Supporting Information

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SI Methods

Bioinformatics. The viral genome database (https://www.ncbi. nlm.nih.gov/genome/viruses) was downloaded from the NCBI and was searched for the hormone peptide sequences reported in Table S1 with a threshold e-value ≤ 0.1 using tBLASTn (50). This vielded the data in Tables S2 and S3. An additional bioinformatics search was performed by BLASTp using the A-chain or B-chain of insulin, IGF1, and IGF2 as query sequences against viral proteomes (NCBI taxonomic ID: 10239). This uncovered GIV VILP presented in this paper, which had not been identified in the original search because the GIV genome was not included in the NCBI viral genome database. The whole protein sequence of each significant hit was compared with insulin, IGF1, and IGF2 using a multiple sequence alignment program (Clustal Omega) to determine the positions of the cysteines and the number of the identical and conserved residues. Sequence alignment was used to predict domain structures of the VILPs, and I-TASSER was used to predict 3D structures (18). SignalP was used to predict the possible signal peptides of the VILPs (www.cbs.dtu.dk/services/SignalP/).

Residues involved in IR and IGF1R binding were added using the CCP4 Molecular Graphics program (www.ccp4.ac.uk/MG/). Crystal structures of human insulin [Protein Data Bank (PDB) ID code 1MSO] and hIGF1R (PDB ID code 1GZR) and I-TASSER–predicted structures of the VILPs were used in this analysis. The two arginines at positions 36 and 37 in the IGF1 molecule are missing from the crystal structure and were inserted manually. An evolutionary tree was constructed using sequences of 30 different insulin, IGF1, and IGF2 sequences and the four VILPs obtained from UniProt (Table S4). After the multiple sequence alignment of these sequences, the alignment file was utilized for the production of a neighbor-joining phylogenetic tree without distance corrections using Clustal Omega (https://www.ebi.ac.uk/Tools/msa/clustalo/).

The sequences identified in the previously published enteric virome/microbiome analysis were used to make a blast database. SGIV, GIV, LCDV-Sa, and LCDV-1 genomes were used as queries for search against the library using the BLASTn program to determine if these viruses are present in these samples. The significant hits obtained from the virome/microbiome study for VILP-carrying viruses were explored a second time to determine their specificity to these viruses and to show they are not found in any other species. The significant DNA reads were retrieved from the previous BLAST databases result and were used as queries to run BLASTn on the NCBI nonredundant database. The sequences reported in this study are the ones that are 100% specific to these viruses. The code for these database searches is available at https://github.com/jdreyf/viral-insulin-peptides.

Peptide Synthesis and Folding. The single-chain viral insulins were assembled on 0.1 mmol Rink amide ChemMatrix (PCAS BioMatrix Inc.) resin using an ABI 433A peptide synthesizer and Fmoc/6-Cl-HOBt/*N*,*N*'-diisopropylcarbodiimide coupling protocols. Fmoc-Asp-OtBu was employed to introduce the C-terminal Asn. Cleavage was conducted by treatment with 10 mL of trifluoroacetic acid (TFA) solution containing 2.5% triisopropylsilane, 2.5% 2-mercaptoethanol, 2.5% anisole, and 2.5% H₂O at room temperature with gentle agitation for 2 h. The resin was filtered, and the peptide was precipitated by the addition of cold ether (50 mL). The precipitate was collected by centrifugation and then was washed with cold ether (3 × 50 mL). The crude peptide was dissolved in 20 mM alkaline glycine buffer (500 mL) followed with the addition of solid cysteine-HCl (0.75 mmol). The pH of

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the solution was adjusted to 10.5 with 1 M NaOH. Sonication was used to accelerate the dissolution of the crude peptide. The resulting solution was stirred vigorously at 4 °C for 2 d. The pH was lowered to 7.0 by the addition of 1 M HCl, and the solution was subjected to purification by preparative reverse-phase HPLC column [Luna 10- μ m C8 100 Å, LC column (Phenomenex Inc.), 250 × 21.2 mm, 10–50% aqueous acetonitrile (0.1% TFA) over 90 min, at a flow rate of 15 mL/min]. The results were assessed by analytical LC-MS. The pooled fractions were lyophilized to provide the single-chain viral insulin as a white fluffy solid.

Receptor Competition Assays. Murine brown preadipocyte cell lines with double knockout of the endogenous IR and IGF1R were stably transfected with either hIR-B or hIGF1R, as previously described (25), and were grown to confluence in 48-well plates and were serum-starved overnight. After washing with PBS, cells were incubated in a Hepes binding buffer containing ¹²⁵I-IGF1 (2.5 nM) for hIGF1R-binding experiments or ¹²⁵I-insulin (1 nM) for IR-binding experiments and increasing concentrations of the unlabeled ligands for 2 h at room temperature. Binding competition was performed in triplicate for each dose. After washing, cells were solubilized with 0.1 M NaOH containing 0.1% SDS, and radioactivity was measured using a gamma-counter. The data were plotted as the percentage of the maximal binding of the ligand alone and were expressed as mean \pm SEM.

IR and IGF1R Phosphorylation. HEK293 cells (ATCC CRL-1573) overexpressing hIR-A, hIR-B, or hIGF1R were plated in 96well plates and were cultured in DMEM supplemented with 100 IU/mL penicillin, 100 µg/mL streptomycin, 10 mM Hepes, and 0.25% bovine growth serum (HyClone SH30541) for 16-20 h at 37 °C, 5% CO₂, and 90% humidity. Serial dilutions of recombinant human insulin, IGF1, and test peptides were prepared in DMEM supplemented with 0.5% BSA and were added to the wells. After 15 min incubation at 37 °C in humidified atmosphere with 5% CO2, the cells were fixed with 5% paraformaldehyde for 20 min at room temperature, washed twice with PBS (pH 7.4), and blocked with 2% BSA in PBS for 1 h. The plate was washed three times, filled with HRP-conjugated antibody against phosphotyrosine (#16-105; Upstate Biotechnology), and incubated for 3 h at room temperature, after which the plate was washed four times, and 0.1 mL of TMB One-Solution substrate (#00-2023; Invitrogen) was added to each well. Color development was stopped 5 min later by adding 0.05 mL 1 M HCl. Absorbance at 450 nm was measured on a Titertek Multiskan MCC340 microplate reader (Thermo Fisher). Absorbance vs. peptide concentration dose-response curves were plotted, and EC₅₀ values were determined using logistic nonlinear three-parameter regression in GraphPad Prism 6 (GraphPad Software).

Insulin Signaling and Immunoblotting. All cells were maintained in DMEM supplemented with 10% FBS, 100 U/mL penicillin, and 100 µg/mL streptomycin (Gibco) and were cultured at 37 °C in a humidified atmosphere of 5% CO₂. Cells expressing hIR-B, mIR-A, hIGF1R, and mIGF1R were serum-starved for 4 h with DMEM containing 0.1% BSA and were stimulated with insulin, IGF1, or VILPs at the indicated concentrations for 15 or 60 min as indicated in Fig. 2 *F* and *H* and Fig. S4. To stop the experiments, cells were washed with ice-cold PBS and were lysed with RIPA lysis buffer (Millipore) complemented with 50 mM

potassium fluoride, 50 mM β-glycerolphosphate, 2 mM EGTA (pH 8), 1 mM Na₃VO₄, and 1× protease inhibitor mixture (Calbiochem). Protein concentrations were determined using the Pierce 660 nm Protein Assay Reagent (Bio-Rad). Lysates (10-20 µg) were resolved on SDS/PAGE gels and were transferred to PVDF membrane for immunoblotting. Membranes were blocked in Starting Block T20 (Thermo Fisher) at room temperature for 1 h, were incubated with the indicated primary antibody in Starting Block T20 solution overnight at 4 °C (Figs. 2 and 3 and Fig. S4), and then were washed three times with 1× PBS and Tween-20 and incubated with HRP-conjugated secondary antibody (1:20,000; anti-mouse IgG, NA931; anti-rabbit IgG, NA934; GE Healthcare) in Starting Block T20 for 1 h. Signals were detected using Immobilon Western Chemiluminescent HRP Substrate (Millipore). Antibodies against phospho-IR/IGF1R (1:500; #3024), IRβ (1:500; sc-711), phospho-ERK1/2 (T202/Y204) (1:1,000; #9101), ERK1/2 (1:1,000; #9102), phospho-Akt (S473) (1:1,000; #9271), and Akt (1:1,000; #4685) were purchased from Cell Signaling Technologies. IR_β antibody (1:500; sc-711) was purchased from Santa Cruz. Human insulin was purchased from Sigma, and hIGF1 was purchased from PeproTech. Densitometric analyses of membranes were performed using ImageJ.

Plasmid Transfections. The cDNA sequence of the LCDV-1 VILP gene (240 bp, whole sequence) was synthesized by Integrated DNA Technologies, Inc. and was subcloned into $3\times$ Flag-CMV-10 mammalian expression vector (Sigma). For transfection, AML-12 (mouse hepatocyte cell line; ATCC) cells were plated at 5×10^4 cells per well and were transfected using 1 µL of Lipofectamine 3000 and 0.5 µg DNA for 0.3 mL medium in each well per the manufacturer's instructions. For signaling experiments of LCDV-1 VILP-transfected cells, the culture medium was replaced 12 h after the transfections with starvation medium (DMEM containing 0.1% BSA), and cells were incubated for an additional 24 h.

DNA Synthesis and Proliferation. GM00409 human fibroblasts (Coriell Institute) were plated in 24-well plates at 5×10^4 cells per well in 500 µL DMEM supplemented with 10% FBS, 100 U/mL penicillin, and 100 µg/mL streptomycin (Gibco) and were cultured at 37 °C in a humidified atmosphere of 5% CO₂. After 24-h incubation, the cells were serum-starved for 24 h with DMEM containing 0.1% BSA, after which 1 µCi [³H]-thymidine (Perkin-Elmer) was added to each well along with the indicated concentrations of ligands, all in triplicate. Experiments were stopped after 24 h, and the wells were washed with PBS. Cells were fixed

by the addition of 10% trichloroacetic acid (TCA) for 10 min and were incubated at -20 °C. The plates were washed one more time with 10% TCA and were lysed in 0.1 M NaOH, followed by liquid scintillation counting.

For transfected AML-12 cells, a related protocol was used. Twelve hours after transfection, cells were serum-starved for 3 h with DMEM containing 0.1% BSA, and 1 μ Ci [³H]-thymidine was added. The experiment was stopped after 6 h of incubation with thymidine.

Cell Culture and Glucose Uptake. 3T3-L1 cells were differentiated as described previously (51). For 2-deoxyglucose uptake, cells were washed with PBS and incubated in starvation medium (low-glucose DMEM + 0.5% FBS) at 37 °C. After 3-h incubation, cells were washed again with PBS, and 0.45 mL of Krebs–Ringer Hepes buffer (KRBH) was added with the indicated concentrations of insulin, IGF1, or different viral insulins for 30 min at 37 °C. One microcurie of [¹⁴C] 2-deoxyglucose (Sigma) in 50 µL KRBH was added to each well for the final 5 min of stimulation. Glucose uptake was stopped by adding 50 µL of 200 mM 2-deoxyglucose. Cells were washed with PBS and were lysed with lysis buffer (0.1% SDS in PBS) followed by liquid scintillation counting. For Fig. 4*A*, results of two experiments were combined.

Insulin Tolerance Test. All animal studies complied with the regulations and ethics guidelines of the NIH and were approved by the Institutional Animal Care and Use Committees of the Joslin Diabetes Center (no. 97-05) and Harvard Medical School (no. 05131). I.p. insulin tolerance testing was performed after a 4-h fast using 9-wk-old male C57BL/6J mice (Jackson Laboratory). Mice were injected i.p with LCDV-1 VILP (1 µmol/kg; n = 4), SGIV VILP (1 µmol/kg; n = 4), insulin [Humulin, 6 nmol/kg (1.0 U/kg); n = 6], or 200 µL of saline (n = 6). Tail-vein blood glucose was measured at the indicated time points (Fig. 4*B*) using an Infinity glucometer (US Diagnostics Inc.). Statistical analysis was by two-way ANOVA followed by Tukey correction; *P < 0.05; **P < 0.01, ****P < 0.0001.

Data and Code Availability. The VILP structures were predicted using I-TASSER (https://zhanglab.ccmb.med.umich.edu/I-TASSER/). All the data used in this study, including PDB files and all the original codes that support the bioinformatics analysis in this study have been deposited with GitHub, https://github.com/jdreyf/viral-insulin-peptides.



Fig. S1. VILPs are structurally a part of insulin superfamily. (A) Whole-sequence alignment of insulin, IGF1, IGF2, and four VILPs. The domains are shown at the top of the sequences. Identical residues are denoted by asterisks, and low and high degrees of similarity are represented by periods and colons, respectively. The underlined sequences are D-domains of IGF1 and IGF2. (*B* and *C*) Conservation IR- (*B*) and IGF1R- (*C*) binding residues of VILPs. The I-TASSER–predicted structures of SGIV, GIV, and LCDV-Sa are shown. The A-chain is cyan; the B-chain is light green; the C-peptide is yellow; and the D-domain is pale brown. The conserved or conservatively substituted side chains of residues of VILPs that are involved in binding to site 1 of the IR/IGF1R are shown in red, and binding-site 2 residues are shown in blue. Conservative substitutions are also indicated by an equal sign. Substitutions that increase affinity are indicated by a plus sign. Molecules were drawn with CCP4-Molecular Graphics.



Fig. S2. Phylogenetic tree for VILPs. A phylogenetic tree produced by Clustal Omega for a sample of 30 vertebrate sequences, including fish, insect, mammal, and bird insulins, IGF1s, IGF2s, and VILPs. The numbers are the terminal branch distances, the distance since the last theoretical splitting event.

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Fig. S3. LC-MS profile of purified single-chain VILPs. Each panel shows the LC-MS profile of a purified VILP. (*A*) SGIV. The single-chain peptide eluted at 4.141 min as a single peak. A mass of 6,488.3 was found for the peptide, consistent with the calculated molecular weight of 6,490.2. (*B*) GIV. The single-chain peptide eluted at 4.293 min as a single peak. A mass of 6,518.2 was found for the material, consistent with the calculated molecular weight of 6,516.2. (*C*) LCDV-1. The single-chain peptide eluted at 3.928 min as a single peak. A mass of 6,710.7 was found for the material, consistent with the calculated molecular weight of 6,708.8.

A Human IGF-1 Receptor



Fig. S4. SGIV and GIV stimulate a late postreceptor signaling response. (*A*) Immunoblotting of protein phosphorylation in lysates from hIGF1R-overexpressing cells stimulated with insulin, IGF1, or VILPs for 60 min. (*B*) Immunoblotting of protein phosphorylation in lysates from hIR-overexpressing cells stimulated with insulin, IGF1, or VILPs for 60 min. (*B*) Immunoblotting of protein phosphorylation in lysates from hIR-overexpressing cells stimulated with insulin, IGF1, or VILPs for 60 min. (*B*) Immunoblotting of protein phosphorylation in lysates from hIR-overexpressing cells stimulated with insulin, IGF1, or VILPs for 60 min. (*B*) Immunoblotting of the different concentrations of GIV, the image showing stimulation in cells overexpressing hIR has been cut and rearranged to indicate a dose–response similar to other analogs. The areas of cutting are indicated by the vertical white lines in the figure.

