPHINEPPIVEGII MADRAAFERACKIEPPIDGRAAVNL	151 152 151 151 151 151 151 151 151 151
Human Bushbaby Chimpanzee Sorilla Macaque Olive_baboon Orangutan Vervet-AGM Suinea_Pig Mouse Rat Cat Cow Dog Ferret Hedgehog Horse Microbat Pig Armadillo Elephant Lesser_hedgehog_tenrec Anole_lizard Chicken Chinese_softshell_turtle Duck Flycatcher Zebra_Finch Amazon_molly-1 Amazon_molly-2 Cave_fish-1 Cave_fish-2 Fugu Medaka Platyfish Spotted_gar Stickleback Fetraodon Tilapia-1 Tilapia-2 Zebrafish	GEVITAD RAAFERACKIEPPIIDGREANVNLAVIGAKERSLOT. GEALOVQLE PELIGRIVGIEPPIIER GEVITAD RAAFERACKIEPPIIDGREANVNLAVIGAKERSLOT. GEALOVQLE PELIGRIVGIEPPIIER KADRAAFERACKIEPPIIDGREANVNLAVIGAKERSLOT. GEALOVQLE PELIGRIVGIEPTIIER KADRAAFERACKIEPPIIDGREANVNLAVIGAKERSLOT. GEALOVQLE PELIGRIVGIEPTIIER KODER KADRAAFERACKIEPPIIDGREANVNLAVIGAKERSLOT. GEALOVQLE PELIGRIVGIEPTIVECA KADRAAFERACKIEPPIIDGREANVNLAVIGAKERSLOT. GEALOVQLE PELIGRIVGIEPTIVECAVI KADRAAFERACKIEPPIIDGREANVNLAVIGAKERSLOT. GEALOVQLE PELIGRIVGIEPTIVECAVI KADRAAFERACKIEPPIIDGREANVNLAVIGAKERSLOT. GEALOVQLE PELIGRIVGIEPTIVECAVI KADRAAFERACKIEPPIIDGREANVNLAVIGAKERSLOT. GEALOVQLE PELIGRIVGIEPTIVECAVI KADRAAFERACKIEPPIIDGREANVNLAVIGAKERSLOT. GEALOVQLE PELIGRIVGIEPTIVECAVI KADRAAFERACKIEPPIIDGREANVNLAVIGAKERSLOT. GEALOVQLE PELIGRIVGIEPTIVECAVI KADRAAFERACKIEPPIIDGREANVNLAVIGAKERSLOT. GETIVOQLE PELIGRIVGIEPTIVECAVI KADRAAFERACKIEPPIIDGREANVNLAVIGAKERSLOT. GETIVOQLE PELIGRIVGIEPTIJEPII KADRA	151 152 151 152 151 151 151 151 151 151

Figure 1. Sequence and structural alignment of RNPC1 in vertebrates. (A) Alignment of RNPC1 in vertebrates from position 1-151.

