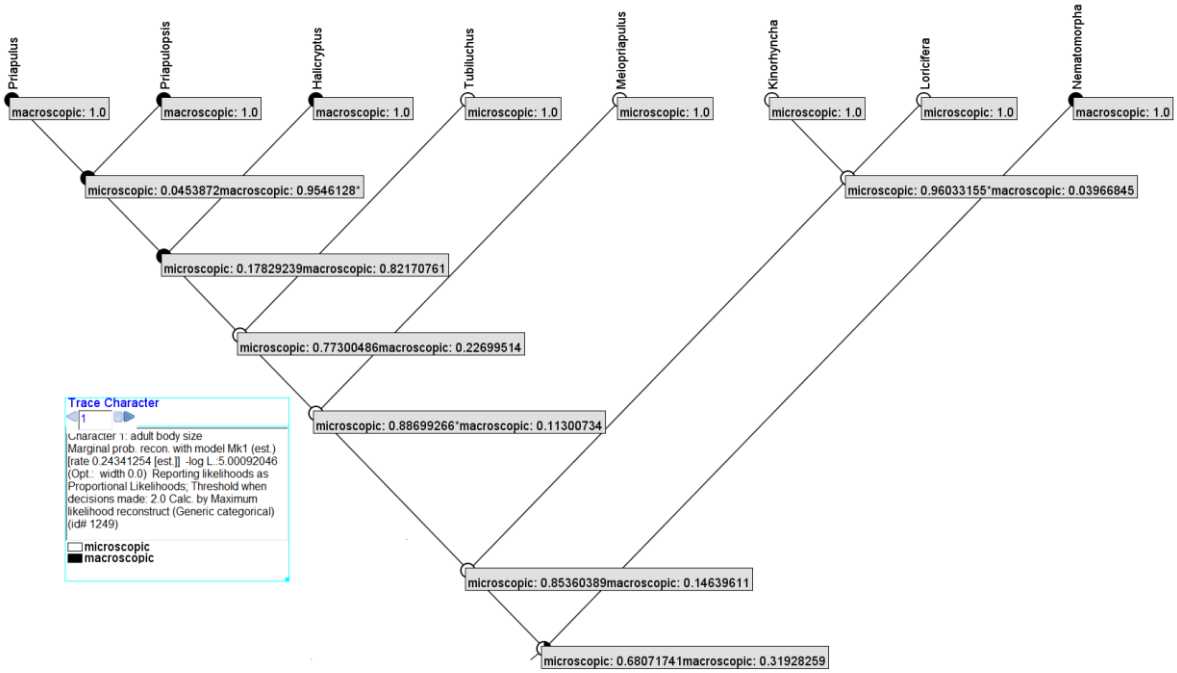
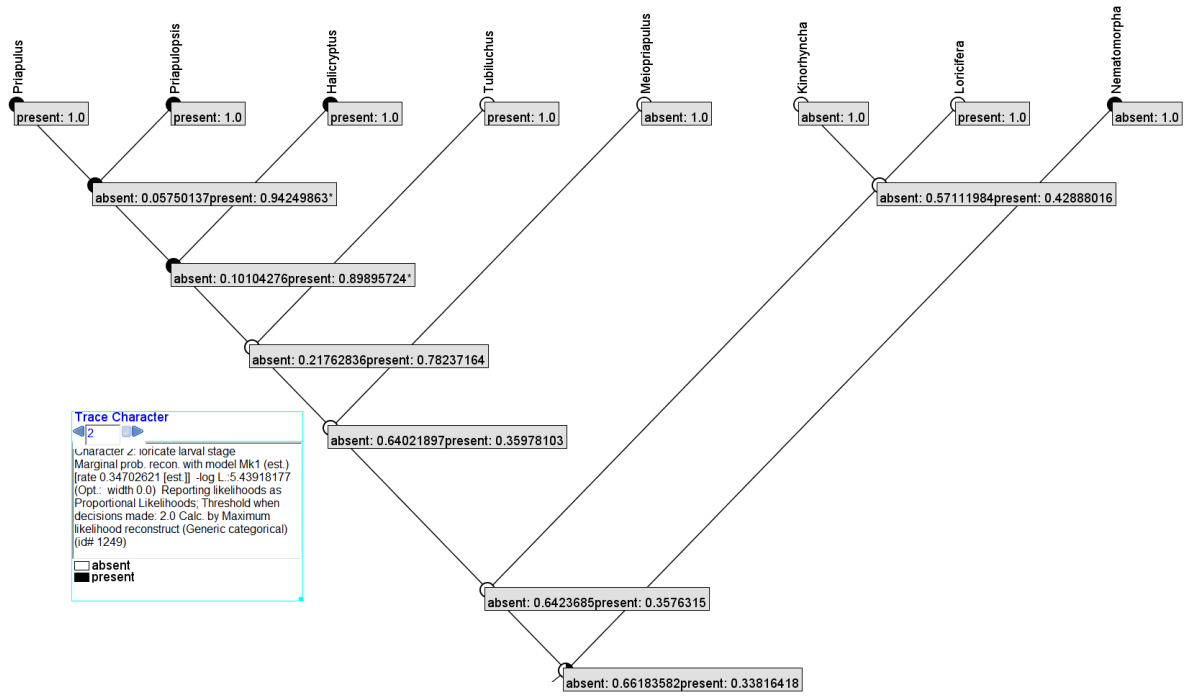
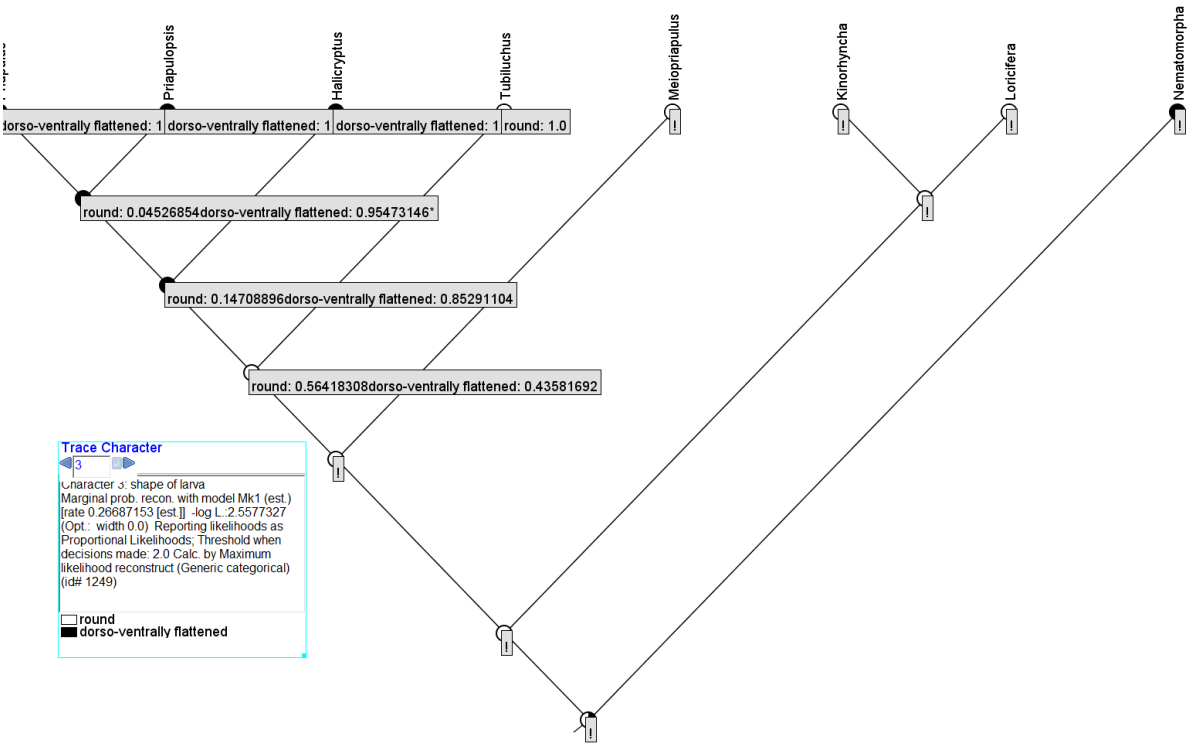


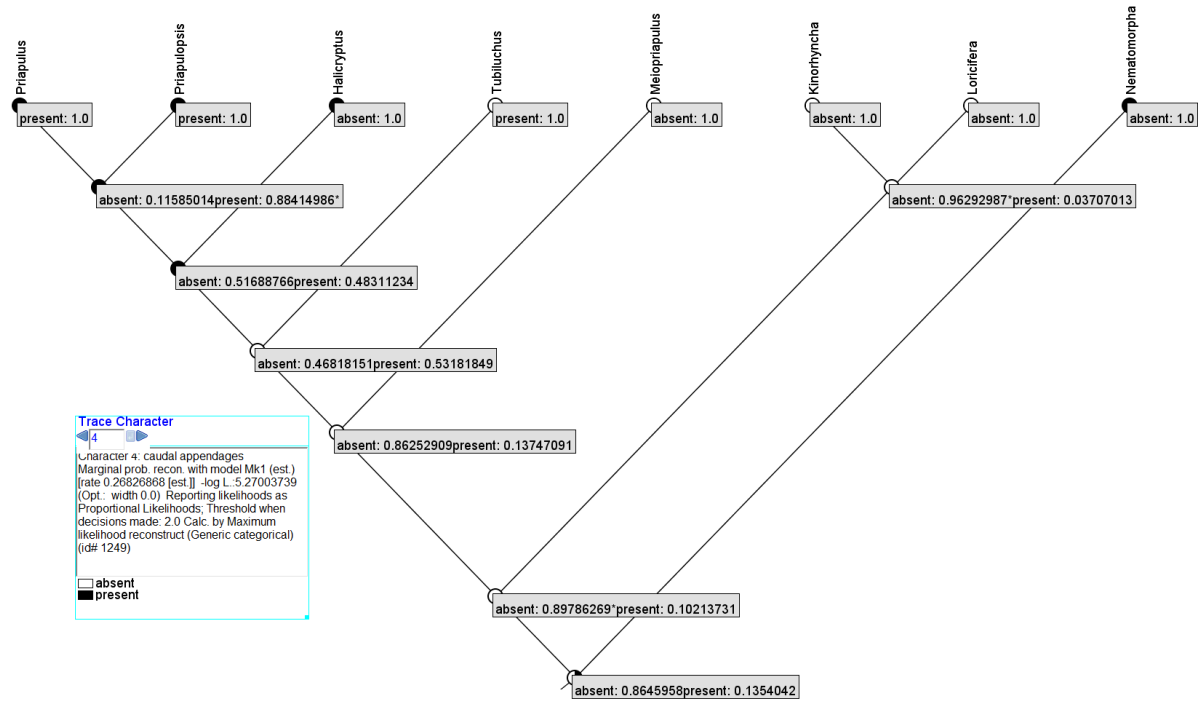
Supplementary figure S30 Likelihoods of the character states on the nodes of the combined 80% occupancy matrix tree calculated by Mesquite for the character ‘adult body size character’.