Table S1.	SignalP-predicted	signal	peptide	positions of	bf
the VILPs					

VILP source	Signal peptide	Cleavage site position	Residues
SGIV VILP	Yes	Between positions 20 and 21	THQ-LQ
GIV VILP	Yes	Between positions 20 and 21	TYQ-LQ
LCDV-1 VILP	Yes	Between positions 19 and 20	ITA-EI
LCDV-Sa VILP	Yes	Between positions 20 and 21	ILC-QT

Table S2. hIR-binding site 1 and corresponding residues on hIGF1 and VILPs

hIR-binding site 1	Human insulin	Ala mutation, K%	hIGF1	GIV	SGIV	LCDV-1	LCDV-Sa
B8	GLY	0.8	GLY 7	GLY 8	GLY 8	SER 8	GLY 8
В9	SER	72	ALA 8	GLY 9	GLY 9	ALA 9	SER 9
B11	LEU	3	LEU 10	LEU 11	LEU 11	LEU 11	LEU 11
B12	VAL	1	VAL 11	ILE 12	ILE 12	VAL 12	VAL 12
B16	TYR	34	GLN 15	THR 16	THR 16	<u>GLN</u> 16	<u>GLU</u> 16
B24	PHE	5	PHE 23	VAL 24	VAL 24	VAL 24	GLY 24
B25	PHE	10	TYR 24	TYR 25	TYR 25	TYR 25	THR 25
B26	TYR	100	PHE 25	<u>THR</u> 26	<u>THR</u> 26	ARG 26	TYR 26
A1	GLY	12	GLY 42	GLY 38	GLY 38	GLY 41	LYS 41
A2	ILE	0.6	ILE 43	LEU 39	LEU 39	ILE 42	ILE 42
A3	VAL	1.8	VAL 44	ALA 40	ALA 40	ALA 43	VAL 43
A4	GLU	142	ASP 45	ASP 41	ASP 41	THR 44	ASP 44
A19	TYR	<0.1	TYR 60	TYR 56	TYR 56	TYR 60	TYR 60
A21	ASN	63	<u>ALA</u> 62	ASN 58	ASN 58	ASN 62	ASN 62

Column 3 shows the effect of alanine ligand mutations on the hIR-binding affinity (from ref. 14 and references therein). Residue numbering is according to the corresponding PDB ID codes. Underlined residues are neither conserved nor conservatively substituted.

DN A C

S A

Table S3.	hIR-binding site	2 and	corresponding	residues	on hIGF1	and VILPs
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hIR-binding site 2	Human insulin	Ala mutation, K%	hIGF-1	GIV	SGIV	LCDV-1	LCDV-Sa
B10	HIS	37	GLU 9	GLU 10	GLU 10	HIS 10	GLU 10
B13	GLU	10	ASP 12	ASP 13	ASP 13	ALA 13	ASP 13
B17	LEU	23	PHE 16	GLU 17	GLU 17	ARG 17	LEU 17
A8	THR	40	PHE 49	LYS 45	LYS 45	THR 48	THR 48
A10	ILE	20	SER 51	GLU 47	GLU 47	GLY 51	GLY 51
A12	SER	36	ASP 53	ASP 49	ASP 49	THR 53	ASN 53
A13	LEU	15	LEU 54	GLU 50	GLU 50	THR 54	TYR 54
A17	GLU	35	GLU 58	ASP 54	ASP 54	GLU 58	LYS 58

Column 3 shows the effect of alanine ligand mutations on the hIR-binding affinity (from ref. 14 and references therein). Residue numbering is according to the corresponding PDB ID codes. Underlined residues are neither conserved nor conservatively substituted.

Table S4.	hIGF1R-binding site	1 residues and	d corresponding	residues on	human	insulin
and VILPs						

hIGF1R-binding site 1	Ala mutation, K%	Insulin	GIV	SGIV	LCDV-1	LCDV-Sa
GLY 7		GLY B8	GLY 8	GLY 8	SER 8	GLY 8
ALA 8		SER B9	GLY 9	GLY 9	ALA 9	SER 9
VAL 11	40	VAL B12	ILE 12	ILE 12	VAL 12	VAL 12
ASP 20		GLU B21	ASP 21	ASP 21	ASN 21	GLU 21
GLY 22		GLY B23	GLY 23	GLY 23	GLY 23	GLY 23
PHE 23		PHE B24	VAL 24	VAL 24	VAL 24	GLY 24
TYR 24		PHE B25	TYR 25	TYR 25	TYR 25	THR 25
PHE 25		TYR B26	THR 26	THR 26	ARG 26	TYR 26
TYR 31	17	-	GLY 31	GLY 31	ARG 31	ALA 31
ARG 36	7 (36 + 37)	-	ARG 32	ARG 32	ARG 32	LYS 34
ARG 37		-	ARG 33	ARG 33	ARG 33	LYS 35
GLY 42		GLY A1	GLY 38	GLY 38	GLY 41	LYS 41
ILE 43		ILE A2	LEU 39	LEU 39	ILE 42	ILE 42
VAL 44		VAL A3	ALA 40	ALA 40	ALA 43	VAL 43
ASP 45		GLU A4	ASP 41	ASP 41	THR 44	ASP 44
MET 59		<u>ASN</u> A18	ARG 55	ARG 55	LYS 59	<u>ASN</u> 59
TYR 60		TYR A19	TYR 56	TYR 56	TYR 60	TYR 60

Column 2 shows the effect of alanine ligand mutations on the IGF-1R affinity (from refs. 15 and 16 and references therein). Residue numbering is according to the corresponding PDB ID codes. Underlined residues are neither conserved nor conservatively substituted. The affinity of alanine mutation at residues 36 and 37 is a combined mutation at both sites.

Table S5.	hIGF1R-binding site 2 residu	les and correspo	nding residues o	n human insulin
and VILPs				

hIGF1R-binding site 2	Ala mutation, K%	Insulin	GIV	SGIV	LCDV-1	LCDV-Sa
GLU 9	34	HIS B10	GLU 10	GLU 10	HIS 10	GLU 10
ASP 12	29	GLU B13	ASP 13	ASP 13	ALA 13	ASP 13
PHE 16	50	LEU B17	GLU 17	GLU 17	ARG 17	LEU 17
LEU 54	24	LEU A13	GLU 52	GLU 52	THR 53	TYR 53
GLU 58	15	GLU A17	ASP 54	ASP 54	GLU 58	LYS 58

Column 2 shows the effect of alanine ligand mutations on the IGF-1R affinity (from refs. 15 and 16 and references therein). Residue numbering is according to the corresponding PDB ID codes. Underlined residues are neither conserved nor conservatively substituted. The affinity of alanine mutation at residues 36 and 37 is a combined mutation at both sites.

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Table S6. Insulin, IGF1, IGF2, and VILP sequences used to produce the Clustal Omega phylogenetic tree