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R	Human	QPSVUIEAAPUPSISSPYIEYIPÄSP.AYAQYPPÄTYDÖ.YFYÄÄSP.ATÄÄSFVGYSYPÄ	209
	Bushbaby	QPSVVIEAAPVPSLSSPVIEVAPASP.AVAQVEPATYDQ.VEVAASP.ATAASFMGVSVPA	210
	Chimpanzee	QPSVVIPAAPVPSLSSPYIEYTPASP.AYAQYPPATYDg.YEYAASP.ATAASFVGYSYPA	209
	Gorilla	DESVIEAAPVPSLSSPYIEYTPASP.AXACYPPATYD: YEYAASP.ATAASEVCS.SYPA	128
	Macaque	OPSVUTPAAPVPSLSSPYTEYTPASP.AYAQYPPATYDO.YEVAASP.ATAASFVOPSYPA	209
	Olive_baboon	CPSVVIFAAPVPSLSSPYIEYTPASP.AYACYPPATYDC.YEYAASP.ATAASFVGYSYPA	209
	Orangutan	OPSVVIPAAPIPSISSPYIEYIPASP.AYAQYPPATYD.YEYAASP.ATAASEVGYSYPA	128
	Vervet-AGM	OPSVVIPAAPVPSLSSPYIEYIPASP.AYAQYPPATYD.YEYAASP.ATAASPVGYSYPA	209
	Guinea_Pig	OPSUVIFAAPUPSITSPYIEYAPASP.AYAQYPPATYDO.YEYAASP.ATATSFVOYGYPA	209
	Mouse	GPSVVIFATPVPSLSSPYLEYTPASP.AYAQYEPATYDC.YEYAASP.AAATSEVGYGYPA	207
	Rat	OPSVVIEATEVPSLSSPYLEYTPASP.ATACYPPATYD.VEYAASP.ATATSEVGYGYPA	128
	Cat	CPSVVIPAAPVPSLSSPYIEYTPASP.AYACYPPATED.YEYAASP.ATAASPVGGGYPA	128
	Cow	OPSVIEAAPVPPLSSPYIEYIPASP.AYACYPPATYD.MEXASP.ATAASPVOYSYPA	209
	Dog	OPSVVIPAAPVPSLSSPYIEYIPASP.ATAOYPPAAPD.VEYAASP.ATAAGPVOYGYPA	128
	Ferret	OPSVVIPAAPVPSLSSPYIEYIPASP.ATAUYPPATEDEFTAASP.ATAASPVOJGYPAPGVR/GVRSG	196
	Hedgehog	OPSVVIJAAPVPSLSSPYIEYIPASP.ATAOYPATYD.YEYAASPAATAASPVGYGYPA	210
	Horse	CPSVILAAPVPPLSSPYIEYIPASP.ATAYPPAATD.HYAASP.ATAASPVOTSYPA.	125
	Microbat	OPSVVIPAAPIPSLSSPFLEYIPASP.AYTOYPPATYD.YFYAASP.ASVTSFVOFSYPA	209
	Pig	OPSVVIPAAPVPSLSSPYIEYIPASP.ATAOYPATYD. YEYAASP.ATAASPVSYGYPA	209
	Armadillo	GPSVVIPAAPVPSLSSPILETAPASP.ATAUTPPAATD. TETAASPAAGTVGTGTPA	189
	Elephant	OPSYVYPAAPVPSLSSPYIEYMPASP.ATATYPFITYD.MEMAPSP.ATATSSVORGYPA	128
	Lesser_hedgehog_tenrec	OPSYMP. APVPSIPSPTIPTPASP.ITTPTPAPTP.STSPAR.ITTSPMG.STPA	205
	Anole_lizard	OFSVVIE.IPVCSITSPYIDYITASC.AYSCETAAAYD.VEYAASPATGEMGYGYIS	183
	Chicken	CPSVVIP.IPVCSIASPYIDYTAASC.AYSCYITAAYD.TPYAASPAAGEVGYGYIG.	125
	Chinese_softshell_turtle	CPSVIL.IPVCSITSPYIDYTSASC.AYTCYITAAYD.AYAASPAAGFVCYGYIN.	183
	Duck	OPSVIE.IPVCSITSPYIDYTASC.AYSCYITAAYD.YPYAASPAAGEVGSGYIG.	183
	Flycatcher	DESVIE.IPVCSITSPYIDYAAAGC.AYSCYSPA.YEC.YEYAASPPESCCANCCAGLEE.	185
	Zebra rinch	TAUNAL ALL ALL ALL ALL ALL ALL ALL ALL ALL	125
	Amazon_molly-1	THE ILV SAASVGI. SEVILUISS XA DIAMAALOOCEPYAASPAGELGKOYIISPIASAGESAAATIAT	220
	Amazon_molly-2	WEDLELGALSETATALISETELESSATSSATSFTARSGLED. WEEVESESP. STGYLST SE SEGTPTPALT. APPTPP.	222
	Cave_IISh-1		
	Cave_fish-2	ASTALLE SLVA. SSY	203
	Fugu	OPSIVICSCISPTVAALASPYLDHGSAYGHEIISGIEG.MEYVCSPIL.AGGYLSYSESPSAPALAAS.FAPIAA.	201
	Fugu	YGMACPYIYPCAFVCFSLVIPFCISISVSISFYLDYSA.AYSCYACAA.YECCYPYAASPASFLGYSY.ATTSPS.	201
	Medaka	OPGLALCTHLAPTAAAAASPYLEYSSAYSPYAPSGLEG.EEYTSSLSP.SSGYINNSSTPGIPIPILI.ASPIPPA	202
	Platyrish	LILPICVSARSVGISPYLDYSSATACYAHAAFDCOYPY.ARSPACELG.YGYTISPIASAGPSAAATI.TATAIV.	215
	Platyfish	OPSILICSHISDTATALTSPYLEYSSAYSPYADSGLED.YFFVDSDSD.STGYLEYSFSDGTFTPALT.APPTPP.	218
	Spotted gar	OPGLVIETCVSSVGSPYLDYSAAYTOYASAAFEC.YEYAASPSFLCYGYEPTPASTP	198
	Stickleback	HPSIVICSCISPTAAAPYLDYGSAYSHYAPAALEC.YFYAPSPSAGYLGYSP	179
	Tetraocon	GPSIVLEIGIS.ISVSI.SPTLDISARISTAGARIEGGTERASPASELGTSIAITISPS	189
	Tilapia-1	OPSILLESELSPIAAALISPYLDYSPAYTPYASIGLEC.MEYIPSPSP.SAGYLSYIFSPSIPAPIII.ASPIPP.	218
	Tilapia-2	OFSLULFICUS.ISUSI.SFYLDISAAYIOYAQAAFECCFFYAASFAGFLGYSYTASFTATUGF.STATIAP	212
	Zebrafish	GESLELETCVSSISSS EVIDE STAYA GYAA SAFEG. MEYAASEGFLSYMYPFGIAGESSAIST.FIFNPLS	211
	Consensus		
		THE ALL AND AN ADDRESS OF ADDRESS	
	Human	AVCALSAA.APA.GI.IFVOTGAP.GLOELAPO	239
	Bushbaby	AVEALSEA. APA. GI. IF VETAP. GLEPTING	240
	Chimpanzee	AVE A SAA AFA GI I VOIGAF GUE ENNO	239
	Gorilla	AVEA SAA.APA.GI.I.VOIGAP.GL.FLPHO	155
	Macaque	AVE A SAA AP	231
	Olive_baboon		231
	Orangutan	AVE A SAL APA GILL VIGAP GULLEN	195
	Vervet-AGM		237
	Guinea_Pig		239
	nouse		231
	Rac		100
	Cat		100
	Cow		239
	1000		1 5 6
	FANNAR	ALLYA DAA AFA GIAA YAQYE YAYAATA YAYAA YAYAA YAYAA YAYAA YAYAA	158
	Ferret	LAVEDGENIE KROFCS.SERGREF BEHISRUSISGREELCRAEAEDNIAGGCLAPASR	158
	Ferret Hedgehog	LAVEDGENIE, KRGECS.SERGROEF. HET IST SLISGRPELCRAEAEDNIAGGCLAPASR .THPCALSTA.TPA.AT.TEVOTOAF.GLOPERNO	158 256 240
	Ferret Hedgehog Horse	LAVEGENIE, KEGEGS SERGIEF BEHISRISLISGRPELCRAEAECNIAGGCLAPASR TMPCALSA.TPA.AT.TFVCYCAF.CLCPDRMC AMPCALSA.AFT.AT.AFVCYCFF.CLCPDRMC	158 256 240 158
	Ferret Hedgehog Horse Microbat	LAVEGENIE, KEGEGS.SEROFEREP. BETISHTISISGRPELCRAEAECNIAGGCLAPASR TMPGA SAA.TDA.AT.TFVQYQAF.GLQFDRMQ AMPGA SAA.APT.AT.AT.VQYQFF.OLQFDRMQ AVPFG SAS.APT.GT.TFVQYQFF.OLQFDRMQ	158 256 240 158 239
	Ferret Hedgehog Horse Microbat Fig	LAVEGGENLE, KEGEGS.SERGIGEP.BEITSHTISLISGRPELCRAEAECNIAGGCLAPASR TMEGAISA.TEA.AT.TEVQYQAF.QLQFDRMQ .AMEGAISAA.APT.AT.AFVQYQEF.QLQFDRMQ .AVEFGISAS.APT.GT.TEVQYQEF.QLQFDRMQ .AVEFGISAS.APT.GT.ATVQYQEF.QLQFDRMQ	158 256 240 158 239 239
	Ferret Hedgehog Horse Microbat Pig Armadillo Flaphart	AVECASALARA, GLARING AND	158 256 240 158 239 239 209
	Ferret Hedgehog Horse Microbat Pig Armadillo Elephant	LAVEGRENIE, KEGEGS.SERORGEF. BEHTSHTISLTSGRPELCRAEAEENIAGGCLAPASR .TMPGALSAA.TPA.AT.TTVQYQAF.GLOPERNQ .AMPGALSAA.APT.AT.ATVQYQFF.GLOPERNQ .AVPFGLSAS.APT.GT.TTVQYQFF.GLOPERNQ .AVPFGLSAS.A.RFA.GT.ATVQYQFF.GLOPERNQ .AVPGALSAA.ARA.GT.ATVQYQFF.GLOPERNQ .AVPGALSAA.ARA.GT.TTVQYQFF.GLOPERNQ .AVPGALSAA.ARA.GT.TTVQYQFF.GLOPERNQ	158 256 240 158 239 239 209 158
	Ferret Hedgehog Horse Microbat Pig Armadillo Elephant Lesser_hedgehog_tenrec	AMEGASAMARA, GLARA GLARA CAPPER AND	158 256 240 158 239 239 209 158 237
	Ferret Hedgehog Horse Microbat Pig Armadillo Elephant Lesser_hedgehog_tenrec Anole_lizard	AVECASIALITA.GI.H. VIEF.EFITSHISIISISGRPELCRAEAECNIAGGCLAPASR IMVCQAISAA.TDA.AT.TVVQTQAP.QLQPDRMQ AMPGAISAA.APT.AT.ATVVQTQFP.QLQPDRMQ AVPFGISAS.APT.GT.TVVQTQFP.QLQPDRMQ AVPFQAISAA.APA.GT.ATVVTQFP.QLQPDRMQ AVPQAISAA.APA.GT.TVVQTQFP.QLQPDRMQ AVPQAISAA.APA.GT.TVVQTQFF.QLQPDRMQ AVPQAISAA.TPA.GT.TVVQTQFF.QLQPDRMQ AVPQAISAA.TPA.GT.TVVQTQFF.QLQPDRMQ AVPQAISAA.TPA.GT.TVVQTQFF.QLQPDRMQ AVPQAISAA.TPA.GT.TVVQTQFF.QLQPDRMQ	158 256 240 158 239 239 209 158 237 216
	Ferret Hedgehog Horse Microbat Pig Armadillo Elephant Lesser_hedgehog_tenrec Anole_lizard Chicken	LAVEGRINE, KEGCS.SERGREP. FFITSHT SLTSGRPELCRAEAEDNIAGGCLAPASR TMPGALSA.TPA.AT.TFVQYQFF.GLQPDRMQ AMPGALSA.AFT.AT.AYVQYQFF.GLQPDRMQ AVPGALSA.AFT.GT.TVQYQFF.GLQPDRMQ AVPGALSA.AFT.GT.AYVQYQFF.GLQPDRMQ AVPGALSA.AFT.GT.AYVQYQFF.GLQPDRMQ AVPGALSA.AFT.GT.TVQYQFF.GLQPDRMQ AVPGALSA.AFT.GT.TYVQYQFF.GLQPDRMQ AVPGALSA.AFT.GT.TYVQYQFF.GLQPDRMQ AVPGALSA.TFA.GT.TYVQYQFF.GLQDDRMQ AVPGALSA.TFA.TFJAFATAYVQYQFC.GLQPDRMQ AVPGFTAS.TFJAFATAYVQYQFC.GLQPDRMQ	158 256 240 158 239 209 158 237 216 157