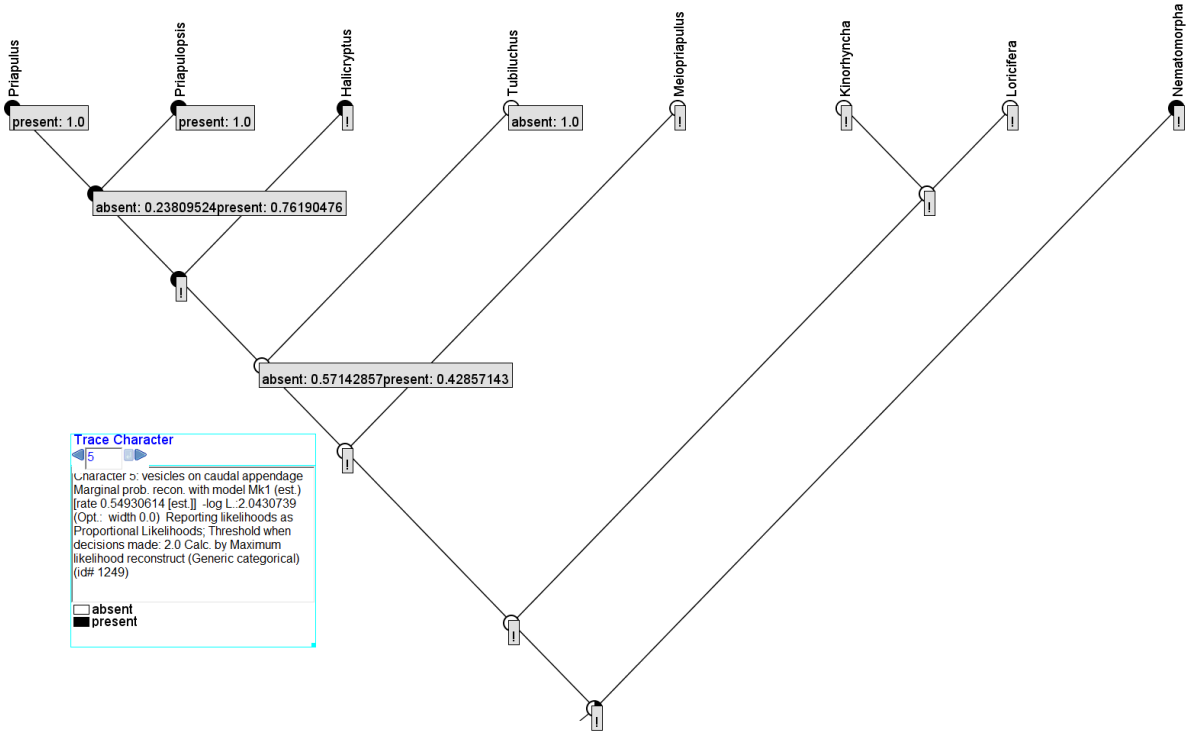
Supplementary figure S31 Likelihoods of the character states on the nodes of the combined 80% occupancy matrix tree calculated by Mesquite for the character ‘loricate larval stage’.



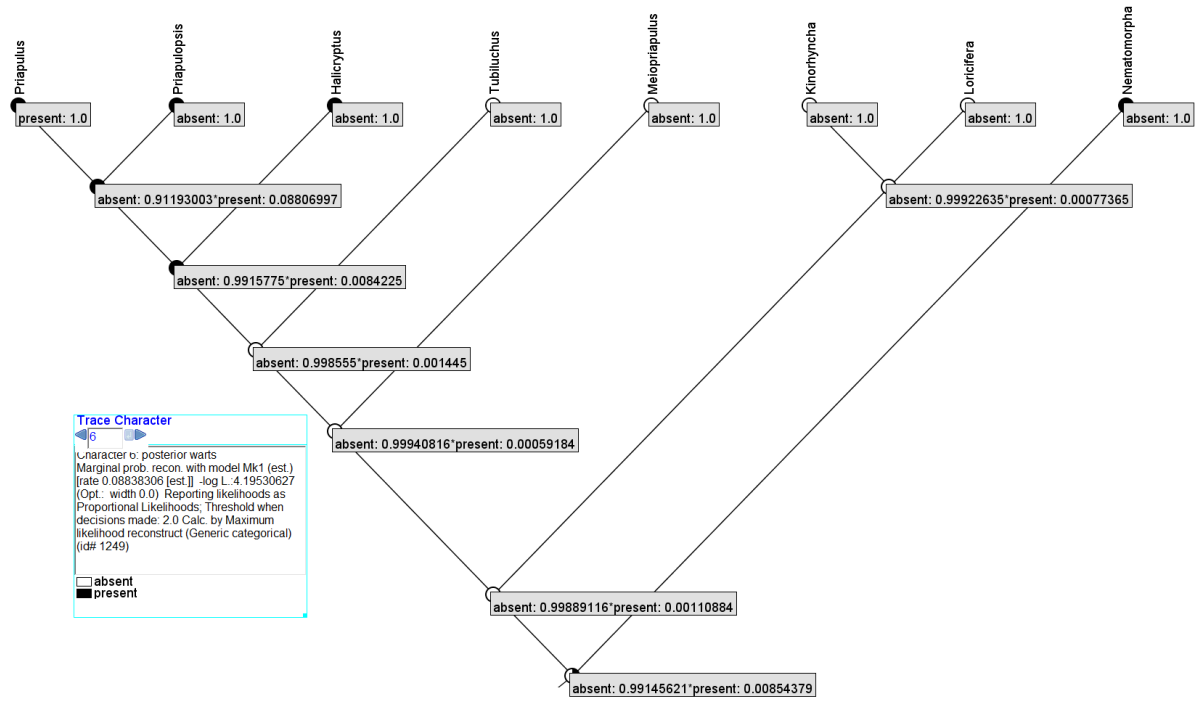
Supplementary figure S32 Likelihoods of the character states on the nodes of the combined 80% occupancy matrix tree calculated by Mesquite for the character ‘shape of lorica’.