Human insulin MALIMERI, LELIALIAN CORDALASI, VINCE CSELVERALVI UCCERCETYPERISEAD Human IGF1 MALIMERI, LELIALIALIAN CORDALASIS, MARCH SUNGCITS IST VIDICUENCY Human IGF1 MERIES LEPCIENCECCE/LEVINUETINGSSBARA OPTER VIDICUENCY CLEWEN Human IGF2 MERIES SUPCIENCECCE/LEVINUETINGSSBARA OPTER VIDICUENCY CLEWEN Human IGF2 MERIES SUPCIENCES CLAINERS SUPCIENCES CLAINERS SUPCIENCES CLAINERS SUPCIENCES AND SUP	VILP source	Sequence
Human IGF1 EUYOGYELGGEGEGAGSLIGHELGELGKEGTVEQCTERICTUREUTENATAGENET LCGARLIND Human IGF2 ALGEVOGENGETPIKKTENDESSARAAPTGETVERCOLERELEKTCALERKEKKENDER Human IGF2 BIGBRENDERGKEKK Grinus carpio insulin ENYMELGGERGENDELLERGERGKENKENTENDERGORDERGELERGULERELEKTCALERKENDER Gyrinus carpio Insulin ENYMELGGERUNALLERGERGKENKENTENDERGODERGENDELIGEVODERGEPTERSKENDER Gyrinus carpio IGF1 KETMERCLECHTLAJUNALLALERASTICAGALUMYCOMBERTYRENDERGKUPTERSKENDER Gyrinus carpio IGF2 MEDIOLARIHISLUMUSVINUMENTERCONSTITUSENDERGINEGELIAR SENDERGENDERGENDERGERGERGERGERGERGERGERGERGERGERGERGERGE	Human insulin	MALWMRLLPLLALLALWGPDPAAAFVNQHLCGSHLVEALYLVCGERGFFYTPKTRREAED
Human IGF1 MCK ISSJPPLG-ROCCEDFLAVRMETHISSISLETLALGLIFTES GATAGEED CAGALYD AC GYVCGBORFYTMETRYDOGSBARAE AND WACGERGARD ACCARLYD AC ALL WARAELDWERTON YD YN GESBARAE AND WACGERGARD YD YN LODDWERD AC ALL WARAELDWERTON YD YN DEWLAND YN DAWLWERTON YD YN DAWLWERD YD YN ARAELDWERTON YD YN DAWLWERD		LQVGQVELGGGPGAGSLQPLALEGSLQKRGIVEQCCTSICSLYQLENYCN
Human IGF2 Human IGF2 Human IGF2 High resonance (International Construction) and the second	Human IGF1	MGKISSLPTQLFKCCFCDFLKVKMHTMSSSHLFYLALCLLTFTSSATAGPETLCGAELVD
ELGERNARCICREKKK Human IGF2 MCI TRAKKIMULIFLARASCOLALIETYCATEASSEKUSYEPTULGUELVOGDRGYYESRASHYS RASKGI VEGOC PRECOLALIETYCATEASSEKUSYEPTULGUELVOGDRGYYESRASHYS RASKGI VEGOC PRECOLALIETYCATEASSEKUSYEPTULGUELVOGDRGYYESRASHYS GYDINUS carpio insulin MVWIQACALIFLIAVSSYMANAGRAPHILOSSEKUSYEPTULGUEVYGEYDEY GYDINUS carpio IGF1 CCHKCLCHTHIEUVULUVLITTETTELESPETUCGELVUTQVVCGBRGYFERVTGY GYDINUS carpio IGF2 MEDQLIKHISUCHTCLGNUTGUEVEGNEGYTERVINAGUEVEGOSEKUSALIVUCQUEVEGNEYESKUSYE MEDQLIKHISUCHTCLGNUTGUEVEGOSEKUSALILGVCAPVARKENJEG GYDINUS carpio IGF2 MEDQLIKHISUCHTCLGNUTGUEVEGOSEKUSALILGVCAPVARKENJEG GYDINUS carpio IGF2 MEDQLIKHISUCHTCLGNUTGUEVEGOSEKUSALILGVCAPVARKENJEG GYDINUS carpio IGF2 MEDQLIKHISUCHTCLGNUTGUEVEGOSEKUSTURGEVEGOSEKUSALILGVCAPVARKENJEG GYDINUS carpio IGF2 MEDQLIKHISUCHTCLGNUTGUEVEGOSEKUSTURGEVEGOSEKUSALILGVCAPVARKENJEG GYDINUS carpio IGF2 MEDQLIKHISUCHTCLGNUTGUEVEGOSEKUSTURGEVEGOSEKUSALILGVCAPVARKENDAGERIE AQEQLIKHISUCHTCLGNUTGUEVEGOSEKUSTURGEVEGOSEKUSUUTGUVEGOSEKUSTUPUCOP Paralichthys olivaceus IGF1 MAJAHIHSVSTAKUSYKOTKENTACQUEVEKKIKKYEVEKKIKKSELGUEVEKKIKKEVELGUEVEKKIKKKEVEKKIKKKESUGAKASUSTAQUE TYDINFARKEVEKKIKKKEVEKKIKKKEVEKKIKKKEVEKKIKKKESUGAKASUSTAQUE TYDINFARKEVEKKIKKKEVEKKIKKKEVEKKIKKKESUGAKIKKKKKESUGAKASUSTAQUE TYDINFARKEVEKKIKKKEVEKKIKKKEVEKKIKKKESUGAKIKKKKESUGAKASUSTAQUE TYDINFARKEVEKKIKKKEVEKKIKKKEVEKKIKKKESUGAKIKKKKKESUGAKIKKKKESUGAKIKKKKKESUGAKIKKKKKESUGAKIKKKKKESUGAKIKKKKESUGAKIKKKKKKESUGAKIKKKKKESUGAKIKKKKKESUGAKIKKKKKESUGAKIKKKKKESUGAKIKKKKKESUGAKIKKKKESUGAKIKKKKESUGAKIKKKKESUGAKIKKKKESUGAKIKKKKESUGAKIKKKKESUGAKIKKKKESUGAKIKKKKESUGAKIKKKKKESUGAKIKKKKESUGAKIKKKKESUGAKIKKKKESUGAKIKKKKESUGAKIKKKKESUGAKIKKKKESUGAKIKKKKESUGAKIKKKKESUGAKIKKKKESUGAKIKKKKESUGAKIKKKKESUGAKIKKKKESUGAKIKKKKESUGAKIKKKESUGAKIKKKKESUGAKIKKKESUGAKIKKKESUGAKIKKKESUGAKIKKKESUGAKIKKKESUGAKIKKKESUGAKIKKKESUGAKIKKKESUGAKIKKKESUGAKIKKKESUGAKIKKKESUGAKIKKKKESUGAKIKKKESUGAKIKKKKKESUGAKIKKKESUGAKIKKKESUGAKIKKKESUGAKIKKKESU		VRAQRHTDMPKTQKYQPPSTNKNTKSQRRKGWPKTHPGGEQKEGTEASLQIRGKKKEQRR
Human IGF2 MGT PHOREMULTLIFLARASCCI AVERPERT COGELIVITIO, DVCGROGPY FERRARDS RISKSTURECCRSCULAILETY COFFASER DESIGN OF THE DVVCGROGPY FERRARDS Cyprinus carpio Insulin MGVT (CARLIE) CARACTERIZATION CORRECT INFORMATION CORRECT		EIGSRNAECRGKKGK
PRBRG VEBCCPRACEDIALLET/CONTRASSERVERPEUT/PENERPERPERANDER Cyprinus carpio insulin MAXWIQAALLFLIAVSSVIAMAGAPGNICGSHUPALELYCCPTOFENRENDPEL Cyprinus carpio IGF1 KCTMRCL3CHTHLSIL/LVSVIAMAGAPGNICGSHUPALELYCCPTOFENRENDPEL Cyprinus carpio IGF2 MEDDLHHSLCHTCLFTDAVTERAGPETLOGAELWOTQCOMPCGENERPERPERPER Cyprinus carpio IGF2 MEDDLHHSLCHTCLFTDAVTERAGPETLOGAELWOTQCOMPCGENERPERPERPERPERPERPERPERPERPERPERPERPERPE	Human IGF2	MGIPMGKSMLVLLTFLAFASCCIAAYRPSETLCGGELVDTLQFVCGDRGFYFSRPASRVS
Gypfinus carpio insulin NUMI QACALLE FLAVSSYNAMAGA PELCOS ELUDALITY OF COPYOFENDERUD PELC Gypfinus carpio IGF1 FLPPRAACETEVADEAFEKOHASVIRKOS IVEQCOS ELUDALITY OF COPYOFEKIPTON COPYOFINUS CARPIO IGF1 Cyprinus carpio IGF2 MEDOLIKHISLICHTCLEDDSVIRKUTEMPECTABLESETUGABLINGLALIDSVERTAKKELLEG COHSSYNEVIQNON Cyprinus carpio IGF2 MEDOLIKHISLICHTCLEDDSVIRKUTEMPECTABLESETUGABLINGLALIDSVCAKEAKSERUVGA ALQCVCORDOPCYPEREPTSLISSESONGHONEVECCEPSCICALILIDSVCAKEAKSERUVGA TSLQVI FVMPTLKQEVPRKHYVKYSKYDMRQRKAAQRLRRGVPATLEAKKFRQAERIE AQCQLHHRRLITLEPSLEPSLISSESONGHONEVECCEPSCICALILIDSVCAKEAKSERUVGA TSLQVI FVMPTLKQEVPRKHYVKYSKYDMRQRKAAQRLRRGVPATLEAKKFRQAERIE AQCQLHHRRLITLEPSLEPSLISSESONGHONEPSLICCALILIDSVCAKEAKSERUVGA TSLQVI FVMPTLKQEVPRKHYVKYSKYDMRQRKAAQRLRRGVPATLEAKKFRQAERIE AQCQLHHRRLITLEPSLEPSLISSESONGHEVELECENSCILLIDUT. TEPTAGAPETLCGAELIDVICE VCCERCFYFSKFTSKOSKARCHVDCCTPSCIELRALEPYCAPARTEKAARSVRACHE TSLQVI FVMPTLKQEVPRKHYVKYSKYDMRQRKAAQRLRRGVPATLEAKKFRRQAERIC VCCERCFYFSKFTSKOSKARCHVDCCTPSCIELRALEPYCAPARTEKAARSVRACHE TSLQQUI FVMPTLKQEVPRKHYVKYSKYDMRQRKAAQRLRRGVPATLEAKKFRRQAE KIKAQCAITHALISSENDUCTERSTAQOPDKYKNKRSSSRALLFALALT. VVVMSASAFTLCGGEL VDALQVVCEDBCFYFSKFTSKOSKARCHVDQCCTS ICCELAVCAERAFTKAARSERVED PCVCQLEGGSFFDICALISVAQCHYVTXKSKTEWQRGRAAQLERGVPATLAKKSRRVA SATSLQVI FVMPALKQEVPFKRHTSKOSKAAULFALLFALALT. VVVEMSASFTLCGGELV VDALQVVCEDBCFYFSKFTSKOSKARCHVDQCCTS ICCELAVCHENCYN Mus musculus Insulin 1 MALMERTELLALLALENEXFERDARREQUICE VECCERSCILLFALLVACERGFYTYERSKREVED PCVQUELGGSFFDICALISVAQCHTVQCCTS ICCLAUCERCCILLFYTSSKREVED PCVQUELGGSFFDICALLSVAQCHYVDQCCTS ICCLAUCERCCILLFYTSSKREVED PCVQUELGGSFFDICALLSVAQCHTVRVINTYN Mus musculus IGF1 MALMERTELFLALLALESEXFFT MALMERTELLALLALESEXFTVENKERVELUCECERCICALAUCERCICCHTCS IVQCCGROCYTEMPHKINGSSRILLENGTLCLUPTYSSKREVED PCVQCGROCYTEMPHKINGSSRILLENGUELCLCLINTISSAAAGPETLCGAELVD ALQCVCCGROCYTEMPHKINGSSSRILLENGUEL		RRSRGIVEECCFRSCDLALLETYCATPAKSERDVSTPPTVLPDNFPRYPVGKFFQYDTWK
FLEPPESAGCETEVADEPERPENAEVITERIGTEVEDCCHERCSTELQMCN Gyprinus carpio IGF1 KCTMRCL3CHTLTLSULCULALTPATLEAGPETLCGAELUNCON Gyprinus carpio IGF2 MEDIA Cyprinus carpio IGF2 MEDIA Cyprinus carpio IGF2 MEDIA Cyprinus carpio IGF2 MEDIA Paralichthys olivaceus insulin MALMENSULUUUUSEPERSUVTINUSURADEPERTCONLILLEYCAMPARSERUNGA Paralichthys olivaceus IGF1 MSALSEQUERMENTITLPERLEPTAGAE Paralichthys olivaceus IGF1 MSALSEQUERMENTITLPERLEPTAGAEPERTCONCEPTICAGEUVTILQ Paralichthys olivaceus IGF1 MSALSEQUERMENTITLPERLEPTAGAEPERTCONCEPTICAGEUVTILQ Paralichthys olivaceus IGF2 METOCKNIGQUESI CHTCRRAESSRILVEKKMSSSRILLEYLCAALEVTURIQ Paralichthys olivaceus IGF2 METOCKNIGQUESI CHTCRRAESSRILVEKKMSSSRILLEYLCAALEVTURIQ Mus musculus Insulin MALLVHEPLELLALLAUEEPTOSPYKCHLOUTERSTRAGUENCERCECULLEYCCAREFYTERSERVED Mus musculus Insulin MALLVHEPLELLALLAUEEPTOSPYKCHLOUTERSSTRALLEATLAUCCERCETTERSERVED Mus musculus IGF1 MALLVHEPLELLALLAUEEPTOSPYKCHLOUTERCERSECULULETSTATAGEPTETTCGAELVTO Mus musculus IGF1 MALLVHEPLELLALLEWSENTCAARESSTRALLEATLAUCCERCETTERSERVED Mus musculus IGF1 MALLVHEPLELLALLAUEEPTOSPYKCHLOUTERCERSECULUTETSTAAARAGEPTICCARELVTO Mus musculus IGF2	Cyprinus carpio insulin	MAVWIOAGALLFLLAVSSVNANAGAPOHLCGSHLVDALYLVCGPTGFFYNPKRDVDPPLG
Cyprinus carpio IGF1 KCTMRCLGCHTLEJULCVLALTPATLEAGPETLCGALUPTLCQUERGYFERFTOY Cyprinus carpio IGF2 MEDQLKHBISLCHTCLAPTEXILSGREQUERGENTRYCRAVPGRTPSVPAQRHTDSPTAKKPLPG Cyprinus carpio IGF2 MEDQLKHBISLCHTCLAPTEXILSGREQUERGENTRYCRAVPGRTPSVPAQRHTDSPTAKKPLPG Paralichthys olivaceus insulin MALMULESVSLIVLIVSLEASGQMAPCPGHLCGARLUPALITUAKKFRQAERIR Paralichthys olivaceus IGF1 MSALEFORHLCOVERSAMCCISCSHTSELLCVLTLPFTATGACPETLCGAELVDTLQF VCCERGYTPSKPTSGUERGENERGENERGENERGONGENERGENERGENERGENER		FLPPKSAQETEVADFAFKDHAEVIRKRGIVEQCCHKPCSIFELQNYCN
GPSSRRSHINGTUPECCEPSCELRELEWICAPVRPEKTPRSPREAGEHTSERFTAKEELEG GSHSSYREVHQKNS Cyprinus carpio IGF2 MEDDLKHISLCHTCLENTSGYTIKVTKWYSTRPHTCTLFLTSAREVASARTTCOGELDO ALQPVCGROEPPERPERSISSRRSKREVTECCTNSCHLALLEQYCKFRASEREDVSA TSLQVTPVMPTLKQEVPRKNTVKYSKYDMORKAAQRLRRQVPATLARAKKPRQAERIT AQEQLHHIRPLITTJPSKLPPTLFQGE Paralichthys olivaceus IGF1 MALMLHSVSLULVISUSASSQAMAPPCHLCGAHLVDALVLVCGERGFYTPKRDVDP LLGFLPFKSGGAAAGCENEVASFAFRQMENWKRGTVEQCCHKOLTPTLOTACH VGERGFYFSKPTGYGPAARGSGUTVECCFGSCLRLEMYCAPAKTSKAARSVRAQRH TDMFTAFKVSTAGHKVTKSTERRTAQOPDCTNNKKPLFGAHLVCAPAKTSKAARSVRAQRH TDMFTAFKVSTAGHKVTKSTERRTAQOPDCTNNKKPLFGAHLVCAPAKTSKAARSVRAQRH TDMFTAFKVSTAGHKVTKSTERRTAQOPDCTNNKKPLFGAHLVCAPAKTSKAARSVRAQRH TDMFTAFKVSTAGHKVTKSTERRTAQOPDCTNNKKPLFGAHLVCAPAKTSKAARSVRAQRH TDMFTAFKVSTAGHKVTKSTERRTAQOPDCTNNKKPLFGAHLVCAPAKTSKAARSVRAQRH TDMFTAFKVSTAGHKVTKSTERRTAQOPDCTNNKKPLFGAHLVCAGERGFYTFKSRREVED VDALDFVCEDRGFYFFFFSTSGSGANAPPONG UVECCFGSCLDLLEQVCARPAKSBRDV SATSLQVTPVMFALKQEVPKRQHTVKYSKYEWQGKKAAQRLRRQVPATLRAKKPRQAE KTRAQEQATFMRELIFENSTENGTAGHLVCAPKCHUCGCTSTCSLVQLENVCN Mus musculus Insulin 1 MLINNFFFFLLALLALWEEPFYLALDVDVCGCTSTCSLVQLENVCN Mus musculus IGF1 MLSTSLCVCFGRGFYFFKRFGTGSSTRAFFGGGELUCTGGLUVTQCCTSTCSLVQLENVCN Mus musculus IGF2 MKSRTVECGFRGGFYFFKRFGTGSSTRARPOGTIVDECCFSCDLRLLEMYCARSFFLCGAELWV ALQFVCGPRGFYFNKFFGTGSSTRARPOGTIVDECCFSCDLRLLEMYCAPLKFFKARRDVEQ PLVSSPLEGGAGULPTULEKSEPFTQFVCKKFGGUTUGGELUVCGERGFYSFRARBVED QCAACHRCGFALLENLLLVESGFFCTGYSSRAMARDVEGGUTUGGELUVCDERGFFYSFRAARDVEQ MRSRGTVECGCFRCDLALLEYYCAFFRAGERVSTGQCHTCGSLVQLENVCN MAS musculus IGF2 MKSNSTSLUCCFCCDFLKVMHTVSYTHFYTLGLLLTTSSAAAGFFTLCGAELWD QCAACHTDMFRAQKEVHLKVTSGRAGGUTUGCGSNLVALLWVCGERGFFYSFRARBVEQ PLVSSPLEGGAGULPQQEEPTERVFRGSSSSRGVQRMCAARAFMARMUCAPTKAPFYSKRS VRAQHTTDMFRAQKEVHLKVTSGRAGTVGGNNTM MALMTESLTLLLALSGPFTFFAGSSSSRGVQRMCAARAFMMULAPTKAGFFTSGRARSKR Amazona aestiva IGF1 MLSNTJLLALLALSGPFTFFAGSSSSSRGVQRMCAARAFMMULAPTKAGFFTGGRSKRK MLSNTJLLALLALSGPFTFFTSSSSSSRGVQRMCAARAFMMULAPTKAGFFTSGRSKRQR PLVSGRGVFFFYGFSSSRGVGRVFTHALKSSSFCAGGSRVFTMAR MCLRWT	Cyprinus carpio IGF1	${\tt KCTMRCLSCTHTLSLVLCVLALTPATLEAGPETLCGAELVDTLQFVCGDRGFYFSKPTGY}$