	Ferret Hedgehog Horse Microbat Pig Armadillo Elephant Lesser_hedgehog_tenrec Anole_lizard Chicken Chinese_softshell_turtle Dock	LAVEGRUPE, KEGGES, SERGEREF, FFITSHTISTISTSGRPELCRAEAEDNIAGGCLAPASR TMPGALSAA.TPA.AT.TTVQYQAF.GLQPDRMQ AMPGALSAA.APT.AT.ATVQYQFF.GLQPDRMQ AVPFGLSAS.APT.GT.ATVQYQFF.GLQPDRMQ AVPGALSAA.APA.GT.ATVQYQFF.GLQPDRMQ AVPGALSAA.APA.GT.ATVQYQFF.GLQPDRMQ AVPGALSAA.APA.GT.TTVQYQFF.GLQPDRMQ AVPGALSAA.TPA.GT.TTVQYQFF.GLQPDRMQ AVPGALSAA.TPA.GT.TTVQYQFF.GLQPDRMQ AVPGALSAA.TPA.GT.TTVQYQFF.GLQPDRMQ AVPGALSAA.TPA.GT.TTVQYQFF.GLQPDRMQ AVPGALSAA.TPA.GT.TTVQYQFF.GLQPDRMQ AVPGALSAA.TPA.GT.TTVQYQFF.GLQPDRMQ AVGPTITAS.TPAAFATATVQYQFG.GLQPDRMQ AVGPTITAS.TPAAFATATVQYQFG.GLQPDRMQ AVGPTITAS.NPAAHTTATVQYQFG.GLQPDRMQ	158 256 240 159 239 209 158 237 216 157 215
	Ferret Hedgehog Horse Microbat Pig Armadillo Elephant Lesser_hedgehog_tenrec Anole_lizard Chicken Chinese_softshell_turtle Duck	LAVEGRINE, KEGCS.SEEQFUEP. EFITSHTSLTSGRPELCRAEAEENIAGGCLAPASR TMPQALSAA.TPA.AT.TVQYQAF.OLQPDRMQ AMPGALSAA.HPT.AT.ATVQYQFF.OLQPDRMQ AVPFGLSAS.APT.GT.TVQYQFF.OLQPDRMQ AVPGALSAA.HPR.GT.AFVQYQFF.OLQPDRMQ AVPGALSAA.HPR.GT.FVQYQFF.OLQPDRMQ AVPGALSAA.HPR.GT.TVQYQFF.OLQPDRMQ AVPGALSAA.HPR.GT.TVQYQFF.OLQPDRMQ AVPGALSAA.HPR.GT.TVQYQFF.OLQPDRMQ AVPGALSAA.HPR.GT.TVQYQFF.OLQPDRMQ AVPGALSAA.HPR.GT.TVQYQFF.OLQPDRMQ AVFGALSAA.HPR.GT.TVQYQFF.OLQPDRMQ AVGGPTTAS.TPAAFATATVQYQFC.OLQPDRMQ .TLQQFTTAS.NPAAFATATVQYQFC.OLQPDRMQ .TLQQFTTAS.NPAAFATATVQYQFC.OLQPDRMQ .WCCFFTAS.NPAAFATATVQYQFC.OLQPDRMQ	158 256 240 159 239 209 158 237 216 157 215 215
	Ferret Hedgehog Horse Microbat Pig Armadillo Elephant Lesser_hedgehog_tenrec Anole_lizard Chicken Chinese_softshell_turtle Duck Flycatcher Zabra Fisch	LAVEGRUIE.KEGEGS.SERGEREF.BFITSHISTISTISTIGRPELCRAEAEDNIAGGCLAPASR TMEGAISAA.TEA.AI.TFVQYQEF.QLQFDRMQ AMEGAISAA.AET.AI.AYVQYQEF.QLQFDRMQ AVEGAISAA.AET.GI.TYVQYQEF.QLQFDRMQ AVEGAISAA.AEA.GI.AYVQYQEF.QLQFDRMQ AVEGAISAA.AEA.GI.TYVQYQEF.QLQFDRMQ AVEGAISAA.AEA.GI.TYVQYQEF.QLQFDRMQ AVEGAISAA.AEA.GI.TYVQYQEF.QLQFDRMQ AVEGAISAA.AEA.GI.TYVQYQEF.QLQFDRMQ AVEGAISAA.AEA.GI.TYVQYQEF.QLQFDRMQ AVEGAISAA.TEA.TITVQYQEF.QLQFDRMQ AVEGAISAA.TEA.TITVQYQEC.QLQFDRMQ AVEGAISAA.TEA.TTATVQYQEC.QLQFDRMQ AVEGAISAA.TEA.TEAATATVQYQEC.QLQFDRMQ AVCGFFITAS.NEAATATVQYQEC.QLQFDRMQ AVCGFFITAS.NEAATATVQYQEC.QLQFDRMQ AVCGFFITAS.NEAATATVQYQEC.QLQFDRMQ AVCGFFITAS.NEAATATVQYQEC.QLQFDRMQ AVCGFFITAS.NEAATATVQYQEC.QLQFDRMQ AVCGFFITAS.NEAATATVQYQEC.QLQFDRMQ AVCGFFITAS.NEAATATVQYQEC.QLQFDRMQ AVCGFFITAS.NEAATATVQYQEC.QLQFDRMQ AVCGFFITAS.NEAATATVQYQEC.QLQFDRMQ AVCGFFITAS.NEAATATVQYQEC.QLQFDRMQ	158 256 240 158 239 239 209 158 237 216 157 215 215 215
	Ferret Hedgehog Horse Microbat Pig Armadillo Elephant Lesser_hedgehog_tenrec Anole_lizard Chicken Chinese_softshell_turtle Duck Flycatcher Zebra_Finch Jeazo mollu-1	LAVEGRUPE.KEGGES.SERGEREP. FFITSHTISLTSGRPELCRAEAEDNIAGGCLAPASR TMPGAISA.TPA.AT.TFVQYQFF.GLQPDRMQ AWFGAISA.AFT.AT.AYVQYQFF.GLQPDRMQ AVFGAISA.AFT.GT.TFVQYQFF.GLQPDRMQ AVFGAISA.AFT.GT.AYVQYQFF.GLQPDRMQ AVFGAISA.AFA.GT.AYVQYQFF.GLQPDRMQ AVFGAISA.AFA.GT.TFVQYQFF.GLQPDRMQ AVFGAISA.AFA.GT.TFVQYQFF.GLQPDRMQ AVFGAISA.TFA.GT.TFVQYQFF.GLQPDRMQ AVFGAISA.TFA.STATATVQYQFC.GLQPDRMQ AVFGAISA.TFA.STATATVQYQFC.GLQPDRMQ AVFGAISA.TFA.STATATVQYQFC.GLQPDRMQ AVFGAISA.TFA.STATATVQYQFC.GLQPDRMQ AVFGAISA.TFA.STATATVQYQFC.GLQPDRMQ MKGHLLVQVVMFKAILGEEGA.FAEALNIFWGA .TVGFFIGS.STATATAYGCGCGTCDDRMQ	158 256 240 158 239 209 158 237 216 157 215 215 218 155
	Ferret Hedgehog Horse Microbat Pig Armadillo Elephant Lesser_hedgehog_tenrec Anole_lizard Chicken Chicken Chinese_softshell_turtle Duck Flycatcher Zebra_Finch Amazon_molly-1 heazon_molly-1	LAVEGRUPE, KEGÇES. SERQEYEP. EPITERTI SITSGRPELCRAEAEDNIAGGCLAPASR TMPQALSAA.TPA.AT.TFVQYQAP.GLQPDRMQ AMPQALSAA.APT.AT.AFVQYQEP.GLQPDRMQ AVPGALSAA.RPA.GT.AFVQYQEP.GLQPDRMQ AVPQALSAA.APA.GT.AFVQYQEP.GLQPDRMQ AVPQALSAA.APA.GT.AFVQYQEP.GLQPDRMQ AVPQALSAA.APA.GT.TFVQYQEF.GLQPDRMQ AVPQALSAA.TPA.GT.TTVQYQEF.GLQPDRMQ AVPQALSAA.TPA.GT.TTVQYQEF.GLQPDRMQ AVPQALSAA.TPA.GT.TTVQYQEF.GLQPDRMQ AVQCPTTANSFVQGFAALQYQEF.GLQPDRMQ AVQCPTTAS.TPAAFATATVQYQEG.GLQPDRMQ AVQCPTTAS.NPAAHTTATVQYQEG.GLQPDRMQ MCGHLLVQVVMFKAIGELA.FAALNIFWGA .TVQFPIAG.TPAAFATATVQYQEG.GLQPDRMQ MCGHLLVQVVMFKAIGELA.FAALNIFWGA	158 256 240 158 239 239 239 239 239 252 216 157 215 215 215 215 215 252
	Ferret Hedgehog Horse Microbat Pig Armadillo Elephant Lesser_hedgehog_tenrec Anole_lizard Chicken Chinese_softshell_turtle Duck Flycatcher Zebra_Finch Amazon_molly-1 Amazon_molly-2 Cave fight:	LAVEGRUPE.KEGCS.SEEQREP.FPHISHTSLISSGRPELCRAEAEENIAGGCLAPASR TMPGALSAA.TPA.AT.TVQYQAP.GLQPDRMQ AMPGALSAA.RPT.AT.ATVQYQFP.GLQPDRMQ AVPFG.SAS.APT.GT.TVQYQFP.GLQPDRMQ AVPGALSAA.RPA.GT.AFVQYQFP.GLQPDRMQ AVPGALSAA.RPA.GT.TFVQYQFP.GLQPDRMQ AVPGALSAA.RPA.GT.TFVQYQFT.GLQDDRMQ AVPGALSAA.RPA.GT.TFVQYQFT.GLQDDRMQ AVPGALSAA.RPA.GT.TFVQYQFT.GLQDDRMQ AVPGALSAA.RPA.GT.TFVQYQFT.GLQDDRMQ AVCGP TAS.TPAAFATAVQYQFC.GLQDDRMQ TCQFP TAS.TPAAFATAVQYQFC.GLQDDRMQ AVCPP TAS.NPAAFATAVQYQFC.GLQDDRMQ AVCCPP TAS.NPAAFATAVQYQFC.GLQDDRMQ AVCCPF TAS.NPAAFATAVQYQFC.GLQDDRMQ AVCCPF TAS.NPAAFATAVQYQFC.GLQDDRMQ ATVCPF TAS.NPAAFATAVQYQFC.GLQDDRMQ	158 256 240 158 239 239 209 259 209 257 216 157 215 215 215 215 252 254
	Ferret Hedgehog Horse Microbat Pig Armadillo Elephant Lesser_hedgehog_tenrec Anole_lizard Chinese_softshell_turtle Duck Flycatcher Zebra_Finch Amazon_molly-1 Amazon_molly-2 Cave_fish-1 Cava_fish-2	LAVEGRINE.KEGES.SERGEREP. FFITSHISITSLISGRPELCRAEAEDNIAGGCLAPASR TMPGALSA.TPA.AT.TVQYQEP.CLOPDRMQ AMPGALSA.APA.GT.ATVQYQEP.CLOPDRMQ AVPGALSA.APA.GT.TVQYQEP.CLOPDRMQ AVPGALSA.APA.GT.TVQYQEP.CLOPDRMQ AVPGALSA.APA.GT.TVQYQEP.CLOPDRMQ AVPGALSA.APA.GT.TVQYQEP.CLOPDRMQ AVPGALSA.APA.GT.TVQYQEP.CLOPDRMQ AVPGALSA.TPA.GT.TVQYQEP.CLOPDRMQ AVPGALSA.TPA.GT.TVQYQEP.CLOPDRMQ AVGCPTTANPPVGGPTALQYGET.CLOPDRMQ AVCCPTTAS.TPAAFATATVQYQEC.CLOPDRMQ AVCCPTTAS.TPAAFATATVQYQEC.CLOPDRMQ AVCCPTTAS.NPAAFATATVQYQEC.CLOPDRMQ AVCCPTTAS.NPAAFATATVQYQEC.CLOPDRMQ AVCCPTTAS.NPAAFATATVQYQEC.CLOPDRMQ AVCCPTTAS.NPAAFATATVQYQEC.CLOPDRMQ AVCCPTTAS.NPAAFATATVQYQEC.CLOPDRMQ AVCCPTTAS.NPAAFATATVQYQEC.CLOPDRMQ AVCCPTTAS.NPAAFATATVQYQEC.CLOPDRMQ AVCCPTTAS.NPAAFATATVQYQEC.CLOPDRMQ AVCCPTTAS.NPAAFATATVQYQEC.CLOPDRMQ AVCCPTTAS.NPAAFATATVQYQEC.CLOPDRMQ ATVACTP J.S.ATCAFTTENTAFCCELOPDRMQ ATVACTP J.S.ATCAFTTENTAFCQECCENTRMQ ATVACTP J.S.ATCAFTTENTAFCQECCENTRMQ ATVACTP J. NANDATENTCONDECCENTRM	158 256 240 158 239 209 159 237 216 157 215 215 215 252 254
