



Extended Data Figure 3 | Anteroposterior patterning in Xenacoelomorpha. a, b, Expression of anteroposterior markers in adult specimens of *M. stichopi* and *I. pulchra*. In both species, *sFRP1/5*, *vax*, *six3/6*, and *BarH* are expressed in anterior territories (black arrowheads). In *M. stichopi*, *Rx* is also expressed anteriorly, but broadly along the animal body in *I. pulchra*. In this acoel, *emx* is detected in the anterior part of the animal (background staining close to the gonads). In the nemertodermatid, the anterior neural markers *otx*, *otp*, *pax2/5/8*, and *fezf* are expressed along the entire anteroposterior axis, in association with the dorsal nerve cords (black dotted lines in *otp*). In *I. pulchra*, *otx*, *pax2/5/8-a*, and *pax2/5/8-b* are broadly expressed. In *M. stichopi*, an *irx*

orthologue is detected in the posterior tip, whereas it is detected in the anterior tip and around the mouth and copulatory apparatus in the acoel (arrowheads). The *gbx* orthologue of *M. stichopi* is expressed posteriorly, and the trunk-related *Hox* genes are expressed in two lateral rows (*anterior Hox*) and anteriorly to the mouth and in the posterior tip (*posterior Hox*). In the nemertodermatid and the acoel, Wnt ligand genes are expressed posteriorly (arrowheads). All images are dorsoventral views with anterior to the left. **c**, Schematic summary of anteroposterior expression in the nemertodermatid *M. stichopi* and the acoel *I. pulchra*. Drawings are not to scale and the extent of the expression domains are only approximate. The expression of *posterior Hox* in *I. pulchra* is based on ref. 22.