Cyprinus carpio IGF2 MEDOLKHIBSLENCIELDEVID ALLOYUGENGER VIEW SALETICGGELVUD ALOFVOGDRGY PERPERSISSRSQNRG IVEECCENSCILLEDYCARPAKESERVSA TSLQVI PVMPTLKEVYSKIVULLIVSLPARAGRLBRQVPATLRAKKPRQAERIR Paralichthys olivaceus Insulin MALMILHSVILVLI IVSLPASQAMAPPOHLCGARLVDALVLVCGERGFYTPKRRQDPARI Paralichthys olivaceus IGF1 MSALSQUILUVEENSCILUUTIENTPARAGREFTLGAELVDTUC VCGERGYTSFRTOYOPANARSGI VVECCENRELBYLGAGENETVAGAEVENARSQUILUCULTETPARAGREFTLGAELVDTUC VCGERGYTSFRTOYOPANARSGI VVECCENRELBYLGAGENETVAGAEVENARSVSAQAH TDMPRAPKVSTAGHKVDKGTERRTAQOPDKTKNKKRELPGISHTHALLEMRQSQLIFTCV GIVCE Paralichthys olivaceus IGF2 METOKINGGI VECCGGECLBRLBWYCARAFTSKARSVSAQAH TDMPRAPKVSTAGHKVDKGTERRTAQOPDKTKNKKRELPGISHTHALLEMRQSQLIFTCV GIVCE Paralichthys olivaceus IGF2 METOKINGGI VECCGGECLBRLBWYCARAFTSKARSVSAQAH MUS musculus insulin 1 MALLVHFLILLLALLINKPEPKPOAFVCNUTYKSKEWDQCARAGREIRGEFYTTPKSRREEDV SATSLQVI FVMPALKQEVPRKQUITYKYSKEWWQRKAAQRLRRGVPA LLRAKKFRRQAE KIKAQEQAIFHRPLISIESKLPPULLATDNVNHN Mus musculus insulin 1 MALLVHFLULLLALINKPEPKPOAFVCNUTQAFTVGAUCHSRCFFYTPKSRREEVED POVEOLELGGSFGOLQTLALEVAQKRGI VDQCCTS ICSLYQLENYCN Mus musculus IGF1 MEKISJUTYLKICLOFFIKTFURSTRSSSARTVER GVAQLELGGGFGAGDLQTLALEVAQKRGI VDQCCTS ICSLYQLENYCN Mus musculus IGF2 MGKIGSLYGKCCRERCOLALEFYCARAFSRGARGFFYTPKSRREVED QVAQLELGGGFGAGDLQTLALEVAQKRGI VDQCCTS ICSLYQLENYCN MALWRELULLILLFURSEFFPTFWKTGYGSSSRLAFKRAFTUGGUEVECRESCULRLEWYCARSSNNG Gallus gallus IGF1 MEKISJIJUKCCCCDFLKKKHTWSY INFFYLGLCLILTISSTAAGFFTLGGAELVD ALOFVCORMUTYKKKVKKUKTGRGSARNLTKM Mas musculus IGF2 MEKISJIJUKCCCCDFLKKKKRTVSGCGCHVCGSCDLRLEWYCARAFFXSRAAK QVRAQHTDMFKAQKEVHLKNTSRGAGTNANAKHTUGGERGFYSFKARARDVEQ HVSSPLAGEAVUPFQGEPYSFKRATOGGSSRRLAHKUTVGCGERGFYSFKARARDVEQ GAUGUS GGF1 MEKINSJISTUKCCCCDFLKKKKRTVSGCCHNCSSJQLERVENYCH Gallus gallus IGF1 MALWILSJIJULLALLSSPCFTSGANATONNNM AMAZGLUARGELDAVEFTSKYTGYGSSSRRLHHKUTVGCERGFYSFKARARDVEQ FVSGRHGVYCKRCUPFEKPTGSSSRRLHKUTVGCCCRGSCDLARLEWYCAFIKFFKARARDVEQ FVSGRHGVYCKRCUPFEKPTGSSSRRLHKUTVGCCRGSCDLARLEWYCAFIKFSKARA VRAQHTDMFKAQKEVHLKNTSRGATGNNNM AMALKSLIJULLALLALARSPTSGAGTGNNNM AMAZ		GPSSRRSHNRGIVDECCFQSCELRRLEMYCAPVKPGKTPRSVRAQRHTDSPRTAKKPLPG
Generation Hubbergeneration ALOPYCEDRGYPSRPTSRLSSRREQMRGIVECCFRSCHLALLEQYCARPAKEBRDVSA Paralichthys olivaceus insulin MALMINGUELTERKLPHILAGOSR Paralichthys olivaceus IGF1 MALMINGUELTERKLPHILAGASR Paralichthys olivaceus IGF1 MSALSEQUHLCOVFKSAMCCISCSHTLSLLLCVLTLTPTATGAGPETICGAELVDALVIQE Paralichthys olivaceus IGF1 MSALSEQUHLCOVFKSAMCCISCSHTLSLLLCVLTLTPTATGAGPETICGAELVDALVG Paralichthys olivaceus IGF2 METORKHOGHSLCHTCRRAESSRLVBCCCPGCCLRRLBWCARAFTSKAARSVRAQRH TUDEPARMYSTATAQOPKTKMKKRRELIGHSHTHALLENRSAQCHARAGRER VCERAGYPTSKPTOYOPARARGERUVDCCCPGCCLRRLBWCARAFTSKAARSVRAQRH Mus musculus insulin 1 MALMINELLLALMINPRYTQAPKKGHUCCTGGEGFYTPKSRREQDE Mus musculus insulin 2 MALMINELPLILALLALMINPRYTQAFVKNHKKRELIGHSHTMLLFWRSREVED POYOELELGGGFGGEDOLTALEVAQKKGTUDOCCTSICSLVQLERVCM Mus musculus IGF1 MALMINELPLILALLILMINSERPTTGAFVKHUCGSHLVEALVUCGERGFYTPKSRREVED QUADLEGGFGRAGULTALEVAQUKRKUTUCCTSICSLUPLANCUNCKI MALMINELPLILALLILMISSLEPTICALCULTTYSTATGPETICGAELVD ALOPYCOGRREYFNKTYCSGSIRRAPORTIVECCERSCOLARLEMYCAPIKERSSAN IRRAPHTMERKCOLARUPACKEVHUKUTSGAGARKTYM Mus musculus IGF1 MALMINELPLILALLILMINSGEDFTYSAARSINGTUNCCCCERGFYSFKRARNOPQ Gallus gallus insulin MALMINELPLILALLUSSCOFTSKAARSRENTCUNLICULTTSSAAAGPETICGAELVD A	Cyprinus carpio IGE2	USHSSYKEVHUKNS MEDOLKHHSLCHTCLRTDSVINKVIKMYWSTRMPICILFLTLSAFEVASAFTLCCCFLVD
TSLOUTPWETLKGEVPRKHUTVKYSKYDMORKAAQRLRRGVPAILRAKKFRRQAERIR AQBQLHHRPLTILPSKLPPILFAQSR Paralichthys olivaceus insulin MAALALISUSILIVLLIVSLPASQAMAPPQHLCGAHLVDALYLIVCGERGFYTPKRDVDP Paralichthys olivaceus IGF1 MSALSTQMLEUVELTUSELASQAMAPPQHLCGAHLVDALYLIVCGERGFYTPKRDVDP VCCERGYFSRFDCYCPMARSRGIVECCCPOSCELIRLEWYCAPAKTSKAARSVAAQHH TUMPRAPKVSTAGHKVDKGTERRTAQOPDKTKNKKRPLPGHSHTHALLFMRGSQLIFTCV GIVCE Paralichthys olivaceus IGF2 METOKRNOCHSCHRFTRADQOPDKTKNKKRPLPGHSHTHALLFMRGSQLIFTCV SATSLQUT FVMFALKQEVPRKOMVTKYSKYEWWORKAAQLRRGVPAILRAKKFRRQAE KIKAOGAAITHENLISLESKLPPULATONYWHN Mus musculus insulin 1 MALLVHELPLLALLALMERKPTQAFVKQHLCGPHLVEALYLVCGERGFYTPKSRREVED PQVEDLELGGSFGOLOTLALEVAQKRGTVQCCTSICSLUJCLENYCG Mus musculus insulin 2 MALWRETLELLLEFUSENER/PAYKQHLCGPHLVEALYLVCGERGFYTPKSRREVED PQVADLELGGSFGAGLOTTALEVAQKRGTVQCCTSICSLUJCLENYCG Mus musculus IGF1 MGLSPVCRKCHCCCPFLKHLTHINSSNERMERLIVULPTKOFKGERSSKSNAN Gallus gallus IGF2 MGIPVGKML/LLISLAFALCCIAAYGPETLCGCELVDTLQFVCSDRGFYSRKARS Gallus gallus IGF1 MALWITESLFLALLLIVSGEGGSTSKAANNOLCGSHLVEALYLVCGERGFYSKARRARDVEQ PLYSSPLEGEAGVLPEQGEFYFKKKERGTVEGGCELINTESLYQLENYCHTYCKSRRARS GALUS gallus IGF2 MALWITESLFLALLAUSSGEGGST		ALQFVCGDRGFYFSRPTSRLSSRRSQNRGIVEECCFNSCNLALLEQYCAKPAKSERDVSA
AQEQLIMENT PLTLEPSQR Paralichthys olivaceus insulin MALVELISSULVLITUSTENSQAMAPOPULCCARLUVDALYLVCCGERGFYTFKRUVDP LLGFLPFKSGGAAAGGENEVAEPAFKDQMEMWYKRGIVEQCCHKPCNIFDLQNYCN Paralichthys olivaceus IGF1 MISALISEQUILCUVERSAMCCISCHILGLLUCULTUPTATGACPETLCGAELUVTLQF VCGERGFYSFKTCYCPARARSRGIVDECCPGSCELRALEMYCAPATGACAELUVTLQF GIVCE Paralichthys olivaceus IGF2 METOKRHOOHSICHTCRAESSRLKVKKMSSSSRALLFALALTLYVVEMASAETLCGGEL VDALOPVCEDRGYFSRFTSGINRARPOINGIVEECCFRSCIDUNLEQYCARARSERDV VDALOPVCEDRGYFSRFTSGINRARPOINGIVEECCFRSCIDUNLEQYCAPAKSERDV VDALOPVCEDRGYFSRFTSGINRARPOINGIVEECCFRSCIDUNLEQYCAPAKSERDV VDALOPVCEDRGYFSRFTSGINRARPOINGIVEECCFRSCIDUNLEQYCAPAKSERDV VDALOPVCEDRGYFSRFTSGINRARPOINGIVEECCFRSCIDUNLEQYCAPAKSERDV VDALOPCGARGFGAOLTLALEVARKINDQCCTSICSIVQIENYCN Mus musculus insulin 1 MALIVHFLPLLALLFLWESHFQAFVKOHCCGSIUFALIVVCERGFYTPKSRREVED PQVeQLELGGSFGJUTLALEVARKINDQCCTSICSIVQIENYCN Mus musculus Insulin 2 MALIWRFLFLLALLFLWESHFQAFVKOHLCGSHLVEALIVVCERGFYTPKSRREVED PQVeQLELGGSFGJUTLALEVARKINDQCCTSICSIVQIENYCN Mus musculus IGF1 MGKISSLPTQLFKICLCOFIKIKIHINSSHLFYLALCLIFFYSSTTAGFETLCGAELVD ALQFVCGRREYFNKPFGYSSSRRIHKGINDQCTSICSIVQERGFYSPKRSRAN QSACHLRGLPALLRARGMILAKELKEFREAKHRFULVDEFXDFAHGASSSMSSNNO QSACHLRGLPALLRARGMILAKELKEFREAKHRFULVPKDFAHGASSSMSSNNO QSACHLRGLPALLRARGMILAKELKEFREAKHRFULVPKDFAHGASSMSSMNO QSACHLRGLPALLRARGMILAKELKEFREAKHRFULVPKDFAHGASSMSSMNO QSACHLRGLPALLRARGMILAKELKEFREAKHRFULVPKDFAHGASSMSSMNO QSACHLRGLPALLLANGSGRFTSKYNGGIVEQCCINTCSLVQERGFYSPKRRAVEQ PLVSSFLRGACVLPFQCFFKFYGSSSRRLHHKINDDECFQSCLRRLEMYCAPTKPRSRAS MALWITSSLTULVKCCCCDFLKVKNRITVSYTHFYLGLCLLITISSAAAGPETLCGAELVD ALQFVCGNRCYFFSFFYGSSSRRLHKNGTVDECCGSCLRLEMYCAPTKPRSRAS VRAQHTDMFKAKEVFLKNTSSGRSTANNYM		TSLQVIPVMPTLKQEVPRKHVTVKYSKYDMWQRKAAQRLRRGVPAILRAKKFRRQAERIR
Paralichthys olivaceus insulin MAALUALISVISLUVLIVUSLPASSQAMAPPOILICGALUDALIVUCGERGFYTYEREDUP Paralichthys olivaceus IGF1 LIGPLPEKSGAAGGEEVEVVERFARENDGEWENVERGIVEQCCHECUTEPLQNYCON Paralichthys olivaceus IGF2 VCGERGFYESKPTGYGPNARRSRGIVDECCTGSCELIRLLEWCARTSKAARSVRAQMH Paralichthys olivaceus IGF2 METOKRIBGOHSLCHTCRRAESSRLWKKNESSSRALLFALALTLWVENASAETLCGGEL VDALGPYCEDRGYPSRPTSRGSNRRPONRGIVEECCFRSCDINLLEQYCARPAKSERDV SATSLQVIPVMPALKQEVPEKQHTVEKYSKEVSQRAAAGRELRGVPATLRAKKERPAGAE KIKAQEGALTHEPLISLISELLEVLLATDVYNNN MALUMERPLIALLALMERFYDAFVKQHLCCSHLVEVLATUVGERGFYTPKSRREVED PQVEQLELGGSPGDLQTLALEVARQKRGIVDQCCTSICSLYQLENYCN MALUMERPLIALLELIALLFLWESHPTQAFVKQHLCCSHLVEALIVVGERGFYTPMSRREVED Mus musculus insulin2 MALWARFLELIALLFLWSHPTGYSSIRRAPQTGIVDECCFRSCDLRRLEWYCAPLKARKFRRQAE Mus musculus IGF1 MGKISSLPTQLEKICLOPTIKKTHI MISSAENUPSICSUNDEDFPHYPVRGRFYTPMSRREVED Mus musculus IGF2 MGIPYCRSMULLISLAFALCCAANQCRGTUPLCCSHLVEDLATUVGERGFYSFRARRDVEQ Gallus gallus insulin MALWIRSLELLALLVESGFCFTSVAARQUEDDFPHYPVGGCSRFFYSFKRARDVEQ Gallus gallus IGF1 MEXINTSLELLALLVESGFCFTSVAARQUEDDFPHYPVGGCASSEMSSNHQ Gallus gallus IGF1 MEXINTSLELLALLVESGFCFTSVAARQUECGUENTCAULPDFPHYPVGGCASSEMSSNHG Gallus gallus IGF2 MEXINTSLELLALLVESGFCFTSVAARQUECGUENTCAULPDFPHYPVGACASAAGEFTLCGAELVD ALQFVCCDRGYFSKPFTGYGSSSRLHHKGIVDECCFQSCDLRLEWYCAPIKPFKSARS VRAQ		AQEQLHHHRPLITLPSKLPPILFAQSR
Paralichthys olivaceus IGF1 MSSALS?GWILGUPYESMECUCIJILTPTATCACPETICGAELUDTLOF VCGEBGYYFSKPTGYCGPNARRSRGTUDGECCFGSCELRELEMYCAPARTSKAARSVRAQRH TOMPRAFKVSTAGHKVDKGTERRTAQQPDKTKNKKRPLPGHSHTAALLFMRQSQLLTFCV GGIVCE Paralichthys olivaceus IGF2 METCKRIGGHSLCHTCRRAESSRLKVKRMSSSSRALLFALATLTVVVEMASAETLCGGEL VDLGYCCERGYYFSRFTSGSGNRRPQNRGTVEECCFRSCDLNLLBYCARFAKSERDV SATSLQVIPVMPALKGQVPKKQHVTVKSSKPRVQDKXKAQRLRGVPAILRAKKFRRQAE KIKAQEQAIFHRPLISLPSKLPYVLATDNYNNN Mus musculus insulin 1 MALLWHFLLLALLALWEPVFTQAFVKQHLCGFHLVEALYLVCGERGFYTFKSRRPVED PQVEQLELGGSFGDLQTLALEVAQKRGTVDQCCTSICSLYQLENYCN Mus musculus insulin 2 MALMWRFLPLLLALLELWESHPTQAFVQAFUCGGHLVDTLUTYCSGRGFFYTMSRREVED PQVEQLELGGGFAGDLQTLALEVAQKRGTVDQCCTSICSLYQLENYCN Mus musculus IGF1 MCKISSLPTQLFKTCLCOFLKTKITHINSSIRRPYCDDCOFDSCDIARLEWACDLEFYTRARRS Mus musculus IGF2 MGTPVGKRJULLISLFXALCCGGLUDTLALEVAQKRGTVDQCCTSICSLYQLENYCN ALQFVCGFRGYFYRNFTGYGSSIRRAPGOTUDGCCGSLUDTLIPVCSDRGFYSSRSSENSHNO QSAGLRRGLPALLRARGRMLAKELKFFREAKRHRFLTJFLSTLGGELUDT ALQFVCGFRGYFSKFTGYGSSRRLHKKITUDECCGSLUDTLIPVCSDRGFYSSRSSESSSHNO QSAGLRRGLPALLRARGRMLAKELKFFREAKRHRFLTJFLSTLTPKSFTAGAFETLCGAELUD ALQFVCGDRGFYFSKFTGYGSSSRRLHKKITUDECCFQSCDLRILEMYCAPIKFFSARZ VRAQHHTDMFKAQKEVHLKNTSRGNTGNNNYM MEXINSLSTQLVKCCCFDFLKVKMHTYSTHFFYLGLCLTTSSAAAGPETLCGAELVD ALQFVCGDRGFYFSKFTGYGSSSRRLHKKITUDECCFQSCDLRILEMYCAPIKFFXSRA VRAQHHTDMFKAQKEVHLKNTSRGNTGNNNYM Amazona aestiva InSUIN MALKILSLSTQLVKCCCFDFLKVKMHTYSTHFFYLGLCLTTSSAAAGPETLCGAELVD ALQFVCGDRGFYFSKFTGYGSSSRRLHKKITUDECGFNCGULAUNCY FVXQRHTDMFKAQKEVHLKNTSRGNTGNNNYM AMAZONA aestiva IGF2 MEXINSLSTQLVKCCFDFLKVKMHTYSTHFFYLGLCLTTSSAAAGPETLCGAELVD ALQFVCGDRGFYFSKFTGYSSSRRLHKKITUDECGFNCGNNNYM AMAZONA aestiva INSUIN MALMILSLFLALLLALALSGFTS	Paralichthys olivaceus insulin	MAALWLHSVSLLVLLIVSLPASSQAMAPPQHLCGAHLVDALYLVCGERGFFYTPKRDVDP
Anarchey Sindeeus Grit 	Paralichthys olivaceus IGE1	LLGFLPPKSGGAAAGGENEVAEFAFKDQMEMMVKRGIVEQCCHKPCNIFDLQNYCN MSSALSFOWHLCDVFKSAMCCISCSHTLSLLCVLTLTPTATGAGPFTLCGAFIVDTLOF
TDMPRAPKVSTAGHKVDKGTERRTAQQPDKTKNKKRPLPGHSHTHALLFMRQSQLLTFCV GIVCE Paralichthys olivaceus IGF2 METQKRRQGHSLCHTCRRAESSRLKVKKMSSSSRALLFALALTLYVVEMASAETLCGGEL VDALQFVCEDRGYPSRPTSRGSMRRPONRGTVEECCFRSCDLALLEQVCAKFAKSERDV SATSLQVI PVMPALKQEVPSRCMVKVKVKSSSRALLFALALTLYVVEMASAETLCGGEL VDALQFVCEDRGYPSRPTSRGSMRRPONRGTVEECCFRSCDLALLEQVCAKFAKSERDV SATSLQVI PVMPALKQEVPSRCMQVTVKYSKYEVWORKASQRLRRCPYTPKSRREVED PQVEQLELGGSPGDQTLALEVAQKRGTVDQCCTSTGSLYQLENYCN Mus musculus insulin 1 MALUMPLFLLALLALMEPKPTQAFVKQHLCGSHLVEALYLVCGERGFFYTPKSRREVED PQVEQLELGGSPGDQTTALEVAQQKRGTVDQCCTSTGSLYQLENYCN Mus musculus IGF1 MGKISSLPTQLFKTCLDPFKLKIKTHIMSSHLFYLALCLLFFTSSTAGPETLCGAELVD ALQPVCOPRGPYTMKPTCYGSSTRAPCTGTUDECCFRSCDLRRLEMYCAPLKPTKAARS TRAQRHTDMPKTQKEVHLKNTSRGSAGNKTYNM Mus musculus IGF2 MGFVGKSMLVLLISLAFALCCTAAYGPGETLCGGELVDTLQFVCSBRGFYSRSPSSRAN RRSRGTVEECCFRSCDLALLETYCATPTAKSBRDVSTSQAVLPDDFPRYPVKKFFQYDTWR QSAGRLRRCLPALLRARRGMLAKELKEFREAKRIRLFULTU PKDPAHOGASSEMSSNHQ PLVSSPLRGEAGVLPFQQEEYEKVRGTVEQCCHNTCSIYQLENYCN Gallus gallus IGF1 MEXTKINSLSTQL/KCCCCPTLKVKMITVSYTHFFYLGCLLLTLTSSAAAGPETLCGAELVD ALQPVCODRGYFSFRFTGSSSRANMTVSYTHFFYLGCLLLTLTSSAAAGPETLCGAELVD ALQPVCORGPFYFSKFTGSSSRSLHKKTVDECCCPGSCDLRRLEMYCAPTKPKSARS VRAQRHTDMPKAQKEVHLKNTSRGNTGNRNYRM Amazona aestiva IGF1 MEXTNISLTQL/KCCLCOFLKVKMITVSYTHFFYLGLCLLTLTSSAAAGPETLCGAELVD ALQPVCORGPFYFSKFTGGSSSRSLHKKTVDECCCPGSCDLRRLEMYCAPTKPKSARS VRAQRHTDMPKAQKEVHLKNTSRGNTGNRNYRM		VCGERGFYFSKPTGYGPNARRSRGIVDECCFQSCELRRLEMYCAPAKTSKAARSVRAQRH