	Ferret Hedgehog Horse Microbat Pig Armadillo Elephant Lesser_hedgehog_tenrec Anole_lizard Chicken Chinese_softshell_turtle Duck Flycatcher Zebra_Finch Amazon_molly-1 Amazon_molly-1 Cave_fish-2 Ency	LAVEGRUPE.KEGGS.SERGREP. FFITSHT SLTSGRPELCRAEAEDNIAGGCLAPASR TMPGALSA.TPA.AT.TFVQYQFF.GLQPDRMQ AMPGALSA.RAFT.AT.AYVQYQFF.GLQPDRMQ AVPGALSA.RAFT.GT.ATVQYQFF.GLQPDRMQ AVPGALSA.RAFT.GT.ATVQYQFF.GLQPDRMQ AVPGALSA.RAFT.GT.ATVQYQFF.GLQPDRMQ AVPGALSA.RFA.GT.TVQYQFF.GLQPDRMQ AVPGALSA.TFA.GT.TVQYQFF.GLQPDRMQ AVPGALSA.TFA.GT.TVQYQFF.GLQPDRMQ AVPGALSA.TFA.GT.TVQYQFC.GLQPDRMQ AVPGALSA.TFA.GT.TVQYQFC.GLQPDRMQ AVQCPTTASNPAHTTAYVQYQFC.GLQPDRMQ AVQCPTTASNPAHTTAYVQYQFC.GLQPDRMQ AVQCPTTAS.NPAAHTTAYVQYQFC.GLQPDRMQ MHCHLL.VQVVMPKALGEELA.RAEALNIPWGA .TVCPFIGS.TFALATAYVQYQFC.GLQPDRMQ MHCHLLVQVVMPKALGEELA.RAEALNIPWGA .TVCPFIGS.TFALATAYVQYQFC.GLQPDRMQ HHCHLLVQVVMPKALGEELA.RAEALNIPWGA TVCPFIGS.TFALATAYVQYQFC.GLQPDRMQ HHCHLLVQVVMPKALGEELA.RAEALNIPWGA TVCPFIGS.TFALATAYVQYQFC.GLQPDRMQ HHCHLLVQVVMPKALGEELA.RAEALNIPWGA TVCPFIGS.TFALATAYVQYQFC.GLQPDRMQ HHCHLLVQVVMPKALGEELA.RAEALNIPWGA TVCPFIGS.TFALATAYVQYQFC.GLQPDRMQ HHCHLLVQVVMPKALGEELA.RAEALNIPWGA TVCPFIGS.TFALATAYVQYQFC.GLQPDRMQ HHCHLLVQVVMPKALGEELA.RAEALNIPWGA TVCPFIGS.TFALATAYVQYQFC.GLQPDRMQ HHCHLLVQVVMPKALGEELA.RAEALNIPWGA TVCPFIGS.TFALATAYVQYQFC.GLQPDRMQ HHCHLVQVVMPKALGEELA.RAEALNIPWGA TVCPFIGS.TFALATAYVQYQFC.GLQPDRMQ HHCHLVQVVMPKALGEELA.RAEALNIPWGA TVCPFIGS.TFALTAYVQYQFC.GLQPDRMQ HHCHLVQVVMPKALGEELA.RAEALNIPWGA TVCPFIGS.TFALTAYVQYQFC.GLQPDRMQ HHCHLVQVVMPKALGEELA.RAEALNIPWGA TVCPFIGS.TFALTAYVQYQFC.GLQPDRMQ HHCHLVQVVMPKALGEELA.RAEALNIPWGA TVCPFIGS.TFALTAYVQYQFC.GLQPDRMQ HHCHLVQVVMPKALGEELA.RAEALNIPWGA TVCPFIGS.TFALTAYVQYQFC.GLQPDRMQ HHCHLVQVVMPKALGEELA.RAEALNIPWGA TVCPFIGS.TFALTAYVQYQFC.GLQPDRMQ HHCHLVQVVMPKALGAPFIFYTHYPYTHQPDRMQ HHCHLVQVVMPKALGOFQCHUPKYYYYYYYYYYYYYYYYYYYYYYYYYYYYYYYYYYYY	158 256 240 158 239 209 158 237 216 157 215 215 218 155 252 254 235
	Ferret Hedgehog Horse Microbat Pig Armadillo Elephant Lesser_hedgehog_tenrec Anole_lizard Chicken Chi	LAVEGRUPE, KEGGS, SERORGEP, EFFISHT SLTSGRPELCRAEAEDNIAGGCLAPASR TMPGALSA.TPA.AT.TFVQYQAF.GLQPDRMQ AMPGALSA.APT.AT.AFVQYQFF.GLQPDRMQ AVPGALSA.APT.GT.AFVQYQFF.GLQPDRMQ AVPGALSA.APT.GT.AFVQYQFF.GLQPDRMQ AVPGALSA.APT.GT.AFVQYQFF.GLQPDRMQ AVPGALSA.APT.GT.TFVQYQFF.GLQPDRMQ AVPGALSA.TPA.GT.TFVQYQFF.GLQPDRMQ AVPGALSA.TPA.GT.TFVQYQFF.GLQPDRMQ AVPGALSA.TPA.GT.TFVQYQFF.GLQPDRMQ AVPGALSA.TPA.GT.TFVQYQFF.GLQPDRMQ AVGPTIAS.TPAAFATAFVQYQFG.GLQPDRMQ AVQFPITAS.TPAAFATAFVQYQFG.GLQPDRMQ MCGHLLVQVVMFKAIGGELA.FAAFALNIFKGA .TVQFFIAG.TPAAFATAFVQYQFG.GLQPDRMQ MCGHLLVQVVMFKAIGGELA.FAAFALNIFKGA .TVQFFIAG.TPAAFATAFVQYQFG.GLQPDRMQ MCGHLLVQVVMFKAIGGELA.FAAFALNIFKGA .TVQFFIAG.TPAAFATAFVQYQFG.GLQPDRMQ MCGHLLVQVVMFKAIGGELA.FAAFALNIFKGA .TVQFFIAG.TPAAFATAFVQYQFG.GLQPDRMQ MCGHLLVQVVMFKAIGGELA.FAAFALNIFKGA .TVQFFIAG.TPAAFATAFVQYQFG.GLQPDRMQ MCGHLLVQVVMFKAIGGELA.FAAFALNIFKGA .TVQFFIAG.TPAAFATAFVQYQFG.GLQPDRMQ MCGHLLVQVVMFKAIGGELA.FAAFALNIFKGA .TVQFFIAG.TPAAFATAFVQYQFG.GLQPDRMQ MCGHLLVQVVMFKAIGGELA.FAAFALNIFKGA .TVQFFIAG.TPAAFATAFVQYQFG.GLQPDRMQ MCGHLLVQVVMFKAIGGELA.FAAFALNIFKGA .TVQFFIAG.TPAAFATAFVQYQFG.GLQPDRMQ MCGHLLVQVVMFKAIGGELA.FAAFALNIFKGA .TVQFFIAG.TPAAFATAFVQYQFG.GLQPDRMQ MCGHLLVQVVMFKAIGGELA.FAAFALNIFKGA .TVQFFIAG.TPAAFATAFVQYQFG.GLQPDRMQ MCGHLLVQVVMFKAIGGELA.FAAFALNIFKGA .TVQFFIAG.TPAAFATAFVQYQFG.GLQPDRMQ MCGHLLVQVVMFKAIGGELA.FAAFATAFVGYGFAAFAFAFAFAFAFAFAFAFAFAFAFAFAFAFAFAFA	158 256 240 158 239 209 159 237 215 215 215 215 215 254 235 235
	Ferret Hedgehog Horse Microbat Pig Armadillo Elephant Lesser_hedgehog_tenrec Anole_lizard Chinese_softshell_turtle Duck Flycatcher Zebra_Finch Amazon_molly-1 Amazon_molly-2 Cave_fish-1 Cave_fish-2 Fugu Fugu	LAVEGRUPE.KEGGES.SERGREP. FFITSHISITSHISITGREPELCRAEAEENIAGGCLAPASR TMPQAISAA.TEA.AIT.TVQYQAP.GLQPDRMQ AMPGAISAA.TEA.AIT.TVQYQFF.GLQPDRMQ AVPGAISAA.RAT.GI.TVQYQFF.GLQPDRMQ AVPGAISAA.RAA.GI.AIVQYQFF.GLQPDRMQ AVPGAISAA.RAA.GI.TVQYQFF.GLQPDRMQ AVPGAISAA.RAA.GI.TVQYQFF.GLQPDRMQ AVPGAISAA.RAA.GI.TVQYQFF.GLQPDRMQ AVPGAISAA.TEA.TVQYQFC.GLQPDRMQ AVPGAISAA.TEA.GI.TVQYQFC.GLQPDRMQ AVQCPF TAANPPVGGFIALGYQFI.GLQPDRMQ AVQCPF TAANPPVGGFIALGYQFI.GLQPDRMQ AVQCPF TAS.NPAAFAITAYQQFC.GLQPDRMQ AVQCPF TAS.NPAAFAITAYQQFC.GLQPDRMQ AVQCPF TAS.NPAAFAITAYQQFC.GLQPDRMQ AVQCPF TAS.NPAAFAITAYQQFC.GLQPDRMQ AVQCPF TAS.NPAAFAITAYQQFC.GLQPDRMQ AVQCPF TAS.NPAAFAITAYQQFC.GLQPDRMQ AVQCPF TAS.NPAAFAITAYQQFC.GLQPDRMQ AVQCPF TAS.NPAAFAITAYQQFC.GLQPDRMQ AVQFP TAS.NPAAFAITAYQQFC.GLQPDRMQ AVQFP TAS.NPAAFAITAYQQFC.GLQPDRMQ AVQFP TAS.NPAAFAITAYQQFC.GLQPDRMQ AVQFP TAS.NPAAFAITAYQFC.GLQPDRMQ AVQFP TAS.NPAAFAITAYQQFC.GLQPDRMQ AVQFP TAS.NPAAFAITAYQYQFC.GLQPDRMQ AVQFP TAS.NPAAFAITAYQYQFC.GLQPDRMQ AVQFP TAS.NPAAFAITAYQFCC.GLQPDRMQ ATVMFT FSAITACAFT LHYAFCCHLQPERMQ AITMFT FSAITACAFT LHYAFCCHLQPERMQ AITMFT ANAAATFAILYYFCCHLQPERMQ AITMFT ANAAATFAILYYFCCHLQPERMQ AITMFT ANAAATFAILYYFCCHLQPERMQ AITMFT ANAAATFAILYYFCCHLQPERMQ AITMFT ANAAATFAILYYFCCHLQPERMQ AITMFT ANAAATFAILYYFCCHLQPERMQ AITMFT ANAAATFAILYYFCCHLQPERMQ AITMFT ANAAATFAILYYFCCHLQPERMQ AITMFT ANAAATFAILYYFCCHLQPERMQ AITMFT ATAYSGFCALHYPLHQBRMQF AITMFT ATAYSGFCALHYPLHQARRMGF AITMFT ATAYSGFCALHYPLA.AFYCCHLGYFCCHLQPERMQ	158 256 240 158 239 209 158 237 215 215 215 215 215 252 254 235 230 245
	Ferret Hedgehog Horse Microbat Pig Armadillo Elephant Lesser_hedgehog_tenrec Anole_lizard Chinese_softshell_turtle Duck Flycatcher Zebra_Finch Amazon_molly-1 Amazon_molly-1 Cave_fish-1 Cave_fish-2 Fugu Fugu Fugu Fugu	LAVEGRUPE.KEGCS.SERGREP.FFHTSHISTISTIGRPELCRAEAEENIAGGCLAPASR TMPQAISIA.TDA.AT.TTVQYQFF.GLQPDRMQ AVPQAISIA.TTAT.AYVQYQFF.GLQPDRMQ AVPQAISIA.REA.GT.AYVQYQFF.GLQPDRMQ AVPQAISIA.REA.GT.TVQYQFF.GLQPDRMQ AVPQAISIA.REA.GT.TVQYQFF.GLQPDRMQ AVPQAISIA.REA.GT.TVQYQFF.GLQPDRMQ AVPQAISIA.REA.GT.TVQYQFF.GLQPDRMQ AVPQAISIA.TRA.GT.TVQYQFF.GLQPDRMQ AVPQAISIA.TRA.GT.TVQYQFC.GLQPDRMQ AVPQAISIA.TRA.GT.TVQYQFC.GLQPDRMQ AVQCPTTAS.TDAAFATAYVQYQFC.GLQPDRMQ AVQCPTTAS.NDAAFATAYVQYQFC.GLQPDRMQ AVQCPTTAS.NDAAFATAYVQYQFC.GLQPDRMQ MHCHLL VCVVMFKAIGEELA.FAEALNIFMGA .TVQFF.JSTDAAFATAYVQYQFC.GLQPDRMQ MHCHLL VCVVMFKAIGEELA.FAEALNIFMGA .TVQFF.JSTDAAFATAYVQYQFC.GLQPDRMQ ATVMFF A.TDAAFATAYVQYGFC.GLQPDRMQ HHCHLP J.SITAVSAFFAELHYPLHQPDRMQ PTPAQTIANAAATFAFLCYPFCCHLQPERMQ NAAATFAFLCYPFCCHLQPERMQ AIHPF AALTAYSAFFAELHYPLHQADRMQF TAGFT.AARAACAAVEQNISSAAGPAATFLHYAPQCHIQFERMQ AHHPF AALTAYSAFCALHYPLCDIRMQ	158 256 240 158 239 209 159 237 216 157 215 218 252 254 235 245 230 245