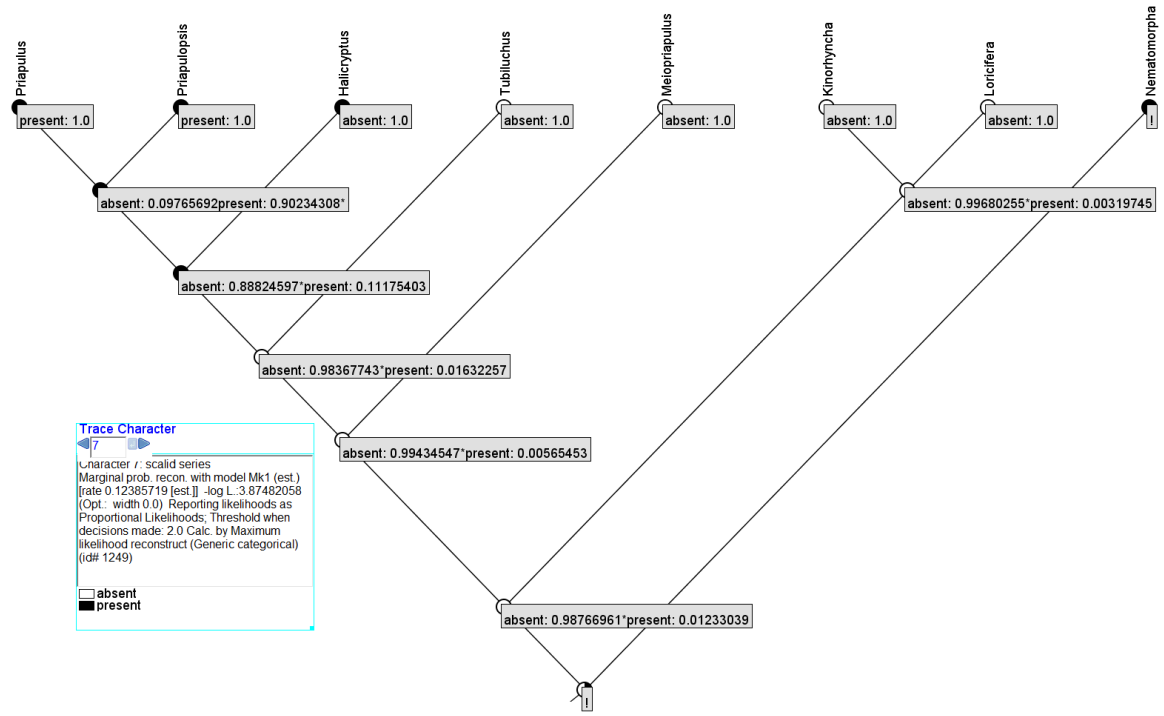
Supplementary figure S33 Likelihoods of the character states on the nodes of the combined 80% occupancy matrix tree calculated by Mesquite for the character ‘caudal appendages’.



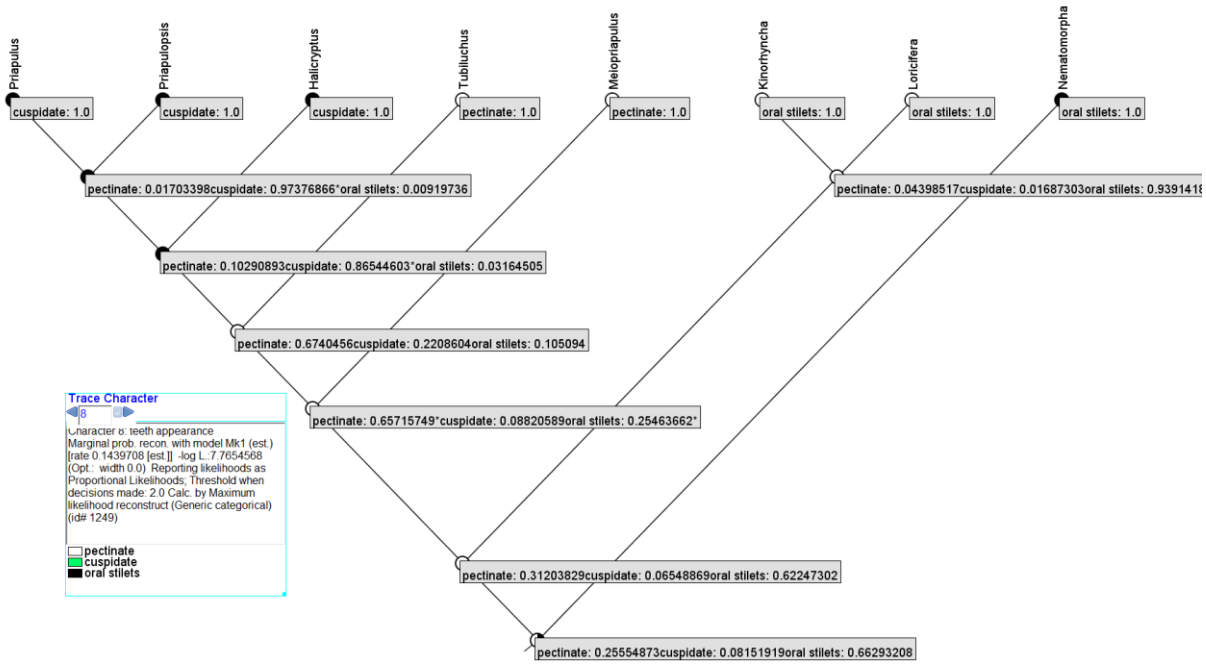
Supplementary figure S34 Likelihoods of the character states on the nodes of the combined 80% occupancy matrix tree calculated by Mesquite for the character ‘vesicles on caudal appendage’.