GUVE Paralichthys olivaceus IGF2 METQKRIGHSLCHTCRRAESSRLKVKKMSSSSRALLFALALTLYVVEMASAETLCGGEL VDALQFVCEDRGFYFSRFTSRGSNRRPQNRGTVEECCFRSCDIALLEQYCAKFAKSERDV SATELQVI PVMPALKQEVPKRQHVTVKYSKYEWQRKAAQRLRRGVPAILRAKKFRRQAE KIKAQGOAIFHRPLISLFSKLPFVLLADHVVNHN Mus musculus insulin 1 MALUVIFLPLLALLALLEVERGKRIDVQCCTSICSLYQLENYCN Mus musculus insulin2 MALMMRFLPLLALLLEVERGPKORGTVDQCCTSICSLYQLENYCN Mus musculus IGF1 MALMMRFLPLLALLFUEBEHFQAFVGKHCCGSHLVBALTVLCGERGFFYTPKSRREVED PQVAQLELGGPGAGDLQTLALEVAQKRGIVDQCCTSICSLYQLENYCN Mus musculus IGF1 MALMMRFLPLLALLFUEBEHFQAFVGKHCCGSHLVBALTVLCGERGFFYTPKSRREVED PQVAQLELGGPGAGDLQTLALEVAQKRGIVDQCCTSICSLYQLENYCN Mus musculus IGF1 MKISSLPTQLFKICLCDFLKIKIHMSSSHLFYLALCLITFTSSTTAGPETLCGAELVD MUs musculus IGF2 MGFVGKNKHVKEVHLKNTSRGSAGKKTYRM Gallus gallus insulin MALWIRSLFLALLVFGGFSYANAFYGGSSTRALPGYCTUGCCFYCSURGFYSSFRANGNEQ GSAGRLRRGLPALLRARGGNLAKELKEFREAKRIRFULVEPKDPAHOGASSBMSSNHQ QSAGRLRRGLPALLRARGGNLAKELKEFREAKRIRFUVDEDDFPKYVKKFYQDTWR Gallus gallus insulin MALWIRSLFLALLVFSGPGTSYAAANQHLCGSHLVBALYLVCGRGFFYSFRARDVEQ PUVSSPLRCEACVLPFQOEEYEKVRRGIVDCCCTQSCDLRRLEMYCAPKLYVCGRAGPTLGAELVD ALQFVCCDRGFYFSFKFTGYGSSSRALHHKGIVDECCFQSCDLRRLEMYCAPKLKNTSRAAGPETLCGAELVD ALQFVCCDRGFYFSFKFTGYGSSRRALHKGIVDECCFQSCDLRRLEMYCAPKIKPKSARS VRAQRHTDMPKAQKEVHLKNTSRGNTGNRNYRM Gallus gallus IGF2 MKKINSLSTQLVKCCCCDFLKVKMHTVSYHFFYLGLCLLTLTSSAAAGPETLCGAELVD ALQFVCCDRGFYFSFKFTGYGSSRRALHKKIVDECCFQSCDLRRLEMYCAP IKPPKSARS VRAQRHTDMPKAQKEVHLKNTSRGNTGNRNYRM Amazona aestiva IGF1 MEKINSLSTQLVKCCLCDFLKVKMHTVSYHFFYLGLCLLTLTSSAAAGPETLCGAELVD ALQFVCCDRGFYFSFKFTGYGSSRRALHKGIVDECCFQSCDLRLEMYCAP IKPPKSARS VRAQRHTDMPKAQKEVHLKNTSRGNTGNRNYRM Amazona aestiva IGF2 MSKAAHTEERCGPAPAFLGGPPFPKESSGSSRGNGARARMMLLLAFLAYALDSA ANGTAFTLCGGUVTGLVVCGDRGFYFSBFRACPQK PAQKHTDMFKAQKEVHLKNSSRGNTGNRNYRM Amazona aestiva IGF2 MSKAAHTEERCGPAPAFLGFERCKRRGIVPGCCMTSLVQCLMYCAP IKPPKSARS VRAQRHTDMPKAQKEVHLKNSSRGNTGNRNYRM Amazona aestiva IGF2 MSKAAHTEERCGPAPAFLAGAELVTAGPFTELGSEVQFSMALHKGIVDECCFPSCDLALLEFT CATAVKRSRFUEQEDPFFXGSSGSTGAPARMALSICFACPGK PAPIlio xuthus INSULIN MCLSR		TDMPRAPKVSTAGHKVDKGTERRTAQQPDKTKNKKRPLPGHSHTHALLFMRQSQLLTFCV
Paralichthys olivaceus (GF2 METQKRRQHSLCHTCRRAESSRLKVKKMSSSSRALLFALLFALLTLTVVEMASAETLCGGEL VDALQFVCEDRGFYERPTSRSSRRPPONGTVEECCFRSCDINLEGYCKAKPRASEEDV SATSLQVI PVMPALKQEVPRKQHVTVKYSKYEVWQRKAAQRLRRGVPAILRAKKFRQAE Mus musculus insulin 1 MALLWRFLELLALLEWBFPTQAFVKQHLCGHLVEALYLVCGERGFFTPKSRREVED PQVQLELGGGPGGDLQTLALEVAQKRGI VQQCCTSICSLYQLENYCN Mus musculus insulin 2 MALMMRFLELLALLFLWBSHFTQAFVKQHLCGHLVEALYLVCGERGFFTPMSRREVED PQVQLELGGGPGAGDLQTLALEVAQKRGI VQQCCTSICSLYQLENYCN Mus musculus IGF1 MGKISSLPTQLFKICLCFLKIKIHIMSSSHLFYLALCLLTFTS STTAGPETLCGAELVD ALQPVCGPRGFYFNKFTGYGSSTRAPQTGI VDECCFRSCDLARLEMYCAPLKPTKARS IRAQRHTDMEYTQKeVHLKNTSRGSAGKNTYRM Mus musculus IGF2 MGI PVGKSMLVLLI SLAFALCCIAAYGPGETLCGGELVDTLQFVCSDRGFYFSRPSSRAN RRSRGTVEECCFRSCDLALLETYCATPAKSRDVSQAVLPDDFPRYPVGKFQDTWR Gallus gallus insulin MALWIRSLPLLALLVFSGPGTSYAAANQHLCGSHLVEALYLVCGERGFFYSPKARRDVEQ PLVSSFLRGEAGVLPPQCEEVEKVKRGTVEQCCHTCSLYQLENYCN Gallus gallus IGF1 MEXINSISTQLVKCCFDFLKVKMHTYSY IHFYLGLCLLTLTSSAAAGPETLCGAELVD ALQFVCGDRGFYFSKPTGYGSSSRLHHKGI VDECCFQSCDLRRLEMYCAP IKPFKSARS VRAQRHTDMPKAQKEVHLKNTSRGNGTGNRNYRM Amazona aestiva IGF1 MEXINSISTQLVKCCCFDFLKVKMHTYSY IHFYLGLCLLTLTSSAAAGPETLCGAELVD ALQFVCGDRGFYFSKPTGYGSSSRLHHKGI VDECCFQSCDLRRLEMYCAP IKPFKSARS VRAQRHTDMPKAQKEVHLKNTSRGNGTGNRNYRM Amazona aestiva IGF2 MSSAGAHTDERCRQPAFLGGPELVFGYSSSRRLHKGI VDECCFQSCDLRRLEMYCAP IKPFK		GIVCE
Wuhler VEDBARK PURKeit PSKPT SANKREYNKEI VEDROK KOLLEUT LAFEASEKDY SATSLQVI FYMPALKQEVPROMTVYKYSYEWORKAAORLINGVELLEUT LAFEASEKDY Mus musculus insulin 1 MALLWEPLISLESKLEPVLLATONYWNN Mus musculus insulin 2 PQVEQLELGGSPEDLETLAEVARQKRGIVDQCCTSICSLYQLENYCN Mus musculus insulin 2 MutMIRFLELLALLFLWESHETQAFVKQHLCGSHLVEALTLVCGERGFFYTPMSRREVED PQVQLELGGSPEDLETLAEVAQKRGIVDQCCTSICSLYQLENYCN Mus musculus IGF1 MKI SSLPTQLFKICLOPLKIKIHMSSSHLPYLALCLIAFTSSTTAGPETLCGAELVD ALgPVCGPRGFYFNKPTQGSSTRAAQCGELVDTLOFVCSDRGFYFSRPSSRAN RRSRGIVEECCFRSCDLALLETVCATPAKSRDVSTQAVLPDDFPRYPVCKFPQDTWR Gallus gallus insulin MALKINSLFLLALLVFSGFGTSYAAANQELCGSLUPLIVCGERGFYSPKRARDVCG Gallus gallus IGF1 MEKINSLSTQLVKCCFCDFLKVKMHTVSYHFFYLGLCLLTLTSSAAAGPETLCGAELVD ALQPVCCDRGFYFSKPTGYGSSSRLHHKGIVDECCFOSCDLRRLEMCAPI KPPKSARS VRAQRHTDMPKAQKEVHLKNTSRONTGNNNYM Gallus gallus IGF2 MEKINSLSTQLVKCCCCDFLKVKMHTVSYHFFYLGLCLLTLTSSAAAGPETLCGAELVD ALQPVCCDRGFYFSKPTGYGSSSRLHHKGIVDECCFOSCDLRLEMCAPI KPPKSARS VRAQRHTDMPKAQKEVHLKNTSRONTGNNYM Amazona aestiva insulin MALVILSLSTQLVKCCCDPLKVKMHTVSYHFFYLGLCLLTLTSSAAAGPETLCGAELVD ALQPVCCDRGFYFSKPTGYGSSSRLHHKGIVDECCFOSCDLRLEMCAPI KPPKSARS	Paralichthys olivaceus IGF2	METQKRHGQHSLCHTCRRAESSRLKVKKMSSSSRALLFALALTLYVVEMASAETLCGGEL
KIKAGEQAIFHRPLISLPSKLPPVLATDNYNNN Mus musculus insulin 1 MALUVHFLPLLALLALMERKPTQAFVKQHLCCHUVEALVLVCGERGFYTPKSRREVED PQVEQLELGGSPGDLQTLALEVARQKRGVVQCCTSICSLVQLENYCN Mus musculus insulin 2 MALMMRFLPLLALLFIMESHPTQAFVKQHLCCSHUVEALVLVCGERGFYTTMSRREVED PQVEQLELGGSPGDLQTLALEVARQKRGVVQCCTSICSLVQLENYCN Mus musculus IGF1 MGKISSLPTQLFKICLOPIKKIKIHIMSSHLFYLALCLTFTSSTAGPETLCGAELVD ALQFVCGPRGFYTMKPTGYGSSIRRAPQCTVIDECCTSCDLRRLEMYCAPLKPTKARS IRAQRHTDMPKTQKEVHLKNTSRGSAGNKTYMM Mus musculus IGF2 MGIPVCKSMLVLLISLAFALCCIAYGPGETLCGGELVDTLQFVCSDRGFYFSRPSRAN RRSRGIVEECCFRSCDLALETYCATPAKSERDVSTQAVLPDPFNYPQKFPQYDTWR QSAGRLRRGLPALLRARRGMLAKELKEFREAKRHRPLIVLPPKDPAHGGASSEMSSNHQ QSAGRLRRGLPALLRARRGMLAKELKEFREAKRHRPLIVLPPKDPAHGGASSEMSSNHQ Gallus gallus insulin MALMINSLFLLALLVFSGPGTYSAAANQHLCCGHUVEALYLVCCERGFFYSFKARRDVEQ FUVSSFLREAGAU-PPQDEFYEKVKRGIVEQCCHNTCSLVQLENYCN Gallus gallus IGF1 MEKINSLSTQLVKCCFCDFLKVKMHTVSYIHFFYLGLCLLTITSSAAAGPETLCGAELVD ALQFVCGDRGFYFSKFTGYGSSSRRLHNGIVDCCCPGCDLRRLEMYCAPIKPFKSARS VRAQRHTDMPKAQKEVHLKNTSGRVTGNNNYM Amazona aestiva insulin MALMILSLFLLALLSGPXTSHAAATQHLCCSHLVEALYLVCGERGFFYSFKARRDVEQ PUVSGRLHGEVQGLPPPEPEVGVKRGIVPCCUNTCSLVQLENYCAPIKPFKSARS VRAQRHTDMPKAQKEVHLKNTSGRVTGNNNYMM Amazona aestiva IGF1 MEKINSLSTQLVKCCLCDFLKVKMHTVSYIHFFYLGLCLLTITSSAAGPETLCGAELVD ALQFVCGDRGFYFSKFTGGSSSRRLHNGVDCCTSVQCDLRAREMMLLLAFLAYALDSA AAYGTAETLCGGELVDTLQFVCBCPGFYSRVGRNARRMIKLLLAFLAYALDSA AAYGTAETLCGGELVDTLQFVCBGRGFYSRVGRNARRMIKLLLAFLAYALDSA AYGQRHTDMFKAQKEVHLKNSSGRNTGNNNYMM Amazona aestiva IGF2 MSAGAHTDERCRQPAFLPGPEPFPEVESSGSSKVQMCAARARMLLLAFLAYALDSA AAYGTAETL		VDALQFVCEDRGFIFSRTSRGSNRRPQNRGIVEECCFRSCDLNLLEQICARPARSERDV SATSLOVIPVMPALKOEVPRKOHVTVKYSKYEVWORKAAORLRRGVPAILRAKKERROAE
Mus musculus insulin 1 MALLVHFLPLLALLALWEPKPTQAFVKQHLCGPHLVEALYLVCGERGFFYTPKSRREVED PQVEQLELGGSPGDLQTLALEVARQKRGUTQCCTSICSLYQLENYCN Mus musculus insulin2 MALMMRFLPLLALLLFLWESHPTQAFVKQHLCGSHLVEALYLVCGERGFFYTPMSRREVED PQVAQLELGGGPGAGDLQTLALEVARQKRGUTQCCTSICSLYQLENYCN Mus musculus IGF1 MGKISSLPTQLFKICLCPFLKIKHIMSSSHLFYLALCLIFTSSTTAGPETLCGAELVD ALQFVCGPRGFYFNKPTGYGSSIRRAPQTGIVDECCFSICSLYQLENYCN Mus musculus IGF2 MGIPVGKSMLVLISLAFALCCIAAYGPGETLCGGELVDTLQFVCSDRGFYFSRPSSRAN RRSRGIVEECCFRSCDLALLETYCATPAKSBENDSTQAVLPDDPFNYPYGKFFQYDTWR Gallus gallus insulin MALWIRSLPLLALLVFSGGTSYAAANQHLCGSHLVEALYLVCGERGFFYSPKSRARRDVEQ PUVSSPLRCEAGVLPFQQEEYEKVKRGIVEQCCHNTCSLYQLENYCN Gallus gallus IGF1 MEKINSLSTQLVKCCFCDFLKVKMRTVSYIHFFYLGLCLLTISSAAGPETLCGAELVD ALQFVCGDRGFYFSFFTGYGSSSRRLHHKGIVDECCTQSCDLRRLEMYCAPIKPFKSARS VRAQRHTDMPKAQKEVHLKNTSRGNTGNRNYRM Amazona aestiva insulin MALWILSLPLLALLALSGPXTBHAATQHLCCSHLVEALYLVCGERGFFYSPKRRRDVEQ PLVSGRLHGEVGELFFQPEEFQKVKRGIVEQCHNTCSLYQLENYCN ALQFVCGDRGFYFSFFTGYGSSSRRLHHKGIVDECCTQSCDLRRLEMYCAPIKPFKSARS VRAQRHTDMPKAQKEVHLKNTSRGNTGNRNYRM Amazona aestiva insulin MALWILSLPLLALLALSGPXTBHAATQHLCCCHNTCSLYQLENYCN ALQFVCGDRGFYFSKFTGYGSSSRRLHHKGIVDECCTQSCDLRRLEMYCAPIKPFKSARS VRAQRHTDMPKAQKEVHLKNSRGNTGNRNYRM Amazona aestiva IGF2 MEXINSLSTQLVKCCLCDFLKVKMHTVSYIHFFYLGLCLLTITSSAAAGPETLCGAELVD ALQFVCGDRGFYFSKFTGYGSSSRRLHKKIVDECCTQSCDLRRLEMYCAPIKPFKSARS VRAQRHTDMPKAQKEVHLKNSRGNTGNRNYRM Amazona aestiva IGF2 MEXINSLSTQLVKCCLCDFLKVKMHTVSYIHFFYLGLCLLTITSSAAAGPETLCGAELVD ALQFVCQDRGFYFSKFTGYGSSSRRLHKKLIDCUNTCSSRVDWQ		KIKAQEQAIFHRPLISLPSKLPPVLLATDNYVNHN
PQVEDLELGSPGDLQTLALEVARQKRGIVDQCCTSICSLVQLENYCN Mus musculus insulin2 MALMMRFLPLLALLFIWESHPTQAFVKQHLCGSHLVEALYLVCGERGFFYTMSRREVED PQVAQLELGGSPGAGDLQTLALEVAQQKRGIVDQCCTSICSLVQLENYCN Mus musculus IGF1 MGKISSLPTQLFKICLCDFLKIKIHIMSSSHLFYLALCLLTFTSSTTAGPETLCGAELVD ALQFVCGPRGYFNKFTGVGSSIRRAPQTGIVDECCFRSCDLRLEMYCAPLKPTKAARS IRAQMRTDMFKTQKEVPLIKNTSRGAGKNTYRM Mus musculus IGF2 MGIPVGKSMLVLLISLAFALCCIAAYGPGETLCGGELVDTLQFVCSDRGFYFSRPSSRAN RRSRGIVEECCFRSCDLALLETYCATPAKSERDVSTSQAVLPDDFPRYPVGKFFQYDTWR QSAGRLRGLPALLRARGRMLAKELKEFREAKRHRPLIVLPPKDPAHGGASSEMSSNHQ QSAGRLRGLPALLRARGRMLAKELKEFREAKRHRPLIVLPPKDPAHGGASSEMSSNHQ QSAGRLRGLPALLRARGRMLAKELKEFREAKRHRPLIVLPPKDPAHGGASSEMSSNHQ QSAGRLRGLPALLRARGRMLAKELKEFREAKRHRPLIVLPFKDFAHGASSEMSSNHQ QSAGRLRGLPALLRARGRMLAKELKEFREAKRHRPLIVLPKDPAHGASSEMSSNHQ QSAGRLRGLPALLRARGRMLAKELKEFREAKRHRPLIVLPKDFAHGASSEMSSNHQ QSAGRLRGLPALLRARGRMLAKEKVHENVSYLHFYLGLCLLTLTSSAAAGPETLCGAELVD ALQFVCGDRGFYFSKPTGYGSSSRRLHKGIVDECCFQSCDLRLEMYCAPIKPRKARS VRAQRHTDMFKAQKEVHLKNTSRGNTGNRNYRM Gallus gallus IGF2 MEKINSLSTQLVKCCCCDFLKVKMHTVSYLHFYLGLCLLTLTSSAAAGPETLCGAELVD ALQFVCGDRGFYFSKPTGYGSSSRRLHKGIVDECCFQSCDLRLEMYCAPIKPFKSARS VRAQRHTDMFKAQKEVHLKNTSRGNTGNRNYRM Amazona aestiva insulin MLWILSLPLLALLALSGYXTSHAAATOHLCGSHLVEALVLVCGERGFFYSPKARRDVEQ PLVSGRLHGEVGELFPQPEEFQKVKRGIVEQCCHNTCSLYQLENYCN Amazona aestiva IGF1 MEKINSLSTQLVKCCLCDFLKVKMHTVSYLHFYLGLCLLTTSSAAAGPETLCGAELVD ALQFVCGDRGFYFSKPTGYGSSSRRLHKGIVDECCFQSCDLRLEMYCAPIKPFKSARS VRAQRHTDMFKAQKEVHLKNSSGNTGNRNYRM	Mus musculus insulin 1	MALLVHFLPLLALLALWEPKPTQAFVKQHLCGPHLVEALYLVCGERGFFYTPKSRREVED
