**Table S3. Summary of ZP protein expression and phenotypes**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| ***C. elegans* ZP proteins** | **Class** | **Expression** | | | | **Mutant (or RNAi) phenotype** | **Reference** |
| **Stage** | **Cell types** | **Matrix** | **Evidence** |
| CUT-1 | IIIa | Dauer | Seam Epidermis | Alae | Tx; Ab | Dauer: Dpy, no alae | SEBASTIANO *et al.* 1991;  FAVRE *et al.* 1998;  SAPIO *et al.* 2005 |
| CUT-3 | IIIa | Late embryo | N.D. | N.D. | RT-PCR | L1: Dpy, no alae | SAPIO *et al.* 2005 |
| CUT-4 | IIIa | Adult | N.D. | N.D. | RT-PCR | Adult: abnormal cuticle | SAPIO *et al.* 2005 |
| CUT-5 | IIIa | Embryo,  Dauer | Seam Epidermis | N.D. | Tx | L1: Dpy, abnormal/broken alae;  Dauer: Dpy, abnormal/broken alae | SAPIO *et al.* 2005 |
| CUT-6 | IIIb | Late embryo, L1, Dauer | Seam Epidermis | Alae | Tx; Ab | Dauer: Dpy, missing/abnormal alae and annuli | MURIEL *et al.* 2003 |
| DYF-7 | I | Embryo – L1 | Neurons,  Excretory canal | Sensory matrix  at nose tip; excretory canal-duct junction | Tx; Tl | Embryo/L1: Dyf, Dex, Pin | Starich *et al.* 1995;  HEIMAN and SHAHAM 2009;  LOW *et al.* 2018; this study |
| FBN-1 | IIIb | Embryo – L4 | Epidermis, Vulva, Rectum,  Buccal cavity | Varied types of  Pre-cuticle | Tx; Tl | Embryo/L1: Pin;  Larvae: Mlt | FRAND *et al.* 2005;  KELLEY *et al.* 2015;  This study |
| LET-653 | IIIb | Embryo – L4 | Epidermis, Duct, Pore, Rectum, Buccal cavity, Glia, Vulva | Varied types of Pre-cuticle | Tx; Tl | Embryo/L1: Exc;  L1: abnormal alae;  Adult: abnormal alae | GILL *et al.* 2016 |
| NOAH-1 | I | Embryo – L4 | Epidermis, Vulva | Epidermal  Pre-cuticle | Tx; Tl | Embryo: Epidermal rupture;  Larvae: Mlt | FRAND *et al.* 2005;  VUONG-BENDER *et al.* 2017;  This study |
| NOAH-2 | I | Embryo – L4 | Epidermis, Vulva | Epidermal  Pre-cuticle | Tx; Tl | Embryo: Epidermal rupture;  Larvae: Mlt | FRAND *et al.* 2005;  VUONG-BENDER *et al.* 2017;  This study |
| RAM-5 | IIIb | Adult (male) | Ray structural cells, Glia | Male ray cuticle | Tx, Tl | Adult: Mis-shapen rays in male tail | BAIRD and EMMONS 1990;  YU *et al.* 2000 |

Tx = transcriptional reporter N.D. = no data

Tl = translational reporter Ab = antibody