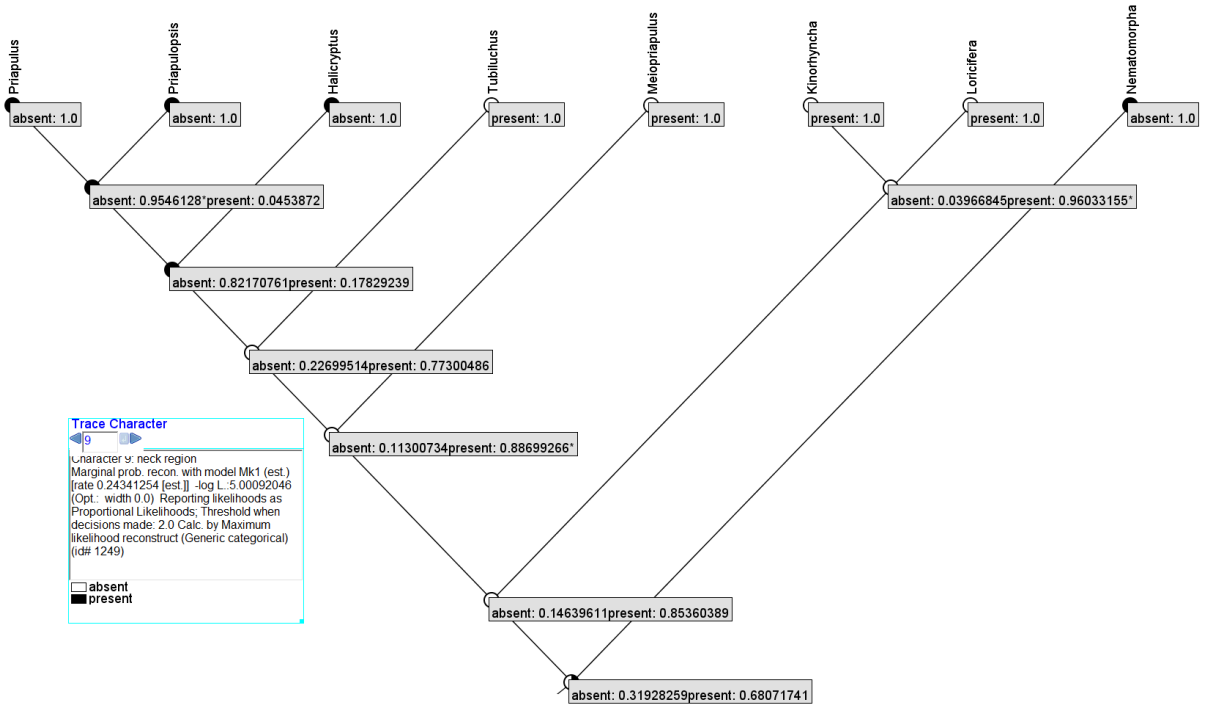
Supplementary figure S35 Likelihoods of the character states on the nodes of the combined 80% occupancy matrix tree calculated by Mesquite for the character ‘posterior warts’.