Mus musculus insulin2 MLWMREEPLLALLEFWESHPTQAFVKQHLCGSHLVEALTI/VGERGFFYTPMSRREVED PQVAQLELGGGPGAGDLQTLALEVAQQKRGIVDQCCTSICSLYQLENYCN Mus musculus IGF1 MGKISSLPTQLFKICLCDFLKIKTHIMSSHLFYLALCLLTFTSSTTAGPETLCGAELVD ALQFVGPRGFYFNKPTGYGSSIRRAPQTGIVDECCFRSCDLRRLEMYCAPLKPTKAARS IRAQRHTDMPKTQKEVHLKNTSRGSAGNKTYRM Mus musculus IGF2 MGTVGKSMLLETYCATPAKSERDVSTSQAVLPDDFPRYPVGKFFQYDTWR QSAGRIRRGLPALLRARGGMLAKELKEFFREAKRHPLIVLPFKDPAHGAASSEMSSNHQ MALWIRSLPLLALLVFSGPGTSYAAANQHLCGSHLVEALYLVGGERGFFYSPKSPSSRAN RRSRGIVEECCFRSCDLALLETYCATPAKSERDVSTSQAVLPDDFPRYPVGKFFQYDTWR QSAGRIRRGLPALLRARGGMLAKELKEFFREAKRHPLIVLPFKDPAHGAASSEMSSNHQ MALWIRSLPLLALLVFSGPGTSYAAANQHLCGSHLVEALYLVGGERGFFYSPKARRDVEQ PLVSSPLRGEAGVLPFQQEEYEKVKRGIVEQCCHNTCSLYQLENYCN Gallus gallus IGF1 MEKINSLSTQLVKCCFCDFLKVKMHTVSYIHFFYLGLCLLTISSAAAGPETLCGAELVD ALQFVCGDRGFYFSKPTGYGSSSRRLHHKGIVDECCFQSCDLRRLEMYCAPIKPKSARS VRAQRHTDMPKAQKEVHLKNTSRGNTGNRNYRM Amazona aestiva insulin MALWILSLPLLALLALSGPXTSHAAATQHLCGSHLVEALYLVGGERGFFYSPKARRDVEQ PLVSGRLGEVFGGDRGFYFSKPTGYGSSSRRLHHKGIVDECCFQSCDLRRLEMYCAPIKPKSARS VRAQRHTDMPKAQKEVHLKNTSRGNTGNRNYRM Amazona aestiva IGF1 MEKINSLSTQLVKCCCCDFLKVKMHTVSYIHFFYLGLCLLTITSSAAAGPETLCGAELVD ALQFVCGDRGFYFSKPTGYGSSSRRLHKGIVDECCFQSCDLRRLEMYCAPIKPKSARS VRAQRHTDMPKAQKEVHLKNTSRGNTGNRNYRM Amazona aestiva IGF2 MSSAGAHTDERCRQPAFLPGGVKRGIVSQCCHNTCSLYQLENYCN Amazona aestiva IGF2 MSSAGAHTDERCRQPAFLPGPPFPEVESSSGSSKVQRMCAARRMMLLLAFLAYALDSA AAYGTAETLCGGELVDTLQFVCGDRGFYFSRPVGNNRRINGIVEECCFRSCDLALLET YCAKSVKSERDLSATSLAGLPALSKESFQKPNVGRNARAMLLLAFLAYALDSA AAYGTAETLCGGLVDTLGPVCGDRGFYFSRPVGRNRRINGIVEECCFRSCDLALLET YCAKSVKSERDLSATSLAGLPALSKESFQKPNVGRNARAMLLLAFLAYALDSA AMGTGRTLDALLLLCNMEETHLSAEVQPSEQYIVKNTLNEMKANYKDIKSKLSRQKR DLVDTCYKPCKYEDLEMYC Papilio xuthus INSULIN MCLSRVQGELDNVFSLHVMHCFIEIKTSEKISKMKLIICIMATGILFGNVSTNISFEDGK MHFCGRTLDALLLLAVAGAALCGRADAASVAMKLCGRKLGELLSRVCSAYNSPAWDYPTVVE QTAGVVRRRETGIVTGCTQGCTLEHLTEYCATTIKATSETSVDSHMIEDRSAESTGSG STGAAGAAAMATAARAPAAHIIKSAARAPVVGTVSPLLTWGRTLNTDLFVDNDRYAYV IYA		PQVEQLELGGSPGDLQTLALEVARQKRGIVDQCCTSICSLYQLENYCN
PURADELIGGGGAGAGUE TIALEVAQUAGU UDUCTSSITSSTICSTICATION Mus musculus IGF1 McKISLPTQLFKICLOPEKIKIHIMSSSHLFYLALCLIFTSSTTAGPETLCGAELVD ALQFVCGPRGFYFNKPTGYGSSIRAPQTGIVDECCFRSCDLRLEMYCAPLKPTKAARS IRAQRHTDMPKTQKEVHLKNTSRGSAGKNTYRM Mus musculus IGF2 MGIPVGKSMLVLLI SLAFALCCIAAYGPGETLCGGELVDTLQFVCSDRGFYFSRPSSRAN RRSRGTVEECCFRSCDLALLETYCATPAKSERDVSTSQAVLPDDFPRYPVGKFFQYDTWR QSAGRLRRGLPALLRARRGRMLAKELKEFREAKRHRPLIVLPPKDPAHGGASSEMSSNHQ Gallus gallus insulin MALWIRSLPLLALLVFSGFGTSYAANOHLCGSHLVEALVLVCGERGFFYSFKARRDVEQ FUVAQUELOGGGAGUEVEXULFQQEEVEKKRGTVEQCONTCSLVQLENYCN Gallus gallus IGF1 MEKINSLSTQLVKCCCCDFLKVKMHTVSYIHFFYLGLCLLTLTSSAAGPETLCGAELVD ALQFVCGDRGFYFSKPTGYGSSSRRLHHKGTVDECCFQSCDLRRLEMYCAPIKPFSARS VRAQRHTDMFKAQKEVHLKNTSRGNTGNRNYRM Gallus gallus IGF2 MKKINSLSTQLVKCCCCDFLKVKMHTVSYIHFFYLGLCLLTLTSSAAGPETLCGAELVD ALQFVCGDRGFYFSKPTGYGSSSRRLHHKGTVDECCFQSCDLRRLEMYCAPIKPKSARS VRAQRHTDMFKAQKEVHLKNTSRGNTGNRNYRM Amazona aestiva insulin MALWILSLPLLALLASGFYTSHAADQHLCGSHLVEALYLVCGERGFFYSPKARRDVEQ PLVSGRLHGEVGELPFQPEEFCKVRRGTVDCCCNTCSLVQLENYCN Amazona aestiva IGF1 MEKINSLSTQLVKCCLCDFLKVKMHTVSYIHFFYLGLCLLTLTSSAAGPETLCGAELVD ALQFVCGDRGFYFSKFTGYGSSSRLHKGTVDCCCNTCSLVQLENYCAPIKPKSARS VRAQMHTDMFKAQKEVHLKNSSRGNTGNRNYRM Amazona aestiva IGF2 MSSAGAHTDERCRQPAFLGGAELSKESFQKPSHAKYSKDVQKKSSQRLQREVPGILR RQYRWQAEGLQAAEEAKALHRPLISLFSSSSGSKVQRMCAARRMLLLLAFLAYALDSA AAYGTAETLCGGELVDTLQFVCGDRGFYFSRPTGRGNSSRGNTGNRNYM Amazona aestiva IGF2 MSSAGAHTDERCRQPAFLGPAFLGAASKSKSRGNTGNRNYM Amaz	Mus musculus insulin2	MALWMRFLPLLALLFLWESHPTQAFVKQHLCGSHLVEALYLVCGERGFFYTPMSRREVED
ALQPVCGPRGFYFNKFTGYGSSIRRAPQTGIVDECCFRSCDLRALEMYCAPLKPTKAARG IRAQRHTDMPKTQKEVHLKNTSRGSAGNKTYRM Mus musculus IGF2 MGIPVGKSMUVLLISLAFALCCIAAVGPGETLCGGELVDTLQFVCSDRGFYFSRPSSRAN RRSRGIVEECCFRSCDLALLETYCATPAKSERDVSTSQAVLPDDFPRYPVGKFFQVDTWR QSAGRLRRGLPALLRARGMLAKELKEFREAKRIRPLIVLPPKDPAHGGASSEMSSNHQ Gallus gallus insulin MAWIRSLPLLALLVFSGPGTSYAAANQHLCGSHLVEALYLVCGERGFFYSPKARRDVEQ PLVSSPLRGEAGVLPFQQEEYEKVKRGIVEQCCHNTCSLYQLENYCN Gallus gallus IGF1 MEKINSLSTQLVKCCFCDFLKVKMHTVSYIHFFYLGLCLLTLSSAAAGPETLCGAELVD ALQFVCGDRGFYFSKPTGYGSSSRRLHHKGIVDECCFQSCDLRRLEMYCAPIKPKSARS VRAQRHTDMPKAQKEVHLKNTSRGNTGNRNYRM Gallus gallus IGF2 MEKINSLSTQLVKCCFCDFLKVKMHTVSYIHFFYLGLCLLTLTSSAAAGPETLCGAELVD ALQFVCGDRGFYFSKPTGYGSSSRRLHKGIVDECCFQSCDLRRLEMYCAPIKPPKSARS VRAQRHTDMPKAQKEVHLKNTSRGNTGNRNYRM Amazona aestiva insulin MALWILSLPLLALLALSGPXTSHAAATQHLCGSHLVEALYLVCGERGFFYSPKARRDVEQ PLVSGRLHGEVGELPFQPEEFQKVKRGIVEQCCHNTCSLYQLENYCN Amazona aestiva IGF1 MALWILSLPLLALLALSGPXTSHAAATQHLCGSHLVEALYLVCGERGFFYSPKARRDVEQ PLVSGRLHGEVGELPFQYESSSRRLHKGIVDECCFQSCDLRRLEMYCAPIKPPKSARS VRAQRHTDMPKAQKEVHLKNTSRGNTGNRNYRM Amazona aestiva IGF1 MEKINSLSTQLVKCCLCDFLKVKMHTVSYIHFFYLGLCLLTLSSAAAGPETLCGAELVD ALQFVCGDRGFYFSKPTGYSSSSRRLHKGIVDECCFQSCDLRRLEMYCAPIKPPKSARS VRAQRHTDMPKAQKEVHLKNSSRGNTGNRNYRM Amazona aestiva IGF2 MSSAGAHTDERCROPAPLFCPPPPEVESSSGSSKVQMCAARRMMLLLAFLAYALDSA AAYGTAETLCGGELVDTLQFVCGDRGFYFSRPTGRNNRRINRGIVEECCFRSCDLALLET YCAKSVKSERDLSATSLAGLPALSKESFQKPSHARYSKYDVWQKKSSQRLQREVPGILRA RQYRWQAEGLQAAEEAKALHRPLISLPSQRPAARASPETAGPQK Papilio xuthus insulin MCLSRVQGELDNVFSLMVMRCFTELKTSEKISKMKLIICIMATGILFGNVSTNISFEDGK AMHFCGRLIDAVFKDKMRYC Papilio xuthus IGF2 MLLRRVVTALLAVAAGAALCGRADAASVAMKLCGRKLGEILSRVCSAYNSPAWDVTVVE QTAGVVRRRETGIVYCCTQGCTLEHLTEYCATTIKATSETSVDSHMIEDRSAESTGSG STGAAGAAATAARAPAAHIIKSAARAAPVGTVSPLLTWGRTLNTDLPTVDNDRXAYV IYA	Mus musculus IGF1	MGKISSLPTOLEKICLCDELKIKIHIMSSSHLEYLALCLLTETSSTTAGPETLCGAELVD
IRAQRHTDMPKTQKEVHLKNTSRGSAGNKTYRM MUs musculus IGF2 MGIPVGKSMLVLLISLAFALCCITAAVGPGETLCGGELVDTLQFVCSDRGFYFSRPSSRAN RRSRGIVEECCFRSCDLALLETYCATPAKSERDVSTSQAVLPDDPPRYPVGKFFQVDTWR QSAGRLRRGLPALLRARGRMLAKELKEFREAKRHRPLIVLPPKDPAHGASSEMSSNHQ PLVSSPLRGEAGVLPFQQEEYEKVKRGIVEQCCHNTCSLYQLENYCN Gallus gallus IGF1 MEKINSLSTQLVKCCFCDFLKVKMHTVSYIHFFYLGLCLLTLTSSAAAGPETLCGAELVD ALQFVCGDRGFYFSKPTGYGSSSRLHHKGIVDECCFQSCDLRRLEMYCAPIKPPKSARS VRAQRHTDMPKAQKEVHLKNTSRGNTGNRNYRM Gallus gallus IGF2 MEKINSLSTQLVKCCFCDFLKVKMHTVSYIHFFYLGLCLLTLTSSAAAGPETLCGAELVD ALQFVCGDRGFYFSKPTGYGSSSRLHHKGIVDECCFQSCDLRRLEMYCAPIKPPKSARS VRAQRHTDMPKAQKEVHLKNTSRGNTGNRNYRM Amazona aestiva insulin MALWILSLPLALLALSGPXTSHAAATQHLCGSHLVEALYLVCGERGFFYSPKARRDVEQ PLVSGRLHGEVGELPPQPEEFQKVKRGIVEQCCHNTCSLYQLENYCN Amazona aestiva IGF1 MEKINSLSTQLVKCCLCDFLKVKMHTVSYIHFFYLGLCLLTLTSSAAAGPETLCGAELVD ALQFVCGDRGFYFSKPTGYGSSSRLHHKGIVDECCFQSCDLRRLEMYCAPIKPPKSARS VRAQRHTDMPKAQKEVHLKNTSRGNTGNNYRM Amazona aestiva IGF2 MSAGAHDDERCRQPAFLFGPKVKRGIVEQCCHNTCSLYQLENYCN Amazona aestiva IGF2 MCLSRVQGELDVPTLGFVCSDSGSSKVQRMCAARRMMLLLAFLAYALDSA AAYGTAETLCGGELVDTLQFVCGDRGFYFSRPVGRNNRKINRGIVEECCFRSCDLALLET YCAKSVKSERDLSATSLAGLPALSKESFQKPSHAKYSKYDVWQKKSSQRLQREVPGILRA RQYRRQAEGLQAAEEXALHRPLISLPSQRPPARASPETAGPQK Papilio xuthus Insulin MCLSRVQGELDNVFSLHVMHCFIELKTSEKISKMKLICIMATGILFGNVSTNISFEDGK AMHFCGRTLIDALILLCNMEETHLSAEVQPSEQYIVKNTLNEMKANYKDIKSKLSRRQKR DLVDTCYYRCKYEDLDNYC Papilio xuthus IGF2 MLLRRVVTALLAVAAGAALCGRADAASVAMKLCGRKLGEILSRVCSAYNSPAMDVPTVVE QTAGVVRRREETGIVPCCTQGCTLEHLTEYCATTIKATSETSVDSHMIEDRSAESTGSG STGAAGAAMATAARAPAAHIIKSAARAPVVGTVSPLLTWGRTINDLPTVDNDRXAVI IYA		ALQFVCGPRGFYFNKPTGYGSSIRRAPQTGIVDECCFRSCDLRRLEMYCAPLKPTKAARS
Mus musculus IGF2 MGIPVGKSMLVLLISLAFALCCIAAYGPGETLCGGELVDTLQFVCSDRGFYFSRPSSRAN RRSRGIVEECCFRSCULALLETYCATTKATSETSVDSMUPPOKER Gallus gallus insulin MALWIRSLPLLALLVFSGPGTSYAAANQHLCGSHLVEALYLVCCERGFFYSPKARRDVEQ PLVSSPLRGEAGVLPFQQEEYEKVKRGIVEQCCHNTCSLYQLENYCN Gallus gallus IGF1 MEKINSLSTQLVKCCFCDFLKVKMHTVSYIHFFYLGLCLLTLTSSAAAGPETLCGAELVD ALQFVCGDRGFYFSKPTGYGSSSRLHHKGIVDECCFQSCDLRRLEMYCAPIKPPKSARS VRAQRHTDMPKAQKEVHLKNTSRGNTGNRNYRM Gallus gallus IGF2 MEKINSLSTQLVKCCFCDFLKVKMHTVSYIHFFYLGLCLLTLTSSAAAGPETLCGAELVD ALQFVCGDRGFYFSKPTGYGSSSRLHHKGIVDECCFQSCDLRRLEMYCAPIKPPKSARS VRAQRHTDMPKAQKEVHLKNTSRGNTGNRNYRM Gallus gallus IGF2 MEKINSLSTQLVKCCFCDFLKVKMHTVSYIHFFYLGLCLLTLTSSAAAGPETLCGAELVD ALQFVCGDRGFYFSKPTGYGSSSRLHHKGIVDECCFQSCDLRRLEMYCAPIKPPKSARS VRAQRHTDMPKAQKEVHLKNTSRGNTGNRNYRM Amazona aestiva insulin MALWILSLPLLALLALSGPXTSHAAATQHLCGSHLVEALYLVCGERGFFYSPKARRDVEQ PLVSGRLHGEVGELPFQPEFEQKVKRGIVEQCCHNTCSLYQLENYCN Amazona aestiva IGF1 MEKINSLSTQLVKCCLCDFLKVKMHTVSYIHFFYLGLCLLTLTSSAAAGPETLCGAELVD ALQFVCGDRGFYFSKPTGYGSSSRRLHKGIVDECCFQSCDLRRLEMYCAPIKPPKSARS VRAQRHTDMPKAQKEVHLKNSSRGNTGNRNYRM Amazona aestiva IGF2 MSSAGAHTDERCRQPAFLGPPPEFEVESSGSSKVQMCAARRMMLLLAFLAYALDSA AAYGTAETLCGGELVDTLQPVCGDRGFYFSRPVCRNNRRINRGIVEECCFRSCDLALLET YCAKSVKSERDLSATSLAGLQAALGERAVALHRPLISLPSQRPPAARASPETAGPQK Papilio xuthus insulin MCLSRVQGELDNYFSLHVMHCFILKTSEKISKMKLIICIMATGILFGNVSTNISFEDGK AMHFCGRTLIDALILLCNMEETHLSAEVQPSEQYIVKNTLNEMKANYKDIKSKLSRRQKR DLVDTCYKPCKYEDKIMPC Papilio xuthus IGF2 MLLRRVVTALLAVAGAALCGRADAASVAMKLCGRKLGEILSRVCSAYNSPAWDVPTVVE QTAGVVRRREETGIVYECCTQGCTLEHLTEYCATTIKATSETSVDSMMEDRSAESTGSG STGAAGAAGAATAARAPAAHI KSARARAPVGTVSPLLTWGRTLNTDLPTVDNDRXAVY		IRAQRHTDMPKTQKEVHLKNTSRGSAGNKTYRM
RRSRGTVEECCFRSCDLALLETYCATPAKSEEDVSTSQAVLPDDFPRYPVGKFFQVDTWR QSAGRLRRGLPALLRARGRMLAKELKEFREAKRHRPLIVLPFKDPAHGGASSEMSSNHQ Gallus gallus insulin MALWIRSLPLLALLVFSGPGTSYAAANQHLCCSHLVEALYLVCGERGFFYSPKARRDVEQ PLVSSPLRGEAGULPFQQEEYEKVKRGTVEQCCHNTCSLYQLENYCN Gallus gallus IGF1 MEKINSLSTQLVKCCFCDFLKVKMHTVSYIHFFYLGLCLLTITSSAAAGPETLCGAELVD ALQFVCCDRGFYFSKPTGYGSSSRRLHHKGTVDECCFQSCDLRRLEMYCAPIKPPKSARS VRAQRHTDMPKAQKEVHLKNTSRGNTGNRNYRM Gallus gallus IGF2 MEKINSLSTQLVKCCFCDFLKVKMHTVSYIHFFYLGLCLLTITSSAAAGPETLCGAELVD ALQFVCCDRGFYFSKPTGYGSSSRRLHHKGTVDECCFQSCDLRRLEMYCAPIKPPKSARS VRAQRHTDMPKAQKEVHLKNTSRGNTGNRNYRM Amazona aestiva insulin MALWILSLPLLALLALSGPXTSHAAATQHLCGSHLVEALYLVCGERGFFYSPKARRDVEQ PLVSGRLHEEVGELPFQPEEFQVVRRGTVEQCCHNTCSLYQLENYCN Amazona aestiva IGF1 MEKINSLSTQLVKCCLCDFLKVKMHTVSYIHFFYLGLCLLTITSSAAAGPETLCGAELVD ALQFVCGDRGFYFSKPTGYGSSSRSRLHKGTVDECCFQSCDLRRLEMYCAPIKPPKSARS VRAQRHTDMPKAQKEVHLKNTSRGNTGRNYRM Amazona aestiva IGF2 MSSAGAHTDERCRQPAFLPGPEPFQVKRGTVEQCCHNTCSLYQLENYCAPIKPPKSARS VRAQRHTDMPKAQKEVHLKNSSRONTGRNYRM Amazona aestiva IGF2 MSSAGAHTDERCRQPAFLPGPEPPPPEVESSSGSSKVQRMCAARRMLLLLAFLAYALDSA AAYGTAETLCGGELVDTLQFVCGDRGFYFSRPARASKEDAYSKYDVMQKKSSQRLQREVPGILRA RQYRWQAEGLQAAEEAKALHRPLISLSPSQRPARASPETAGPQK	Mus musculus IGF2	MGIPVGKSMLVLLISLAFALCCIAAYGPGETLCGGELVDTLQFVCSDRGFYFSRPSSRAN