	Ferret Hedgehog Horse Microbat Pig Armadillo Elephant Lesser_hedgehog_tenrec Anole_lizard Chicken Chicken Chinese_softshell_turtle Duck Flycatcher Zebra_Finch Amazon_molly-1 Amazon_molly-2 Cave_fish-2 Fugu Medaka Platyfish Platyfish	LAVEGRAUHER, GL. AN ORAFLEY ENTISET SETSGRPELCRAEAEENIAGGCLAPASE IAVEGRAUHE KEGES.SEENGREP. ENTISET SETSGRPELCRAEAEENIAGGCLAPASE TMPGALSA.TPA.AT.TFVQYQFP.CLOPDRMQ AVFGALSA.AFT.AT.AYVQYQFP.CLOPDRMQ AVFGALSA.AFT.GT.AYVQYQFP.CLOPDRMQ AVFGALSA.AFT.GT.AYVQYQFP.CLOPDRMQ AVFGALSA.TPA.GT.TYVQYQFP.CLOPDRMQ AVFGALSA.TPA.GT.TYVQYQFP.CLOPDRMQ AVFGALSA.TPA.GT.TYVQYQFP.CLOPDRMQ AVFGALSA.TPA.GT.TYVQYQFC.CLOPDRMQ AVFGALSA.TPA.GT.TYVQYQFC.CLOPDRMQ AVFGALSA.TPA.GT.TYVQYQFC.CLOPDRMQ AVGPT TAS.TPAAFATAYVQYQFC.CLOPDRMQ MCSHL.VQVVMPKALGEELA.FAEALNIPWGA .TVCFFIAS.NFAAFATAYVQYQFC.CLOPDRMQ MCSHL.VQVVMPKALGEELA.FAEALNIPWGA .TVCFFIAS.TPAAFATAYVQYQFC.CLOPDRMQ MCSHL.VQVVMPKALGEELA.FAEALNIPWGA .TVCFFIAS.TPAAFATAYVQYQFC.CLOPDRMQ MCSHL.VQVVMPKALGEELA.FAEALNIPWGA .TVCFFIAS.TASAFATATVQYQFC.CLOPDRMQ MCSHL.VQVVMPKALGEELA.FAEALNIPWGA .TVCFFIAS.TASAFATATVQYQFC.CLOPDRMQ MCSHL.VQVVMPKAGAPATELHYAFQCBLOFERMQ AATHFFI PSATAGAPTELHYAFQCBLOFERMQ ATHFFIA.TAYSGFCAFLHYPIHQFDRMQ FTFAGTI ANAMAATFATLCYFFCCHLOPERMM HFFF A.TAYSGFCAFLHYPIHQFDRMQ AMIHFF AALTAYSAFCAFLHYPILQFDRMQ MCSHL.ATAYSGFCAFLHYPILQFDRMQ AMIHFF AALTAYSAFCAFLHYPILQFDRMQ MCSHL.JVQVTER.JTAYSAFCAFLHYPILQFDRMQ MTHFFI J.ATAYSGFCAFLHYPILQFDRMQ MTHFFI J.ATAYSGFCAFLHYPILQFDRMQ MTHFFI J.ATAYSGFCAFLHYPIL	158 256 240 159 239 239 239 239 239 215 215 215 215 215 215 215 225 235 235 235 235 235 235 235 235 23
	Ferret Hedgehog Horse Microbat Pig Armadillo Elephant Lesser_hedgehog_tenrec Anole_lizard Chicken Chicken Chicken Chicken Style Lebra_Finch Amazon_molly-1 Amazon_molly-2 Cave_fish-2 Fugu Fugu Fugu Fugu Fugu Fugu Scotted gar	LAVEGRAUHER, GLAR CALVER LEVELTSHT SLTSGRPELCRAEAEENIAGGCLAPASR TMPGALSAA.TPA.AT.TFVQYQAF.GLQPDRMQ AMPGALSAA.APT.AT.AFVQYQFF.GLQPDRMQ AVPGALSAA.APT.GT.AFVQYQFF.GLQPDRMQ AVPGALSAA.APT.GT.AFVQYQFF.GLQPDRMQ AVPGALSAA.APT.GT.AFVQYQFF.GLQPDRMQ AVPGALSAA.TPA.GT.TFVQYQFF.GLQPDRMQ AVPGALSAA.TPA.GT.TFVQYQFF.GLQPDRMQ AVPGALSAA.TPA.GT.TFVQYQFF.GLQPDRMQ AVPGALSAA.TPA.GT.TFVQYQFF.GLQPDRMQ AVPGALSAA.TPA.GT.TVQYQFC.GLQPDRMQ AVGFDTAS.TPAAFATAFVQYQFC.GLQPDRMQ AVGFDTAS.TPAAFATAFVQYQFC.GLQPDRMQ MCGHLLVQVVMFKAIGGELA.FAALALIPNGA .TVQFPLAG.TPAAFATAFVQYQFC.GLQPDRMQ ATVHFTIFSATAGAFTTHYARQCELOFERMQ AATHFFT.A.TAVSGGFQATLOYDFCCHLQPDRMQ PTPAQTLANAMAATFAFTQYPFCCHLQPDRMQ MCHLLVQVVMFK.A.AIGPATHYPIHQPDRMQ MCHLLVQVVMFK.A.AIGPATHYPIHQPDRMQ ATHFFTA.TAVSGGFQATHYPIHQADRMQF TAGFT.AAMAAGAAVHQNLSSAAGPAATFLHYAPQCHIQFERMQ AATHFFT ALTAVSATFFAFLWYPIHQDDRMQ MHCHLLATTAVSATFFAFLWYPICIMGP ATHFFTALTAVSATFFAFLWYPIFQDDRMQ PTPAGTLANAMAAGAAVHQNLSSAAGPAATFLHYAPQCHIQFERMQ AATHFFT ALTAVSATFFAFLWYPIHQDDRMQ MHTHFTALTAVSATFFAFLWYPIHQDDRMQ	158 2566 2400 239 209 209 209 209 209 209 209 215 215 215 215 215 215 215 225 225 230 235 230 245 235 245 234 249 239
	Ferret Hedgehog Horse Microbat Pig Armadillo Elephant Lesser_hedgehog_tenrec Anole_lizard Chinese_softshell_turtle Duck Flycatcher Zebra_Finch Amazon_molly-1 Amazon_molly-1 Cave_fish-1 Cave_fish-2 Fugu Fugu Fugu Medaka Platyfish Spotted_gar Stuckienary	LAVEGRUIP.KEGCS.SEEQREP. FFITSHISIISIISGRPELCRAEAEENIAGGCLAPASR TMPQAISIA.TDA.AI.TTVQYQEP.GLQPIRMQ AVPQAISIA.TDA.AI.TTVQYQEP.GLQPIRMQ AVPQAISIA.APA.GI.AIVQYQEP.GLQPIRMQ AVPQAISIA.APA.GI.TVQYQEP.GLQPIRMQ AVPQAISIA.APA.GI.TVQYQEP.GLQPIRMQ AVPQAISIA.APA.GI.TVQYQEP.GLQPIRMQ AVPQAISIA.TDA.GI.TVQYQEP.GLQPIRMQ AVQQPITANPPVGGPIALQYQET.GLQPIRMQ AVQQPITANPPVGGPIALQYQET.GLQPIRMQ AVQCPFITAS.TDAAFAIAYQYQEC.GLQPIRMQ AVQCPFITAS.NPAAFAIAYQYQEC.GLQPIRMQ AVQCPFITAS.NPAAFAIAYQYQEC.GLQPIRMQ AVQCPFITAS.NPAAFAIAYQYQEC.GLQPIRMQ AVQCPFITAS.NPAAFAIAYQYQEC.GLQPIRMQ AVQCPFITAS.NPAAFAIAYQYQEC.GLQPIRMQ MHCHLL VCVVMFKAIGEETA.FAEINIFMGA .TVQFFI.S.NTAAFAIAYQYQEC.GLQPIRMQ AHHPPIALTAYSATPPAFLHYPIHQPIRMQ PTPAQTIANAMAATPAFLCYPECCHLOPERMQ AMIHPPIALTAYSATPPAFLHYPIHQPIRMQ FIFAGT.ANAMAATPAFLCYPECCHLOPERMQ AMIHPPIALTAYSATPPAFLHYPIHQPIRMQ FIFAGT.ANAMAATPAFLCYPECCHLOPERMQ AMIHPPIALTAYSATPPAFLHYPIHQPIRMQ AMIHPPIALTAYSATPPAFLHYPIHQPIRMQ AMIHPPIALTAYSATPPAFLHYPIHQPIRMQ AMIHPPIALTAYSATPPAFLHYPIHQPIRMQ AMIHPPIALTAYSATPPAFLHYPIHQPIRMQ AMIHPPIALTAYSATPPAFLHYPIHQPIRMQ AMIHPPIALTAYSATPPAFLHYPIHQPIRMQ AMIHPPIALTAYSATPPAFLHYPIHQPIRMQ AMIHPPIALTAYSATPPAFLHYPIHQPIRMQ AMIHPPIALTAYSATPPAFLHYPIHQPIRMQ AMIHPPIALTAYSATPPAFLHYPIHQPIRMQ AMIHPPIALTAYSATPPAFLHYPIHQPIRMQ AMIHPPIALTAYSATPPAFLHYPIHQPIRMQ AMIHPPIALTAYSATPPAFLHYPIHQPIRMQ AMIHPPIALTAYSATPPAFLHYPIHQPIRMQ AMIHPPIALTAYSATPPAFLHYPIHQPIRMQ AMIHPPIALTAYSATPPAFLHYPIHQPIRMQ AMIHPPIALTAYSATPPAFLHYPIHQPIRMQ	158 256 240 158 239 239 158 237 215 215 215 215 215 215 252 254 230 245 230 245 234 245 250
	Ferret Hedgehog Horse Microbat Pig Armadillo Elephant Lesser_hedgehog_tenrec Anole_lizard Chinese_softshell_turtle Duck Flycatcher Zebra_Finch Amazon_molly-1 Amazon_molly-2 Cave_fish-1 Cave_fish-2 Fugu Medaka Platyfish Spotted_gar Stickleback Tetrandon	LAVEGRUER.KIG.G.LAV. GLEFF. BY FISHT SLISGRPELCRAEAEDNIAGGCLAPASR TMPGALSIA.TDA.AT.TVQYQFF.GLOPDRMQ AVPGALSIA.AFT.AT.AYVQYQFF.GLOPDRMQ AVPGALSIA.AFT.AT.AYVQYQFF.GLOPDRMQ AVPGALSIA.AFT.AT.AYVQYQFF.GLOPDRMQ AVPGALSIA.AFT.AT.YVQYQFF.GLOPDRMQ AVPGALSIA.AFT.AT.YVQYQFF.GLOPDRMQ AVPGALSIA.TFA.GT.TYVQYQFF.GLOPDRMQ AVPGALSIA.TFA.GT.TYVQYQFC.GLOPDRMQ AVPGALSIA.TFA.GT.TYVQYQFC.GLOPDRMQ AVPGALSIA.TFA.GT.TYVQYQFC.GLOPDRMQ AVPGALSIA.TFA.GT.TYVQYQFC.GLOPDRMQ AVPGALSIA.TFA.STDAFATAYVQYQFC.GLOPDRMQ MUCHTIS.NPAAHTTAYVQYQFC.GLOPDRMQ MUCHLI.VQVVMPKALGEELA.FAEALNIFWGA .TVCFFI.S.NPAAHTTAYVQYQFC.GLOPDRMQ MUCHLI.VQVVMPKALGEELA.FAEALNIFWGA .TVCFFI.S.NFAAFATAYVQYQFC.GLOPDRMQ MHCHLI.VQVVMPKALGEELA.FAEALNIFWGA .TVCFFI.S.NFAAFATAYVQYGFC.GLOPDRMQ MHCHLI.VQVVMPKALGEELA.FAEALNIFWGA ATVHFT FSATACAPTTLHYAFCGELOPDRMQ ATVHFT FSATACAPTTLHYAFCGELOPDRMQ ATVHFT FSATACAPTTLHYAFCGELOPDRMQ ATVHFT FSATACAPTTLHYAFCGELOPDRMQ ATVHFT FSATACAPTTLHYAFCGELOPDRMQ ALMPH ALTAVSTAFCALDYFFC.L.DIBMQ ATVHFT ANAMAATFAFLCYFFCCHOPDRMQ AMINFF ALTAVSTAFCALDYFFCCHOPDRMQ ANTHFF ALTAVSTAFCALDYFFCCHOPDRMQ HTIPLATATYSTAFCALDYFFCCHOPDRMQ AMINFF ALTAVSTAFCALDYFFCCHOPDRMQ AMINFF ALTAVSTAFCALDYFFCCHOPDRMQ HTIPLATATAVSTAFCALDYFFCCHOPDRMQ AMINFF ALTAVSTAFCALDYFFCCHOPDRMQ AMINFF ALTAVSTAFCALDYFFCCHOPDRMQ AMINFF ALTAVSTAFCALDYFFCCHOPDRMQ AMINFF ALTAVSTAFCALDYFFCCHOPFEND AMINFF ALTAVSTAFCALDYFFCCHOPFEND AMINFF ALTAVSTAFCALDYFFCCHOPFEND AMINFF ALTAVSTAFCALDYFFCCHOPFEND AMINFF ALTAVSTAFCALDYFFCCHOPFEND AMINFF ALTAVSTAFCALDYFFCCHOPFEND AMINFF ALTAVSTAFCALDYFFF ATFFF ATFFF ATFFF ATFFFF ATFFFF ATFFFFF ATFFFFF ATFFFFFFFF	158 256 240 239 239 239 239 259 259 252 252 252 252 254 235 235 245 245 245 245 245 245 229 209 209 209 239 209 219 219 219 219 219 219 219 219 219 21
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Figure 1. Continued. (B) Alignment of RNPC1 in vertebrates from position 152-239. All the RNPC1 gene and protein sequences were collected from Ensembl and checked using the BLAST tool at NCBI. The complete RNPC1 gene was identified in the human, bushbaby, chimpanzee, macaque, gorilla, olive baboon, vervet-AGM, guinea pig, mouse, rat, cow, dog, ferret, hedgehog, armadillo, elephant, lesser hedgehog tenrec, anole lizard, chicken, Chinese softshell turtle, duck, Amazon molly, flycatcher, cave fish, fugu, medaka, platyfish, spotted gar, stickleback, tilapia, *tetraodon* and zebrafish genomes.



