

ELECTRONIC APPENDIX

This is the Electronic Appendix to the article

Behavioural manipulation in a grasshopper harbouring hairworm: a proteomics approach

by

D. G. Biron, L. Marché, F. Ponton, H. D. Loxdale, N. Galéottia, L. Renault, C. Joly & F. Thomas

Proc. R. Soc. B ([doi:10.1098/rspb.2005.3213](https://doi.org/10.1098/rspb.2005.3213))

Electronic appendices are refereed with the text; however, no attempt is made to impose a uniform editorial style on the electronic appendices.

Table 4: Identification of proteins showing a differential expression in the grasshopper CNS and in the hairworm during the observation of the abnormal behaviour of the host.

Localization	Protein Spot Identity	Protein name (Find in SwissProt (#) and TrEMBL(*))	Accession Number	Family of protein	Exp. pI_Mw	Theo. pI_Mw	Known Function
<i>In grasshopper's CNS</i>	hA	Act2 (#)	P07837	Actin; 1	5.13_45.8	5.29_41.6	Actins are highly conserved proteins that are involved in various types of cell motility and are ubiquitously expressed in all eukaryotic cells. Multiple isoforms are involved in various cellular functions such as cytoskeleton structure, cell mobility, chromosome movement and muscle contraction.
	hB	Alpha-tubulin (#)	Q8T8B5	Tubulin; 1	4.98_60.9	4.97_50.1	This family includes the tubulin alpha, beta and gamma chains, as well as the bacterial FtsZ family of proteins. Members of this family are involved in polymer formation. FtsZ is the polymer-forming protein of bacterial cell division. It is part of a ring in the middle of the dividing cell that is required for constriction of cell membrane and cell envelope to yield two daughter cells. FtsZ and tubulin are GTPases. FtsZ can polymerise into tubes, sheets, and rings <i>in vitro</i> and is ubiquitous in eubacteria and archaea. Tubulin is the major component of microtubules.
	hC	CG31732-PD, isoform D (*)	Q8IP47	Unknown	5.00_60.3	5.25_63.8	Implied in biological process of geotactic behaviour (gravitactic behaviour: the orientated locomotion of an organism in response to gravity).
	hD	Hunchback protein (#)	Q01791	zf-C2H2; 6	5.04_61.0	6.20_59.5	Gap class segmentation protein that controls development of head structures.
	hE	Moosin/ezrin/radixin homolog 1 (#)	P46150	Band_41; 1	5.27_52.9	5.60_60.5	In embryonic CNS, expression is seen in the neuropil, developing brain and neuronal cell bodies. Involved in connections of major cytoskeletal structures to the plasma membrane.
	hF	Flotillin-2 (#)	O61492	Band_7; 1 Flotillin; 1	5.95_45.6	5.70_46.6	May play a role in axon growth and regeneration as well as in epidermal cell adhesion and epidermal structure and function. Biological process: cell adhesion
	hG	CG8863-PA, isoform A (*)	Q9V9V9	DnaJ; 1	5.97_49.2	6.08_45.2	Reactions triggered in response to the presence of a foreign body or the occurrence of an injury, which result in restriction of damage to the organism attacked or prevention/recovery from the infection caused by the attack. Also, a change in state or activity of an organism or cell (in terms of movement, secretion, enzyme production, gene expression, etc.) that occurs in response to stress, usually, but not necessarily exogenous (e.g. temperature, humidity, ionizing radiation).
	hH	Neural/ectodermal development factor IMP-L2 [Precursor] (#)	Q09024	Ig; 2	5.13_34.1	5.7_29.4	Essential developmental role during embryogenesis, in particular the normal development of the nervous system. May be involved in some aspect of cell adhesion.
	hI	Wingless [Fragment] (*)	Q27671	Wnt; 1	4.81_31.0	Undefined; Undefined	It is thought to play a role in intercellular communication and seems to be a signaling

	molecule important in the development of the central nervous system (CNS). The sequence of wnt-1 is highly conserved in mammals, fish, and amphibians. Wnt-1 is a member of a large family of related proteins that are all thought to be developmental regulators. These proteins are known as wnt-2 (also known as irp), wnt-3 up to wnt-15. At least four members of this family are present in <i>Drosophila</i> .					
hJ	Synaptosome-associated protein SNAP-25-1 (*)	O96574	SNAP-25; 1. SNARE; 1.	5.14_30.1	4.43_22.0	Biological process: endocytosis and exocytosis in CNS.
hK	Wingless [Fragment]	O46295	wnt; 1	5.67_22.3	Undefined; Undefined	Wnt-1 (previously known as int-1) is a proto-oncogene induced by the integration of the mouse mammary tumor virus. It is thought to play a role in intercellular communication and seems to be a signaling molecule important in the development of the central nervous system (CNS).
hL	Similar to <i>Drosophila</i> melanogaster qm [Fragment] (*)	Q6XIN5	Ribosomal_L10e; 1	5.86_23.5	Undefined; Undefined	Biological process: protein biosynthesis.
hM	Unknown			4.99_30.3		Unknown
hN	Unknown			5.38_37.7		Unknown
hO	Unknown			5.45_29.1		Unknown
hP	Unknown			5.50_30.8		Unknown
hQ	Unknown			5.65_31.0		Unknown
hR	Unknown			5.83_33.1		Unknown
pA	Actin (#)	P90689	Actin; 1	5.13_45.8	5.3_41.7	As with Act2 (#) above
pB	Hypothetical protein Y49E10.23a (*)	Q9XTT2	CARD; 1	4.94_73.2	5.27_84.7	Biological process: regulation of apoptosis.
pC	Hypothetical protein C47D12.6b (*)	Q86D21	HGTP_anticondon; 1	5.21_69.1	6.43_79.5	Biological process: protein biosynthesis.
pD	Heat shock protein 60 (*)	Q8MZM9	Cpn60_TCP1; 1	5.06_60.6	6.55_62.3	Molecular function: unfolded protein binding.
pE	Tyrosine 3-monooxygenase (#)	P90986	Biopterin_H; 1	5.63_63.6	6.2_59.6	Biological process: aromatic amino acid family metabolism
pF	Unknown			5.90_58.3		Unknown
pG	Putative acetylcholine regulator unc-18 (#)	P34815	Sec1; 1	5.91_60.0	6.50_67.4	Sec1-like molecules have been implicated in a variety of eukaryotic vesicle transport processes including neurotransmitter release by exocytosis. They regulate vesicle transport by binding to t-SNARE, from the syntaxin family. This process is thought to prevent SNARE complex formation, a protein complex required for membrane fusion. Whereas Sec1 molecules are essential for neurotransmitter release and other secretory events, their interaction with syntaxin molecules seems to represent a