Gallus gallus insulin MALWIRSLPILALLVFSGPGTSYAAANQHLCGSHLVEALVLVCGERGFFYSPKARRDVEQ PLVSSPLRGEAGVLPFQQEEYEKVKRGIVEQCCHNTCSLYQLENYCN Gallus gallus IGF1 MEKINSLSTQLVKCCFCDFLKVKMHTVSYIHFFYLGLCLLTLTSSAAAGPETLCGAELVD ALQFVCGDRGFYFSKPTGYGSSSRRLHHKGIVDECCFQSCDLRRLEMYCAPIKPPKSARS VRAQRHTDMPKAQKEVHLKNTSRGNTGNRNYRM Gallus gallus IGF2 MEKINSLSTQLVKCCFCDFLKVKMHTVSYIHFFYLGLCLLTLTSSAAAGPETLCGAELVD ALQFVCGDRGFYFSKPTGYGSSSRRLHHKGIVDECCFQSCDLRRLEMYCAPIKPPKSARS VRAQRHTDMPKAQKEVHLKNTSRGNTGNRNYRM Amazona aestiva insulin MALWILSLPLLALLALSGPXTSHAAATQHLCGSHLVEALYLVCGERGFFYSPKARRDVEQ PLVSGRLHGEVGELPFQPEEPGKVKRGIVEQCCHNTCSLYQLENYCN Amazona aestiva IGF1 MEKINSLSTQLVKCCLCDFLKVKMHTVSYIHFFYLGLCLLTLTSSAAAGPETLCGAELVD ALQFVCGDRGFYFSKPTGYGSSSRRLHHKGIVDECCFQSCDLRRLEMYCAPIKPPKSARS VRAQRHTDMPKAQKEVHLKNSSRGNTGNRNYRM Amazona aestiva IGF2 MSSAGAHTDERCRQPAFLPGPPEPEVESSSGSSKVQRMCAARRMMLLLAFLAYALDSA AAyGTAETLCGGELVDTLQFVCGDRGFYFSRPVGRNNRRINRGIVEECCFRSCDLALLET YCAKSVKSERDLSATSLAGLPALSKESFQKPSHAKYSKYDVWQKKSSQRLQREVPGILRA RQYRWQAEGLQAAEEAKALHRPLISLPSQRPARARSPETAGPQK Papilio xuthus insulin MCLSRVQGELDNVFSLHVMHCFIEIKTSEKISKMKLIICIMATGILFGNVSTNISFEDGK AMHFCGRTLIDALILLCNMEETHLSAEVQPSEQYIVKNTLNEMKANYKDIKSKLSRRQKR DLVDTCCYKPCKYEDLRMYC Papilio xuthus IGF2 MLLRRVVTALLAVAGAALCGRADASVAMKLCGRKLGELLSRVCSAYNSPAWDVPTVVE QTAGVWRRRETGIVYECCTQCCTLEHLTEYCATTIKATSETSVDSHMIEDRSAESTGSG STGAAGAAGMATAARAPAAHIIKSAARAPVVGTVSPLLTWGRTLNTDLPTVDNDRYAYV IVA		RRSRGIVEECCFRSCDLALLETYCATPAKSERDVSTSQAVLPDDFPRYPVGKFFQYDTWR
PLVSSPLRGEAGVLPFQQEEYEKVKRGIVEQCCHNTCSLYQLENYCN Gallus gallus IGF1 MEKINSLSTQLVKCCFCDFLKVKMHTVSYIHFFYLGLCLLTLTSSAAAGPETLCGAELVD ALQFVCGDRGFYFSKPTGYGSSSRRLHHKGIVDECCFQSCDLRRLEMYCAPIKPPKSARS VRAQRHTDMFKAQKEVHLKNTSRGNTGNRNYRM Gallus gallus IGF2 MEKINSLSTQLVKCCFCDFLKVKMHTVSYIHFFYLGLCLLTLTSSAAAGPETLCGAELVD ALQFVCGDRGFYFSKPTGYGSSSRRLHHKGIVDECCFQSCDLRRLEMYCAPIKPPKSARS VRAQRHTDMFKAQKEVHLKNTSRGNTGNRNYRM Amazona aestiva insulin MALWILSLPLLALLALSGPXTSHAAATQHLCGSHLVEALYLVCGERGFFYSPKARRDVEQ PLVSGRLHGEVGELPFQPEEFQKVKRGIVEQCCHNTCSLYQLENYCN Amazona aestiva IGF1 MEKINSLSTQLVKCCLCDFLKVKMHTVSYIHFFYLGLCLLTLTSSAAAGPETLCGAELVD ALQFVCGDRGFYFSKPTGYGSSSRRLHHKGIVDECCFQSCDLRRLEMYCAPIKPPKSARS VRAQRHTDMFKAQKEVHLKNSSRGNTGNRNYRM Amazona aestiva IGF2 MEKINSLSTQLVKCCLCDFLKVKMHTVSYIHFFYLGLCLLTLTSSAAAGPETLCGAELVD ALQFVCGDRGFYFSKPTGYGSSSRRLHHKGIVDECCFQSCDLRRLEMYCAPIKPKSARS VRAQRHTDMFKAQKEVHLKNSSRGNTGNRNYRM Amazona aestiva IGF2 MEKINSLSTQLVKCCLCDFLKVKMHTVSYIHFFYLGLCLLTLSSAAAGPETLCGAELVD Papilio xuthus insulin MCLSRVQGELDNVFSLHVMCFIEIKTSEKISKMKLIICIMATGILFGNVSTNISFEDGK AMHFCGRTLIDALILLCNMEETHLSAEVQPSEQYIVKNTLNEMKANYKDIKSKLSRRQKR DLVDTCCYKPCKYEDLRMYC Papilio xuthus IGF2 MLLRRVVTALLAVAGAALCGRADAASVAMKLCGRKLGERLGEILSRVCSAYNSPAWDVPTVVE QTAGVVRRRETGIVYECCTQGCTLEHLTEYCATTIKATS	Gallus gallus insulin	MALWIRSLPLLALLVFSGPGTSYAAANOHLCGSHLVEALYLVCGERGFFYSPKARRDVEO
Gallus gallus IGF1 MEKINSLSTQLVKCCFCDFLKVKMHTVSYIHFFYLGLCLLTLTSSAAAGPETLCGAELVD ALQFVCGDRGFYFSKPTGYGSSSRRLHHKGIVDECCFQSCDLRRLEMYCAPIKPPKSARS VRAQRHTDMPKAQKEVHLKNTSRGNTGNRNYRM Gallus gallus IGF2 MEKINSLSTQLVKCCFCDFLKVKMHTVSYIHFFYLGLCLLTLTSSAAAGPETLCGAELVD ALQFVCGDRGFYFSKPTGYGSSSRRLHHKGIVDECCFQSCDLRRLEMYCAPIKPPKSARS VRAQRHTDMPKAQKEVHLKNTSRGNTGNRNYRM Amazona aestiva insulin MALWILSLPLLALLALSGPXTSHAAATQHLCGSHLVEALYLVCGERGFFYSPKARRDVEQ PLVSGRLHGEVGELPFQPEEFQKVKRGIVEQCCHNTCSLYQLENYCN Amazona aestiva IGF1 MEKINSLSTQLVKCCLCDFLKVKMHTVSYIHFFYLGLCLLTLTSSAAAGPETLCGAELVD ALQFVCGDRGFYFSKPTGYGSSSRRLHHKGIVDECCFQSCDLRRLEMYCAPIKPPKSARS VRAQRHTDMPKAQKEVHLKNSSRGNTGNRNYRM Amazona aestiva IGF2 MSSAGAHTDERCRQPAFLPGPPPFPEVESSSGSSKVQRMCAARRMMLLLAFLAYALDSA AAYGTAETLCGGELVDTLQFVCGDRGFYFSRPVGRNNRINRGIVEECCFRSCDLALLET YCAKSVKSERDLSATSLAGLPALSKESFQKPSHAKYSKYDVWQKKSSQRLQREVPGILRA Papilio xuthus insulin MCLSRVQGELDNVFSLHVMHCFIELKTSEKISKMKLLICIMATGILFGNVSTNISFEDGK AMHFCGRTLIDALILLCNMEETHLSAEVQPSEQYIVKNTLNEMKANYKDIKSKLSRRQKR DLVDTCCYKPCKYEDLRMYC Papilio xuthus IGF2 MLLRVVTALLAVAAGAALCGRADAASVAMKLCGRKLGEILSRVCSAYNSPAWDVPTVVE QTAGVVRRRETGIVYECCTQGCTLEHLTEYCATTIKATSETSVDSHMIEDRSAESTGSG STGAAGAGMATAARAPAAHIIKSAARAAPVVGTVSPLLTWGRTLNTDLPTVDNDRYAYV	5	PLVSSPLRGEAGVLPFQQEEYEKVKRGIVEQCCHNTCSLYQLENYCN
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Gallus IGF2 WEKINSLSTQLVKCCFOFLKVKMHTVSYIHFFYLGLCLLTLTSSAAAGPETLCGAELVD ALQFVCGDRGFYFSKPGYGSSSRLHHKGIVDECCFQSCDLRLEMYCAPIKPPKSARS VRAQRHTDMPKAQKEVHLKNTSRGNTGNRNYRM Amazona aestiva insulin MALWILSLPLLALLALSGPXTSHAAATQHLCGSHLVEALYLVCGERGFFYSPKARRDVEQ PLVSGRLHGEVGELPFQPEEFQKVKRGIVEQCCHNTCSLYQLENYCN Amazona aestiva IGF1 MEKINSLSTQLVKCCLCDFLKVKMHTVSYIHFFYLGLCLLTTSSAAAGPETLCGAELVD ALQFVCGDRGFYFSKPTGYGSSSRRLHHKGIVDECCFQSCDLRRLEMYCAPIKPPKSARS VRAQRHTDMPKAQKEVHLKNSSRGNTGNRNYRM Amazona aestiva IGF2 MSSAGAHTDERCRQPAFLPGPPPPEVESSSGSSKVQRMCAARRMMLLLAFLAYALDSA AAYGTAETLCGGELVDTLQFVCGDRGFYFSRPVGRNNRRINRGIVEECCFRSCDLALLET YCAKSVKSERDLSATSLAGLPALSKESFQKPSHAKYSKYDVWQKKSSQRLQREVPGILRA RQYRWQAEGLQAAEEAKALHRPLISLPSQRPPAARASPETAGPQK Papilio xuthus insulin MCLSRVQCELDNVFSLHVMHCFIEIKTSEKISKMKLIICIMATGILFGNVSTNISFEDGK AMHFCGRTLIDALILCNMEETHLSAEVQPSEQYIVKNTLNEMKANYKDIKSKLSRRQKR DLVDTCCYKPCKYEDLRMYC Papilio xuthus IGF2 MLRRVVTALLAVAAGAALCGRADAASVAMKLCGRKLGEILSRVCSAYNSPAWDVPTVVE QTAGVVRRRRETGIVYECCTQGCTLEHLTEYCATTIKATSETSVDSHMIEDRSAESTGSG STGAAGAAGMATAARAPAAHIIKSAARAAPVVGTVSPLLTWGRTLNTDLPTVDNDRYAYV IYA		ALQFVCGDRGFYFSKPTGYGSSSRRLHHKGIVDECCFQSCDLRRLEMYCAPIKPPKSARS
ALQFVCGDRGFYFSKPTGYGSSSRRLHHKGIVDECCFQSCDLRRLEMYCAPIKPPKSARS VRAQRHTDMPKAQKEVHLKNTSRGNTGNRNYRM Amazona aestiva insulin MALWILSLPLLALLALSGPXTSHAAATQHLCGSHLVEALYLVCGERGFFYSPKARRDVEQ PLVSGRLHGEVGELPFQPEEFQKVKRGIVEQCCHNTCSLYQLENYCN Amazona aestiva IGF1 MEKINSLSTQLVKCCLCDFLKVKMHTVSYIHFFYLGLCLLTLTSSAAAGPETLCGAELVD ALQFVCGDRGFYFSKPTGYGSSSRRLHHKGIVDECCFQSCDLRLEMYCAPIKPPKSARS VRAQRHTDMPKAQKEVHLKNSSRGNTGNRNYRM Amazona aestiva IGF2 MSSAGAHTDERCRQPAFLPGPPPPEVESSSGSSKVQRMCAARRMLLLLAFLAYALDSA AAYGTAETLCGGELVDTLQFVCGDRGFYFSRPVGRNNRRINRGIVEECCFRSCDLALLET YCAKSVKSERDLSATSLAGLPALSKESFQKPSHAKYSKYDVWQKKSSQRLQREVPGILRA RQYRWQAEGLQAAEEAKALHRPLISLPSQRPPAARASPETAGPQK Papilio xuthus insulin MCLSRVQGELDNVFSLHVMHCFIEIKTSEKISKMKLIICIMATGILFGNVSTNISFEDGK AMHFCGRTLIDALILLCNMEETHLSAEVQPSQYIVKNTLNEMKANYKDIKSKLSRQKR DLVDTCCYKPCKYEDLRMYC Papilio xuthus IGF2 MLLRRVVTALLAVAAGAALCGRADAASVAMKLCGRKLGEILSRVCSAYNSPAWDVPTVVE QTAGVVRRRETGIVYECCTQGCTLEHLTEYCATTIKATSETSVDSHMIEDRSAESTGSG STGAAGAAGMATAARAPAAHIIKSAARAAPVVGTVSPLLTWGRTLNTDLPTVDNDRYAYV	Gallus gallus IGE2	VRAQRHTDMPKAQKEVHLKNTSRGNTGNRNYRM MEKINSLSTOLVKCCECDELKVKMHTVSYTHFFYLGLCLLTLTSSAAAGPETLCGAELVD
VRAQRHTDMPKAQKEVHLKNTSRGNTGNRNYRM Amazona aestiva insulin MALWILSLPLLALLALSGPXTSHAAATQHLCGSHLVEALYLVCGERGFFYSPKARRDVEQ PLVSGRLHGEVGELPFQPEEFQKVKRGIVEQCCHNTCSLYQLENYCN Amazona aestiva IGF1 MEKINSLSTQLVKCCLCDFLKVKMHTVSYIHFFYLGLCLLTLTSSAAAGPETLCGAELVD ALQFVCGDRGFYFSKPTGYGSSSRRLHHKGIVDECCFQSCDLRRLEMYCAPIKPPKSARS VRAQRHTDMPKAQKEVHLKNSSRGNTGNRNYRM Amazona aestiva IGF2 MSSAGAHTDERCRQPAFLPGPPPPPEVESSSGSSKVQRMCAARRMMLLLAFLAYALDSA AAYGTAETLCGGELVDTLQFVCGDRGFYFSRPVGRNNRRINRGIVEECCFRSCDLALLET YCAKSVKSERDLSATSLAGLPALSKESFQKPSHAKYSKVDVWQKKSSQRLQREVPGILRA RQYRWQAEGLQAAEEAKALHRPLISLPSQRPPAARASPETAGPQK Papilio xuthus insulin MCLSRVQGELDNVFSLHVMHCFIEIKTSEKISKMKLIICIMATGILFGNVSTNISFEDGK AMHFCGRTLIDALILLCNMEETHLSAEVQPSEQYIVKNTLNEMKANYKDIKSKLSRQKR DLVDTCCYKPCKYEDLRMYC MLLRRVVTALLAVAAGAALCGRADAASVAMKLCGRKLGEILSRVCSAYNSPAWDVPTVVE QTAGVVRRRETGIVYECCTQGCTLEHLTEYCATTIKATSETSVDSHMIEDRSAESTGSG STGAAGAAGMATAARAPAAHIIKSAARAAPVVGTVSPLLTWGRTLNTDLPTVDNDRYAYV		ALQFVCGDRGFYFSKPTGYGSSSSRRLHHKGIVDECCFQSCDLRRLEMYCAPIKPPKSARS
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Amazona aestiva IGF1 MERTINOSTIGETICOLOGITENTITISTITUTUSTITUTUSCELETETICSARAGETTICGALEUE ALQFVCGDRGFYFSKPTGYGSSSRRLHHKGIVDECCFQSCDLRRLEMYCAPIKPPKSARS VRAQRHTDMPKAQKEVHLKNSSRGNTGNRNYRM Amazona aestiva IGF2 MSSAGAHTDERCRQPAFLPGPPPPPEVESSSGSSKVQRMCAARRMMLLLAFLAYALDSA AAYGTAETLCGGELVDTLQFVCGDRGFYFSRPVGRNNRRINRGIVEECCFRSCDLALLET YCAKSVKSERDLSATSLAGLPALSKESFQKPSHAKYSKYDVWQKKSSQRLQREVPGILRA RQYRWQAEGLQAAEEAKALHRPLISLPSQRPPAARASPETAGPQK MCLSRVQGELDNVFSLHVMHCFIEIKTSEKISKMKLIICIMATGILFGNVSTNISFEDGK AMHFCGRTLIDALILLCNMEETHLSAEVQPSEQYIVKNTLNEMKANYKDIKSKLSRQKR DLVDTCCYKPCKYEDLRMYC Papilio xuthus IGF2 MLLRRVVTALLAVAAGAALCGRADAASVAMKLCGRKLGEILSRVCSAYNSPAWDVPTVVE QTAGVVRRRETGIVYECCTQGCTLEHLTEYCATTIKATSETSVDSHMIEDRSAESTGSG STGAAGAAGMATAARAPAAHIIKSAARAAPVVGTVSPLLTWGRTLNTDLPTVDNDRYAYV	Amazona aestiva IGE1	PLVSGRLHGEVGELPFQPEEFQKVKRGIVEQCCHNTCSLYQLENYCN
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Papilio xuthus insulin YCAKSVKSERDLSAEEAKALHRPLISLPSQRPPAARASPETAGPQK RQYRWQAEGLQAAEEAKALHRPLISLPSQRPPAARASPETAGPQK MCLSRVQGELDNVFSLHVMHCFIEIKTSEKISKMKLIICIMATGILFGNVSTNISFEDGK AMHFCGRTLIDALILLCNMEETHLSAEVQPSEQYIVKNTLNEMKANYKDIKSKLSRRQKR DLVDTCCYKPCKYEDLRMYC Papilio xuthus IGF2 MLLRRVVTALLAVAAGAALCGRADAASVAMKLCGRKLGEILSRVCSAYNSPAWDVPTVVE QTAGVVRRRETGIVYECCTQGCTLEHLTEYCATTIKATSETSVDSHMIEDRSAESTGSG STGAAGAAGMATAARAPAAHIIKSAARAAPVVGTVSPLLTWGRTLNTDLPTVDNDRYAYV		AAYGTAETLCGGELVDTLQFVCGDRGFYFSRPVGRNNRRINRGIVEECCFRSCDLALLET
Papilio xuthus insulin MCLSRVQGELDNVFSLHVMHCFIEIKTSEKISKMKLIICIMATGILFGNVSTNISFEDGK AMHFCGRTLIDALILLCNMEETHLSAEVQPSEQYIVKNTLNEMKANYKDIKSKLSRQKR DLVDTCCYKPCKYEDLRMYC Papilio xuthus IGF2 MLLRRVVTALLAVAAGAALCGRADAASVAMKLCGRKLGEILSRVCSAYNSPAWDVPTVVE QTAGVVRRRETGIVYECCTQGCTLEHLTEYCATTIKATSETSVDSHMIEDRSAESTGSG STGAAGAAGMATAARAPAAHIIKSAARAAPVVGTVSPLLTWGRTLNTDLPTVDNDRYAYV		YCAKSVKSERDLSATSLAGLPALSKESFQKPSHAKYSKYDVWQKKSSQRLQREVPGILKA ROYRWOAFGLOAAFFAKALHRPLISLPSORPDAARASPETAGDOK
AMHFCGRTLIDALILLCNMEETHLSAEVQPSEQYIVKNTLNEMKANYKDIKSKLSRRQKR DLVDTCCYKPCKYEDLRMYC Papilio xuthus IGF2 MLLRRVVTALLAVAAGAALCGRADAASVAMKLCGRKLGEILSRVCSAYNSPAWDVPTVVE QTAGVVRRRETGIVYECCTQGCTLEHLTEYCATTIKATSETSVDSHMIEDRSAESTGSG STGAAGAAGMATAARAPAAHIIKSAARAAPVVGTVSPLLTWGRTLNTDLPTVDNDRYAYV IYA	Papilio xuthus insulin	MCLSRVQGELDNVFSLHVMHCFIEIKTSEKISKMKLIICIMATGILFGNVSTNISFEDGK
DLVDTCCYKPCKYEDLRMYC Papilio xuthus IGF2 MLLRRVVTALLAVAAGAALCGRADAASVAMKLCGRKLGEILSRVCSAYNSPAWDVPTVVE QTAGVVRRRETGIVYECCTQGCTLEHLTEYCATTIKATSETSVDSHMIEDRSAESTGSG STGAAGAAGMATAARAPAAHIIKSAARAAPVVGTVSPLLTWGRTLNTDLPTVDNDRYAYV IYA IYA		AMHFCGRTLIDALILLCNMEETHLSAEVQPSEQYIVKNTLNEMKANYKDIKSKLSRRQKR
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QIAGVVKKKEIGIVIECCTQGCTLEHLTEICATTIKATSETSVDSHMIEDKSAESTGSG STGAAGAAGMATAARAPAAHIIKSAARAAPVVGTVSPLLTWGRTLNTDLPTVDNDRYAYV IYA	Papilio xuthus IGF2	MLLRRVVTALLAVAAGAALCGRADAASVAMKLCGRKLGEILSRVCSAYNSPAWDVPTVVE
IYA		VIGVVACAALIGIVILUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUU
		ІҮА