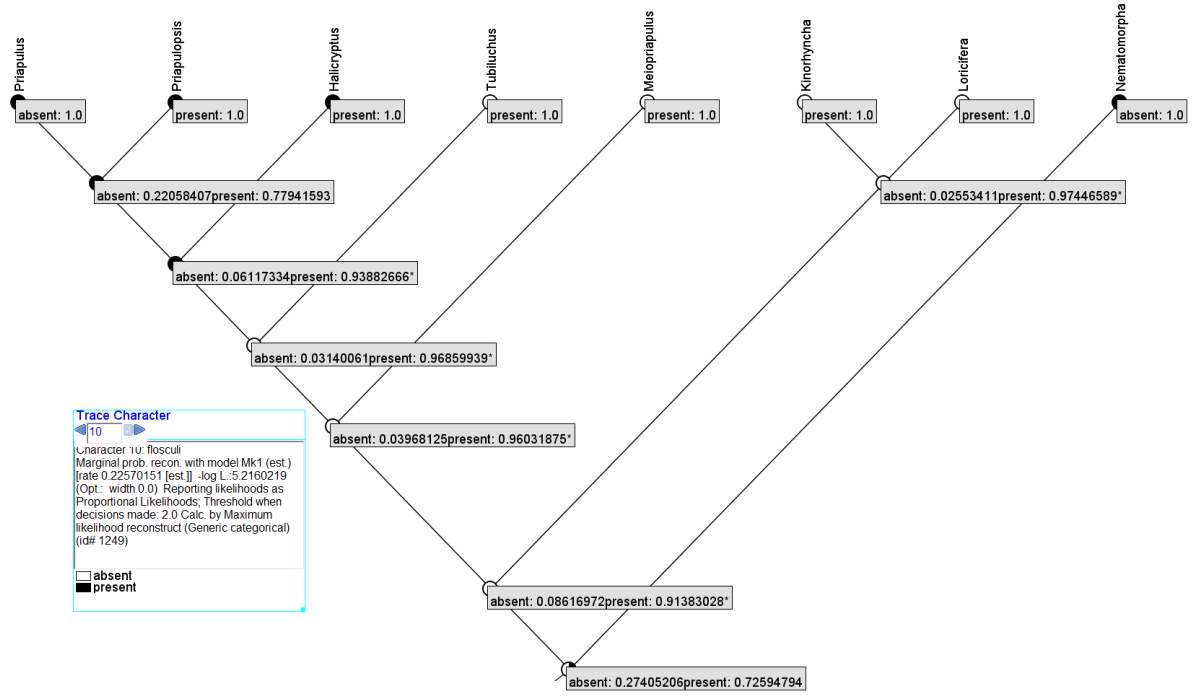
Supplementary figure S36 Likelihoods of the character states on the nodes of the combined 80% occupancy matrix tree calculated by Mesquite for the character ‘scalid series’.



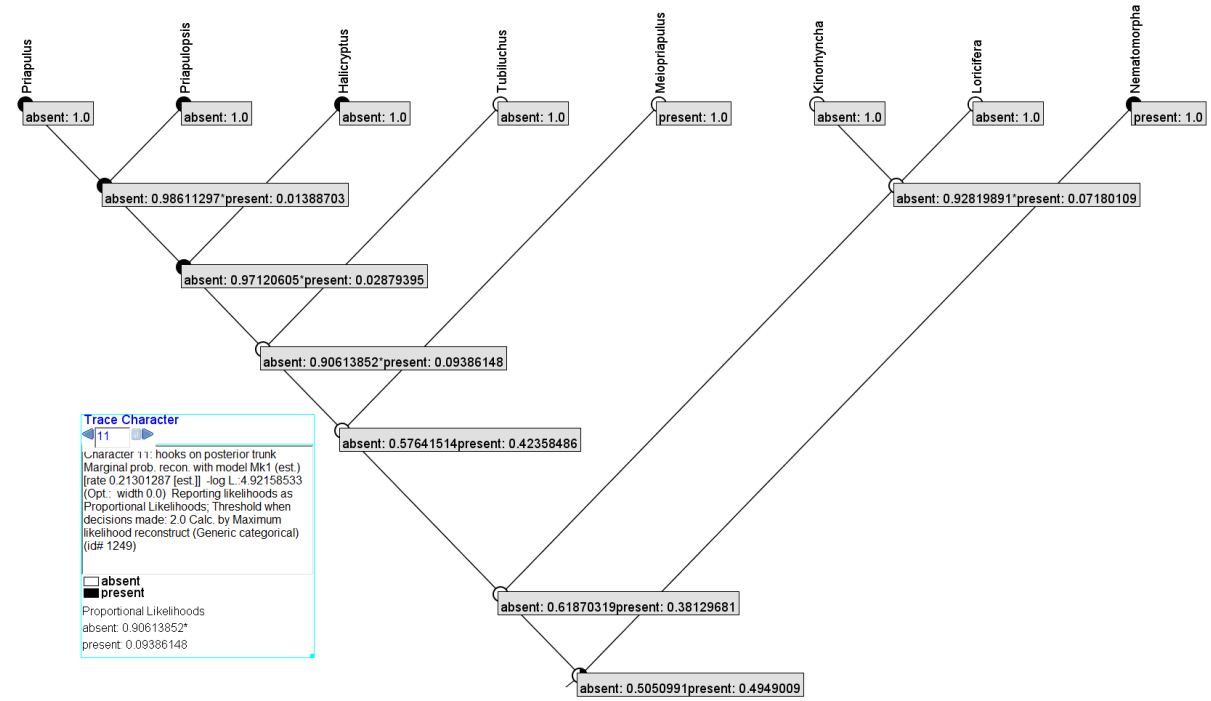
Supplementary figure S37 Likelihoods of the character states on the nodes of the combined 80% occupancy matrix tree calculated by Mesquite for the character ‘teeth appearance’.