Figure 2. The phylogenetic tree was constructed according to the protein-coding sequences of RNPC1 using the maximum likelihood method. The RNPC1 gene from the mammalian, bird, reptile and teleost lineages formed species-specific clusters.

was constructed according to the protein-coding sequences of RNPC1, using the maximum likelihood method; the RNPC1

gene from the mammalian, bird, reptile and teleost lineages formed species-specific clusters (Fig. 2). The exon-intron data

Species	Exon 1	Intron 1	Exon 2	Intron 2	Exon 3	Intron 3	Exon 4	Intron 4	Exon 5	Total exons
Human	237	835	124	501	55	14209	304			720
Bushbaby	240	842	124	430	55	11713	304			723
Chimpanzee	720									720
Macaque	237	816	124	503	55	13671	298			714
Olive baboon	237	835	124	508	55	13677	298			714
Vervet-AGM	237	841	124	505	55	13836	298			714
Mouse	0	1110	231	521	124	411	55	10124	304	714
Rat	118	489	55	9816	300					473
Guinea Pig	237	748	124	442	55	10426	301			717
Cow	237	753	124	483	55	12228	304			720
Pig	237	778	124	559	55	11296	304			720
Armadillo	168	747	124	399	55	12317	283			630
Amazon molly-1	213	4109	141	1707	56	6429	349			759
Amazon molly-2	222	4039	124	2832	55	13455	364			765
Cave fish-2	213	2209	124	151	55	4745	316			708
Fugu-1	171	789	124	1405	55	5561	340			690
Medaka	171	2679	124	2251	55	13729	355			705
Platyfish-2	222	4066	124	2973	55	15548	352			753
Spotted gar	210	2827	124	2302	55	6210	301			690
Stickleback	171	904	124	1223	55	6070	187	54	81	618
Tetraodon	174	1629	124	269	55	3386	214	27	99	666
Zebrafish	211	13848	124	12313	55	17086	247	4	102	739