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Table S	66. C	ont.
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VILP source	Sequence
Acyrthosiphon pisum insulin	MKISMYLSVILLALVIKVVTANVRLQRSPQQYCGSKLADIMKALCNTKYNVPKGHKRSEI
	DFDVWDYKDLEDYNAVDYPYIKKEDISFMPSRFRRSVKRSIIDECCRRPCYLSELKSYCA
	SQ
Ceratitis capitata insulin	MKFPEQTLSFPNLLCLSFVVISLVFCVELSPHCTEALPLLPGGSTEVEFKRYCSTNLSDA
	IRLICGGRYYSLSRKFPDSVGMAQVSSLKRLAGEDGEYRQPFQGAIHECCRRPCGYSELK
	SYCDPDY
Cavia porcellus insulin	MALWMHLLTVLALLALWGPNTGQAFVSRHLCGSNLVETLYSVCQDDGFFYIPKDRRELED
	PQVEQTELGMGLGAGGLQPLALEMALQKRGIVDQCCTGTCTRHQLQSYCN
Cavia porcellus IGF1	MHAVSSSHLFYLAFCLLVLTSSATAGPETLCGAELVDALQFVCGDRGFYFNKPTGYGSSS
	${\tt RRAPQTGIVDECCFRSCDLRRLEMYCAPLKPAKSARSVRAQRHTDMPKTQKEVHLKNASR$
	GSAGNKNYRM
Cavia porcellus IGF2	MGISMGKSMLVLLTFLAFASCCIAAYRPSETLCGGELVDTLQFVCGDRGFYFSRPASRVS
	${\tt RRSRGIVEECCFRSCDLALLETYCATPAKSERDVSASLAVLPDNFPRYPVGKFFQYDTWR$
	QSTQRLRR
SGIV-VILP	${\tt THQLQVCGGELIDALTEHCGDRGVYTPPRRGRRTRSVGLADACCKNECDENELDRYCN$
GIV-VILP	TYQLQVCGGELIDALTEHCGDRGVYTPSRRGRRNRSVGLADACCKNECNENELDRYCN
LCDV1-VILP	ITAEILCSAHLVAALQRVCGNRGVYRPPPTRRRSTRNGTTGIATKCCTTTGCTTDDLEKYCN
LCDV-Sa-VILP	ILCQTLCGSELVDALELVCGEYGGIYRPPKNANKKPQSGKKIVDVCCTTKGCNYMDLKQYCN

Table S7. Approximate EC_{50} values (nM) calculated for the autophosphorylation experiment

Receptor	Human insulin	hIGF-1	GIV	SGIV	LCDV-1
hIGF1R	41	0.9	438	92	11
hIR-A	0.51	8	2,063	745	484
hIR-B	0.65	39	4,208	3,510	2,787

Other Supporting Information Files

Dataset S1 (PDF)
Dataset S2 (PDF)
Dataset S3 (PDF)
Dataset S4 (PDF)
Dataset S5 (PDF)
Dataset S6 (PDF)

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