Lateral synaptic contacts are not distinguishable from random contacts					
Lateral group	**# Membrane contacts**	**# Chemical syn. contacts**	**E[Chemical]**	**# Gap J. contacts**	**E[Gap J.]**
Lateral left	184	20	10.9 ± 3.2	6	2.1 ± 1.5
Lateral right	104	7	6.2 ± 2.4	2	2.4 ± 1.1
$\mathbb{M}^4$ left	1258	81	74.8 ± 9.0	8	14.8 ± 2.8
$\mathbb{M}^4$ right	1258	85	74.8 ± 9.2	3	14.8 ± 1.7

Supplementary Table 3. Lateral contacts are defined as those that occur on one side of the body only, across both animals. If synapses occurred independently and randomly then, for each animal, their frequency would be well described by the connectivity fraction (the fraction of membrane contacts with a synapse) and would obey binomial statistics. For the dataset under consideration (with the smallest 35% of membrane contacts removed (Extended Data Fig. 2), the connectivity fractions are $p_{\text{syn,L4}} = 0.39$, $p_{\text{gap,L4}} = 0.12$, $p_{\text{syn,A}} = 0.47$ and $p_{\text{gap,A}} = 0.13$ (with the subscript A denoting the adult). Given N_{left} and N_{right} (membrane contacts on the left and right side of the body, respectively), the expected lateral count fraction is given by $E[p_{\text{syn}}] = p_{\text{syn,L4}}\, p_{\text{syn,A}}(1 - p_{\text{syn,L4}})\,(1 - p_{\text{syn,A}})$ and the expected counts are given by $E[p_{\text{syn,L4}}] = N_{\text{L4}}\, p_{\text{syn}}$ and $E[p_{\text{syn,A}}] = N_{\text{A}}\, p_{\text{syn}}$ for the L4 and adult, respectively. The expected counts for gap junctions are computed similarly. We compared the lateral number of synapses (and gap junctions) with the predicted numbers under two scenarios. Lateralization of synapses could arise either (i) due to lateralized membrane contacts (rows 1-2 in the Table), or (ii) in the absence of this spatial constraint (rows 3-4). For scenario (i), we counted the number of lateral membrane contacts that support synapses in both animals. For scenario (ii), we counted the number of $\mathbb{M}^4$ membrane contacts that support synapses only on the same side of both the adult and L4. We find that the frequencies of lateral synaptic contacts are either in or below the expected statistical range. Therefore, while specific lateral connections cannot be ruled out, we find no significant statistical trends indicating lateralized synaptic wiring.