Table I. Exon and intron lengths of RNPC1.

collected from the ENSEMBL database are shown in Table I and Fig. 3. In the majority of vertebrates, the RNPC1 gene exhibited exon-intron conservation, with 4 exons and 3 introns, with similar sizes for each exon and intron (Table I). However, there were 5 exons and 4 introns in the RNPC1 gene in the mouse and 3 fish species (stickleback, *tetraodon* and zebrafish). Thus, the intron deletions in the RNPC1 gene may occur during the evolutionary process of these 3 species of fish. Furthermore, site-specific tests for positive selection were performed for the vertebrate, mammalian, primate, and mammalian excluding primate, rodent and teleost lineages. We were unable to identify any site which was under positive selection by the M7 and M8 models in the RNPC1 protein. It seemed that RNPC1 in vertebrates was under purifying selection (data not shown).

*Expression profile of the human RNPC1 gene.* The investigation of the available microarray data and virtual northern blot analysis, we revealed the predominant expression of RNPC1 in bone marrow, whole blood, lymph node, thymus, brain, cerebellum, retina, spinal cord, heart, smooth muscle, skeletal muscle, small intestine, colon, adipocyte, kidneys, liver, lungs, pancreas, thyroid, salivary gland, skin, breast, ovaries, uterus, placenta, prostate and testes. When we searched the PrognoScan database, we found that human RNPC1 was also expressed in bladder, blood, brain, breast, colorectal, eye, head and neck, lung, ovarian, skin and soft tissue cancer.

Comparative genomic analysis of the human RNPC1 gene. The sex determining region Y (SRY)-box 5 (Sox5), runtrelated transcription factor 3 (RUNX3), CCAAT displacement protein 1 (CUTL1), v-rel avian reticuloendotheliosis viral oncogene homolog (Rel)A, peroxisome proliferator-activated receptor  $\gamma$  isoform 2 (PPAR $\gamma$ 2) and activating transcription factor 6 (ATF6) regulatory transcription factor binding sites were identified in the upstream (promoter) region of the RNPC1 gene.

Identification of functionally relevant SNPs in the human RNPC1 gene and somatic mutations in human cancer. A total of 429 SNPs were identified in the human RNPC1 gene. Of these, 34 SNPs were functionally relevant, including 14 SNPs causing missense mutations, 8 exonic splicing enhancer SNPs and 12 SNPs causing nonsense mutations (Table II). By searching the COSMIC database, we identified 30 somatic mutations of RNPC1 in 10,148 cancer samples (Table III).

Meta-analysis of the prognostic value of the human RNPC1 gene in cancer. When provided with the specific gene, PrognoScan displays a summary (in table format) of tests for the gene, with columns for the dataset, cancer type, subtype, endpoint, cohort, contributor, array type, probe ID, number of patients, optimal cut-point, Pmin and Pcor. Among the databases which detected the expression of the RNPC1 gene, an association between the expression of the RNPC1 gene and cancer prognosis was noted in 14 of the 94 tests (blood cancer 2/9, brain cancer 1/5, breast cancer 3/30, colorectal cancer 1/9, eye 1/1, head and neck cancer 0/1, lung cancer 5/24, ovarian cancer 1/10, skin cancer 0/1 and soft tissue cancer 0/1),



Figure 3. Exon-intron conservation among the RNPC1 gene. In the majority of vertebrates, the RNPC1 gene showed a similar exon-intron conservation, namely 4 exons and 3 introns, with similar sizes for each exon and intron (Table I). However, there are 5 exons and 4 introns in the RNPC1 gene in the mouse and 3 fish species (stickleback, *tetraodon* and zebrafish).

with a 5% significance level (Table IV). As regards blood, colorectal and eye cancer, a correlation between the decreased expressino of the RNPC1 gene and poor survival was observed. However, a higher expression of the RNPC1 gene was found to correlated with a poor survival in patients with brain and ovarian cancer. Of the 3 breast cancer cases, a lower expression of the RNPC1 gene, which correlated with poor survival, was observed in 2 cases (E-TABM-158 and GSE7849), while a higher expression of the RNPC1 gene correlated with a poor survival in the case of GSE11121. Of the lung cancer cases, a

lower expression of the RNPC1 gene, which correlated with poor survival, was noted in 2 cases (GSE31210 and GSE31211), while a higher expression of the RNPC1 gene correlated with poor survival in 3 cases (HARVARD-LC, GSE4716-GPL3694 and Jacob-00182-CANDF) cases.

## Discussion

RNPC1 (also known as RBM38), is an RBP that contains one RRM domain. It is expressed as two isoforms, RNPC1a and

Ta	ble	e II	. F	Funct	ional	y :	rele	evant	S	NP	s in	the	human	RN	VPC1	gene.
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SNP ID	Chr 20 position sequence	Sequence	Туре	Amino acid change
rs150246007	55982673(+)	CCCGTC/TGCTGT	mis	S L
rs201278266	55982720(+)	CCTACA/GCCCAG	mis	ТА
rs201875738	55982772(+)	GCCTGC/TCACGG	mis	AV
rs199521379	55982775(+)	TGCCAC/TGGCTG	mis	ТМ
rs201066490	55982813(+)	CCGCCA/GTGCCC	mis	M V
rs201744631	55982843(+)	CACCCA/GCGGGC	mis	ТА
rs16980970	55982858(+)	CTTTCG/CTGCAG	mis	LV
rs1065289	55982781(+)	GGCTGC/ACAGCT	mis	DA
rs369246420	55982844(+)	ACCCGC/TGGGCA	mis	AV
rs373452137	55982615(+)	ACTACA/GTCTAC	mis	I V
rs377081682	55982714(+)	GCCCGG/TCCTAC	mis	AS
rs368322258	55982789(+)	GCTTCA/GTGGGC	mis	M V
rs10652881	55982715(+)	CCCGGC/TCTACG	mis	AV
rs1065290	55982817(+)	CGTGCC/ACCAGG	mis	H P
rs11546710	55983073(+)	AGAGAC/TGGCTT	ese	
rs6128022	55983476(+)	TCCCAG/AGCGCA	ese	
rs8126441	55983505(+)	GGGGCC/AGCCGG	ese	
rs3829703	55983509(-)	TTGGCC/TGGCGG	ese	
rs11546713	55984212(-)	CCCCCA/GCCCTC	ese	
rs1065292	55983556(+)	TTTTTC/TTTGTA	ese	
rs1052752	55983512(+)	CCGGCC/AAAAGG	ese	
rs3207621	55983521(+)	GGCCCC/TTTTCC	ese	
rs141028132	55982671(+)	GTCCCG/ATCGCT	syn	Р
rs201839752	55982683(+)	TCCTCA/GCCCTA	syn	S
rs115516069	55982695(+)	ATTGAG/ATACAC	syn	E
rs200910302	55982719(+)	GCCTAC/TGCCCA	syn	Y
rs199953546	55982758(+)	CCATAC/TGCCGC	syn	Y
rs143107197	55982812(+)	GCCGCC/TGTGCC	syn	А
rs373297597	55982875(+)	GCGCCA/GCAGCT	syn	Р
rs373492567	55982887(+)	CAGCCA/TGACAG	syn	Р
rs202004284	55982704(+)	ACGCCG/AGCCAG	syn	Р
rs376442730	55982872(+)	CAGGCA/GCCGCA	syn	А
rs377524807	55982644(+)	CCCAGC/TGTGGT	syn	S
rs374582705	55982713(+)	AGCCCA/GGCCTA	syn	Р

A total of 429 single nucleotide polymorphisms (SNPs) were identified in the human RNPC1 gene. Of these, 34 SNPs were functionally relevant, including 14 SNPs causing missense (mis) mutations, 8 exonic splicing enhancer (ese) SNPs and 12 SNPs causing nonsense mutations. Chr, chromosome.

