

Supplemental Material for
Developmental and Evolutionary Perspectives on the Origin and Diversification of Arthropod
Appendages

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Supplemental Table 1: References related to expression and function of candidate genes for joint formation from select arthropod lineages, supporting attributions in Figure 3.

Scoring a gene as giving evidence for conservation of a joint formation role based on expression or function in Figure 3 required that the expression/functional evidence be similar across most joints within the legs of the focal lineages. Because much of the functional data is from RNAi and because expression studies may not include all relevant stages, negative results should be regarded cautiously.

Supplemental Table 1: References for information presented in Figure 3. exp=expression; fcn=function.

	<i>Notch</i>		<i>Delta</i>		<i>Ser</i>		<i>nub/pdm</i>		<i>odd family^a</i>		<i>dpp</i>		<i>EGF^b</i>		<i>tal</i>		<i>dve</i>		<i>dAP-2</i>	
	exp	fcn	exp	fcn	exp	fcn	exp	fcn	exp	fcn	exp	fcn	exp	fcn	exp	fcn	exp	fcn	exp	fcn
<i>Drosophila</i>	(1–4)	(1–3, 5)	(1–3, 6)	(1–3)	(1–3, 6)	(1–3)	(3, 7–9)	(9)	(3, 7, 8, 10–12)	(8, 10, 12)	(13)	(13)	(14)	(14)	(15)	(15)	(4, 16)	(4, 16)	(8, 11, 16–18)	(11, 16–18)
<i>Tribolium</i> (embryogenesis)			(19) ^c		(20–22)	(21)			(23)		(24, 25)	(25)	(26)	(26)	(27) ^d	(27)				
<i>Tribolium</i> (metamorphosis)		(28–30)		(28, 29) ^e		(28–30)		(28–30) ^f		(28–30)		(28, 31)		(28–30)						(32) ^g
Orthoptera (<i>Gryllus</i> unless footnoted)	(33)	(33)	(33)	(33, 34)			(9) ^h	(9) ⁱ			(35) ^j , (36)		(33, 37)			(38) ^k				
<i>Periplaneta</i>	(38)	(9) ^l	(38)				(9, 38, 39)	(9, 38) ^m							(38)	(38)				
crustaceans							(40, 41) ⁿ , (42) ^o													
myriapods	(43) ^p : (44) ^q		(43) (44)								(45)		(46) ^r							
chelicerates (<i>Cupiennius</i> unless otherwise specified)	(47, 48)	(48)	(47) ^s		(48)	(48)	(41, 48)		(48)		(49)								(48, 50)	(48)
Onychophora (<i>Euperipatoides</i>)	(51–53) ^u		(51–53) ^v		(53)				(54)		(55, 56)									

^a Combines information from all paralogs in the *odd-skipped* family (called *odd*, *bowl*, *sob* and *drm* in *Drosophila*)

^b Combines information from both receptors and ligands for the EGF signaling pathway

^c See Supplemental Figure S4 in cited source

^d The *Tribolium* homologue of *tarsal-less* is called *mille-patte*.

^e Substantial knockdown of *Dl* expression was achieved; despite this, a joint loss phenotype was observed in only a very small number of specimens.

^f negative result for legs

^g Linz and Tomoyasu (2015) report premetamorphic lethality in response to *tal* RNAi, precluding analysis of joint formation phenotypes.

^h *Acheta*

ⁱ *Acheta*; only a single joint (tibia-tarsus) was lost in RNAi phenotypes.

^j *Schistocerca*

^k Chesebro suggests that the absence of widespread joint phenotypes may reflect redundancy of *tal* function, rather than absence.

^l *Notch* RNAi leads to loss of *nub* expression proximal to joints, but later morphological stages (confirming loss of joints) were not shown, so this was treated as no data in Figure 3

^m Two leg joints are affected in RNAi phenotypes, suggesting a specific role in a few joints, rather than a general joint formation role. In the antenna, most joints are lost in the strongest phenotypes, suggesting a broader role in this appendage type.

ⁿ *Pastifastacus* (a crayfish) shows expression in one ring per segment

^o *Porcellio* (an isopod) shows expression in a reduced number of segments

^p *Glomeris* (millipede) note only early limb expression shown; no rings at that time, but counted as no data because don't have images of more developed limbs

^q *Lithobius* (centipede), early limb dev. gene exp.-no rings, but counted as no data because don't have images of more developed limbs

^r Data from two ligands (not in clear rings) & receptor (ubiquitous)

^s At stages shown, no clear rings of *Dl* are observed

^t *Steatoda* (spider), not in multiple rings

^u De Sena et al. (2013) show reiterated rings of punctate *Notch* expression at late stages of limb development; what this expression corresponds to is not discussed.

^v De Sena et al. (2013) show reiterated rings of punctate *Delta* expression at late stages of limb development; what this expression corresponds to is not discussed.

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