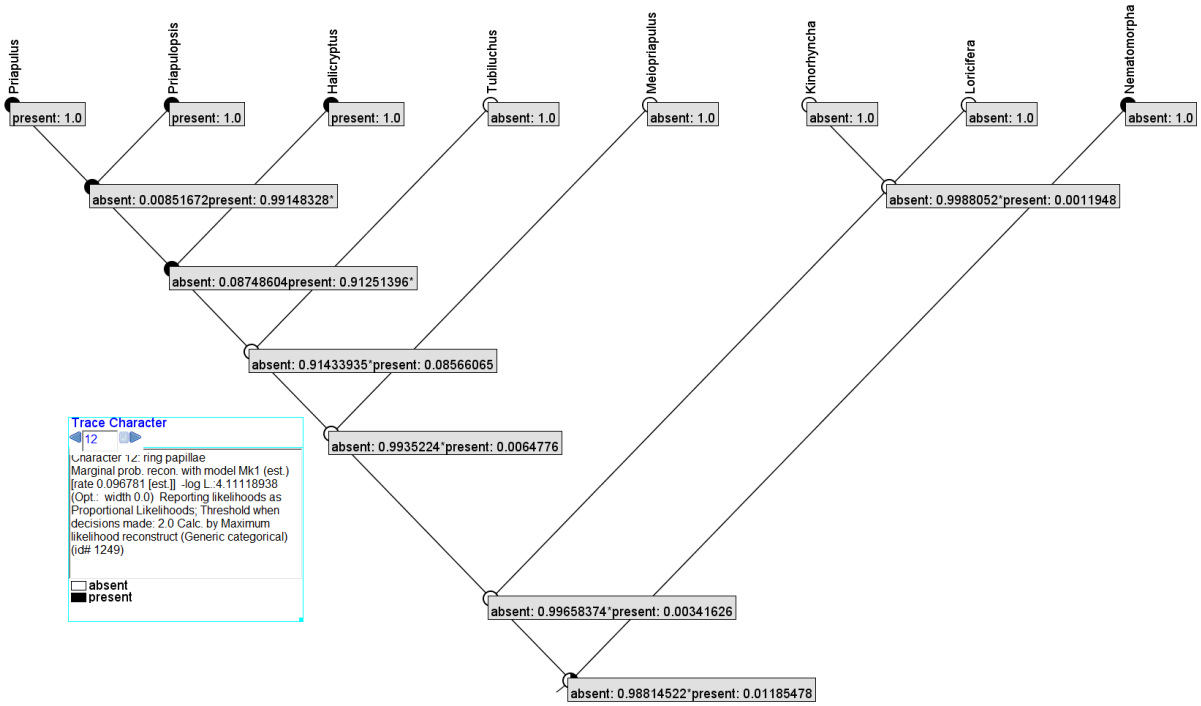
Supplementary figure S38 Likelihoods of the character states on the nodes of the combined 80% occupancy matrix tree calculated by Mesquite for the character ‘neck region’.



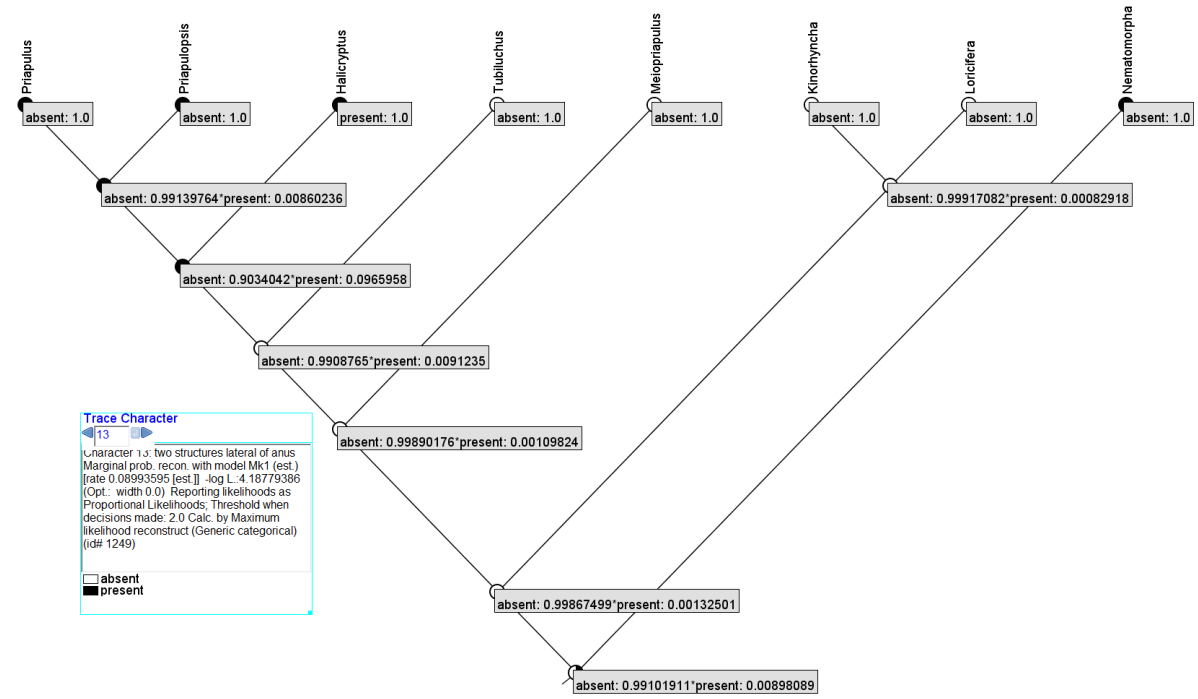
Supplementary figure S39 Likelihoods of the character states on the nodes of the combined 80% occupancy matrix tree calculated by Mesquite for the character ‘flosculi’.