	negative regulatory step in secretion.					
pH	Intermediate filament protein [Fragment] (*)	Q17092	Filament; 1.	5.96_58.6	Undefined; Undefined	Molecular function: structural molecule activity. Intermediate filaments are proteins which are primordial components of the cytoskeleton and the nuclear envelope. They generally form filamentous structures 8 to 14 nm wide.
pI	Beta-tubulin (*)	Q66T51	Tubulin; 1; Tubulin_C; 1	5.62_52.4	4.70_50.2	See spot pE
pJ	Unknown			5.61_50.8		Unknown
pK	Guanine nucleotide-binding protein alpha-16 subunit (#)	Q9N2V6	G-alpha; 1	5.63_50.7	5.32_412	Guanine nucleotide-binding proteins (G proteins) are involved as modulators or transducers in various trans-membrane signaling systems.
pL	Bestrophin 1 (#)	Q21973	Bestrophin; 1	5.59_49.8	6.01_60.5	Molecular function unknown
pM	Arginine kinase (*)	Q9NKV4	ATP-gua_Ptrans; 1	5.61_48.8	6.28_39.1	Molecular function: transferase activity, transferring phosphorus-containing groups. It catalyzes the reversible transfer of high energy phosphate from ATP to creatine, generating phosphocreatine and ADP. There are at least four different, but very closely related, forms of CK. Two isozymes, M (muscle) and B (brain), are cytosolic, whilst the other two are mitochondrial. In sea urchins there is a flagellar isozyme, which consists of the triplication of a CK-domain. A cysteine residue is implicated in the catalytic activity of these enzymes and the region around this active site residue is highly conserved.
pN	Unknown			5.62_48.1		Unknown
pO	Hypothetical protein CBG14575 (*)	Q618N4	Unknown	5.85_50.7	6.19_45.8	Unknown
pP	Heat shock protein 60 (*)	Q8MZM9	Cpn60_TCP1; 1	6.00_48.8	6.55_62.3	Molecular function: unfolded protein binding.
pQ	Wnt5_DROSO(*)	P28466	Wnt; 1	5.49_38.5	Undefined; Undefined	See spot hI
pR	Hypothetical protein CBG08254 [Fragment] (*)	Q61N05	Unknown	4.93_34.8	Undefined; Undefined	Unknown
pS	DNA binding protein [Fragment] (*)	Q08128	zf-C2H2; 8	5.18_31.9	Undefined; Undefined	Molecular function: zinc ion binding.
pT	Troponin t protein 4, isoform b (*)	Q86S43	Troponin; 1	5.54_32.4	5.05_36.2	The troponin (Tn) complex regulates Ca ²⁺ -induced muscle contraction.. This family forms structural complexes with other P1am families.
pU	Probable deoxyhypusine synthase (#)	Q9XXJ0	DS; 1	5.85_33.6	5.50_40.5	Catalyzes the NAD-dependent oxidative cleavage of spermidine and the subsequent transfer of the butylamine moiety of spermidine to the epsilon-amino group of a specific lysine residue of the eIF-5A precursor protein to form the intermediate deoxyhypusine residue.
pV	NOA36-like protein (*)	Q8WQH6	NOA36; 1	5.85_32.9	7.60_36.6	This family consists of several NOA36 proteins which contain 29 highly conserved cysteine residues. The function of this protein is unknown.
pX	Unknown			4.98_29.2		Unknown

pY	Wnt4_DROME (*)	P40589	wnt; 1	5.04_27.4	Undefined; Undefined	Wnt-1 (previously known as int-1) is a proto-oncogene induced by the integration of the mouse mammary tumor virus. It is thought to play a role in intercellular communication and seems to be a signaling molecule important in the development of the central nervous system (CNS).
pZ	Hypothetical protein C54D10.10	Q18836	Kunitz_BPTI; 2	5.41_24.5	5.99_25.9	Molecular function: serine-type endopeptidase inhibitor activity
pA1	Binding protein 2 like protein [Fragment]	Q7Z288	FKBP_C; 1.	5.88_31.0	Undefined; Undefined	Biological process: protein folding
pB1	Hypothetical protein CBG15114 [Fragment]	Q616W4	Unknown	5.97_27.6	Undefined; Undefined	Unknown