RNPC1b (6). RNPC1 is a direct target of p53 and can interact with other members of the p53 family; it can stabilize p21 and p73 transcripts and destabilize p63 transcripts. It can also bind and stabilize the mRNA of the CDK inhibitor, p21, thereby inducing cell cycle arrest in the G1 phase (7,8). RNPC1 also binds and stabilizes the mRNA of another RBP HuR, which in turn facilitates RNPC1-mediated growth arrest (7). In the present study, the complete RNPC1 gene was identified in the human, bushbaby, chimpanzee, macaque, gorilla, olive baboon, vervet-AGM, guinea pig, mouse, rat, cow, dog, ferret, hedgehog, armadillo, elephant, lesser hedgehog tenrec, anole lizard, chicken, Chinese softshell turtle, duck, Amazon molly, flycatcher, cave fish, Fugu, medaka, platyfish, spotted gar, stickleback, tilapia, *tetraodon* and zebrafish genomes, suggesting that RNPC1 exists in all types of vertebrates, including fish, amphibians, birds and mammals. In the different genomes, the gene had a similar organization, namely 4 exons/3 introns, and all the genetic loci were syntenically conserved. The phylogenetic tree revealed that the RNPC1 gene from the mammalian, bird, reptile and teleost lineage formed species-specific clusters. As observed from the alignment and phylogenetic tree, RNPC1 in mammals is conserved among vertebrate genomes,

Table III. Somatic mutations of RNPC1 in cancer tiss	ue
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Position (AA)	Mutation (CDS)	Mutation (amino acid)	Mutation ID (COSM)	Count	Mutation type
19	c.55G>C	p.A19P	COSM1412673	2	Substitution - missense
20	c.56_57insC	p.A20fs*70	COSM3724433	2	Insertion - frameshift
49	c.146C>G	p.S49W	COSM3963694	1	Substitution - missense
55	c.163G>C	p.E55Q	COSM397137	1	Substitution - missense
78	c.234C>T	p.G78G	COSM724075	1	Substitution - coding silent
83	c.249C>T	p.A83A	COSM1165242	1	Substitution - coding silent
89	c.265G>A	p.E89K	COSM724074	1	Substitution - missense
89	c.266A>G	p.E89G	COSM117504	1	Substitution - missense
97	c.290C>T	p.P97L	COSM224597	1	Substitution - missense
109	c.325G>A	p.A109T	COSM1412674	1	Substitution - missense
112	c.336C>T	p.G112G	COSM192074	1	Substitution - coding silent
116	c.346C>T	p.R116W	COSM1579588	1	Substitution - missense
116	c.347G>A	p.R116Q	COSM724073	1	Substitution - missense
120	c.359C>T	p.T120M	COSM1028363	1	Substitution - missense
131	c.392C>G	p.P131R	COSM3405224	1	Substitution - missense
132	c.395C>G	p.T132S	COSM3363328	1	Substitution - missense
139	c.415G>A	p.G139R	COSM125790	1	Substitution - missense
147	c.441A>C	p.P147P	COSM4134683	1	Substitution - coding silent
150	c.450C>T	p.I150I	COSM1565701	1	Substitution - coding silent
160	c.478G>A	p.A160T	COSM1412675	1	Substitution - missense
163	c.487C>T	p.P163S	COSM3548089	1	Substitution - missense
168	c.502C>T	p.P168S	COSM3548090	1	Substitution - missense
172	c.515A>G	p.Y172C	COSM4099709	1	Substitution - missense
174	c.521C>T	p.P174L	COSM1412676	1	Substitution - missense
176	c.527G>A	p.S176N	COSM270012	1	Substitution - missense
193	c.577G>A	p.A193T	COSM3770849	1	Substitution - missense
193	c.579C>T	p.A193A	COSM3548091	1	Substitution - coding silent
210	c.628G>A	p.A210T	COSM4099710	1	Substitution - missense
220	c.659C>T	p.P220L	COSM3911642	1	Substitution - missense
225	c.675C>T	p.F225F	COSM263280	1	Substitution - coding silent

suggesting that the function of RNPC1 plays an important physiological role in all vertebrates during the evolution process.

The investigation of available microarray data and virtual northern blot analysis confirmed the predominant expression of RNPC1 in the bone marrow, whole blood, the lymph node, thymus, brain, cerebellum, retina, spinal cord, heart, smooth muscle, skeletal muscle, small intestine, colon, adipocyte, kidneys, liver, lungs, pancreas, thyroid, salivary gland, skin, breast, ovaries, uterus, placenta, prostate and testes. Thus, RNPC1 is widely expressed in a number of tissues and organs. A total of 429 SNPs were identified in the human RNPC1 gene. Of these, 34 SNPs were functionally relevant, including 14 SNPs causing missense mutations, 8 exonic splicing enhancer SNPs and 12 SNPs causing nonsense mutations, which may affect the multiple functions of RNPC1. However, the effects of these SNPs on RNPC1 physiological and pathological functions require further investigation.

RNPC1 was originally recognized as an oncogene, and was frequently found to be amplified in prostate (14,15), ovarian (16) and colorectal cancer (17,18), chronic lymphocytic leukemia (19), colon carcinoma (20), esophageal cancer (21), dog lymphomas (13) and breast cancer (22-24). In our previous study, we found that RNPC1 played a tumor suppressor role role in breast cancer (40). In the present study, we first noted that RNPC1 was indeed expressed in bladder, blood, brain, breast, colorectal, eye, head and neck, lung, ovarian, skin and soft tissue cancer. Out of 94 tests, 14 revealed an association between RNPC1 gene expression and cancer prognosis (blood 2/9, brain 1/5, breast 3/30, colorectal 1/9, eye 1/1, head and neck 0/1, lung 5/24, ovarian 1/10, skin 0/1 and soft tissue cancer 0/1). It is important to note that the association between the expression of RNPC1 and prognosis varied in different types of cancer, and even in the same type of cancer from different databases. This suggests that the function of RNPC1 in these tumors may be multidimensional, and that RNPC1 is

Database	Case type	Subsyte	No. of patients	Endpoint	Cut- point	P-value	Prognosis	Refs.
GSE12417-GPL570	Blood cancer	AML	79	Overall survival	0.15	0.001223	1	(57)
GSE12417-GPL96	Blood cancer	AML	163	Overall survival	0.39	0.035113	1	(57)
GSE4271-GPL96	Brain cancer	Astrocytoma	77	Overall survival	0.82	0.003856	2	(58)
GSE7849	Breast cancer		76	Disease-free survival	0.3	0.030908	1	(59)
GSE11121	Breast cancer		200	Distant metastasis-free survival	0.82	0.008577	2	(60)
E-TABM-158	Breast cancer		117	Disease-specific survival	0.7	0.035878	1	(61)
GSE17537	Colorectal cancer		55	Overall survival	0.11	0.02856	1	(62)
GSE22138	Eye cancer	Uveal melanoma	63	Distant metastasis-free survival	0.33	0.018941	1	(63)
jacob-00182-CANDF	Lung cancer	Adenocarcinoma	82	Overall survival	0.82	0.020135	2	(64)
HARVARD-LC	Lung cancer	Adenocarcinoma	84	Overall survival	0.69	0.004177	2	(65)
GSE31210	Lung cancer	Adenocarcinoma	204	Relapse-free survival	0.51	0.001557	1	(66)
GSE31211	Lung cancer	Adenocarcinoma	204	Overall survival	0.34	0.000939	1	(66)
GSE4716-GPL3694	Lung cancer	NSCLC	50	Overall survival	0.82	0.044441	2	(67)
DUKE-OC	Ovarian cancer		133	Overall survival	0.85	0.010709	2	(68)

Table IV. Dataset content from PrognoScan demonstrating an association between the expression of the RNPC1 gene and cancer prognosis.

Of the 94 tests, in 14, we noted an association between the expression of the RNPC1 gene and cancer prognosis (blood cancer 2/9, brain cancer 1/5, breast cancer 3/30, colorectal cancer 1/9, eye cancer 1/1, head and neck cancer 0/1, lung cancer 5/24, ovarian cancer 1/10, skin cancer 0/1 and soft tissue cancer 0/1) with a 5% significance level. AML, acute myeloid leukemia; NSCLC, non-small cell lung cancer.

not just a tumor suppressor or promoter. Moreover, we identified 30 somatic mutations of RNPC1 in cancer tissues in the present study. Further investigation is required to elucidate the mechanisms through which these mutations affect tumor formation. The mechanisms underlying the role of RNPC1 in the process of these tumors may be involve the mRNA stabilizion of oncogenes or anti-oncogenes, such as p53 (13), p63 (11), MDM2 (12), p73 (9), HuR (7) and p21 (6). However, the mechanisms underlying the role of RNPC1 in the developmental process of these tumors require further investigation.

The Sox5, RUNX3, CUTL1, RelA, CCAAT-enhancerbinding protein (C/EBP)a, c-Ets-1, PPARy2 and ATF6 regulatory transcription factor binding sites were identified in the upstream (promoter) region of the RNPC1 gene. Sox5 plays a role in the regulation of embryonic development and in the determination of cell fate. It can function as a transcriptional regulator after forming a protein complex with other proteins. It has a negative effect on cell proliferation in some cell types and functions as a target of microRNAs (41,42). RUNX3 encodes a member of the runt domain-containing family of transcription factors. A heterodimer of this protein and a  $\beta$  subunit forms a complex that binds to the core DNA sequence 5'-PYGPYGGT-3' found in a number of enhancers and promoters, and can either activate or suppress transcription. It functions as a tumor suppressor and is frequently deleted or transcriptionally silenced in cancer (43-46). CUTL1 is a transcription factor which plays a role in development and multiple physiological processes. Emerging evidence indicates that CUTL1 is not only involved in developmental events, but also in pathological processes, such as tumorigenesis and multiple signal transduction pathways of cancer (47,48). RelA is a subunit of the nuclear factor (NF- $\kappa$ B) p65. NF- $\kappa$ B is an ubiquitous transcription factor which plays a role in several biological processes. NF-KB is composed of NFKB1 or NFKB2 bound to either REL, RELA or RELB. NF-κB is a pleiotropic transcription factor present in almost all cell types and is the endpoint of a series of signal transduction events that are initiated by a vast array of stimuli related to a number of biological processes, such as inflammation, immunity, differentiation, cell growth, tumorigenesis and apoptosis (49-52). C/EBPa is required for the proper control of adipogenesis, glucose metabolism, granulocytic differentiation, lung development and the development of various types of cancer (53,54). c-Ets-1 is known to play an important role in various biological processes, such as development, differentiation, proliferation, apoptosis, migration, tissue remodeling, invasion and angiogenesis in a variety of cell types, including B cells, endothelial cells, fibroblasts and neoplastic cells (55,56). These tumor-related transcriptional factors may be involved in the effects of RNPC1 in tumors (14-24).

In conclusion, integrative genomic analyses of RNPC1 and its role in cancer prediction provide a powerful tool for the evaluation of RNPC1 as a potential tumor markers and therapeutic targets in cancer research.

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