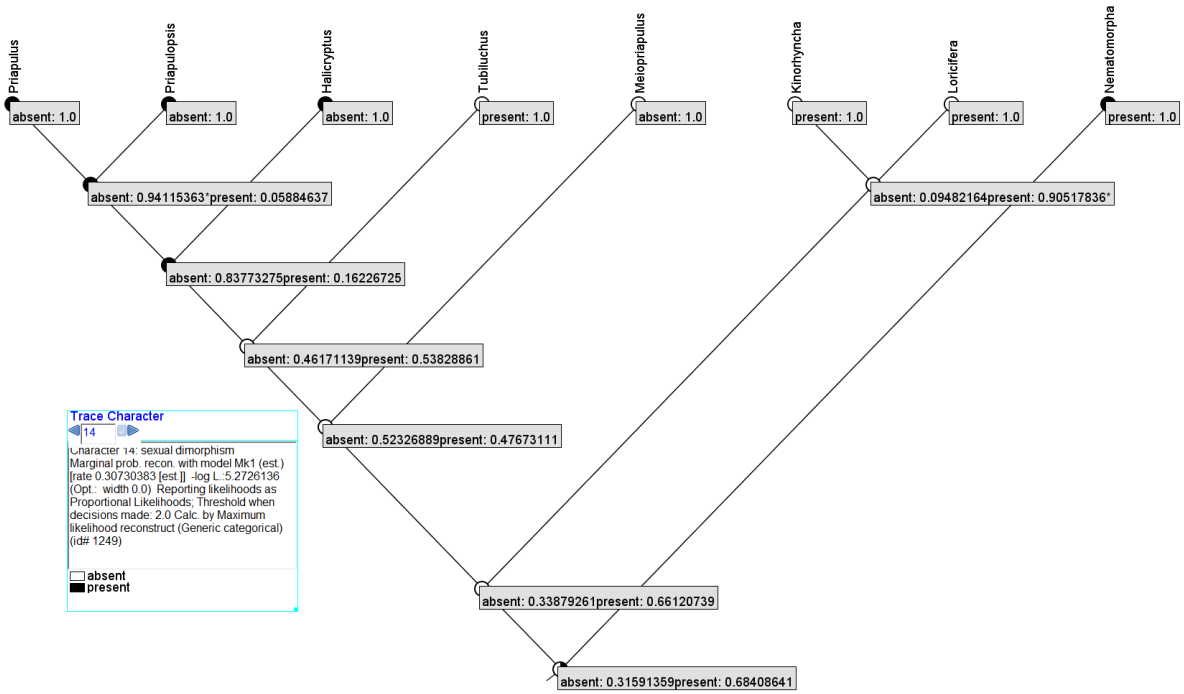
Supplementary figure S40 Likelihoods of the character states on the nodes of the combined 80% occupancy matrix tree calculated by Mesquite for the character ‘hooks on posterior trunk’.



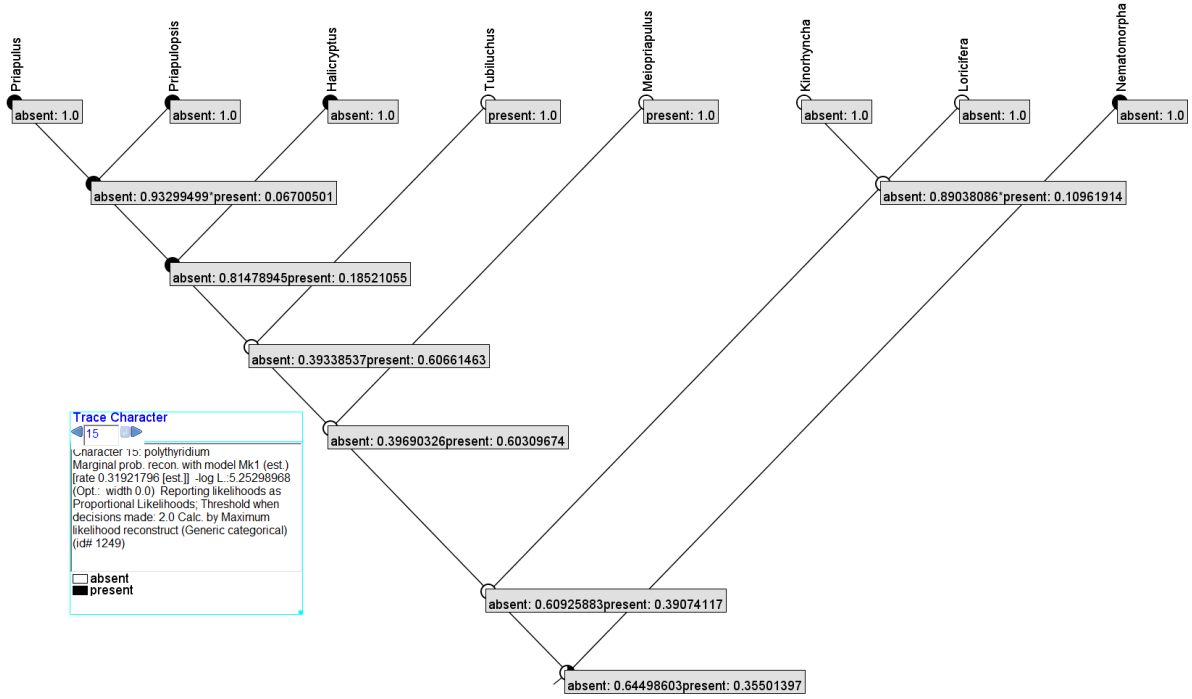
Supplementary figure S41 Likelihoods of the character states on the nodes of the combined 80% occupancy matrix tree calculated by Mesquite for the character ‘ring papillae’.



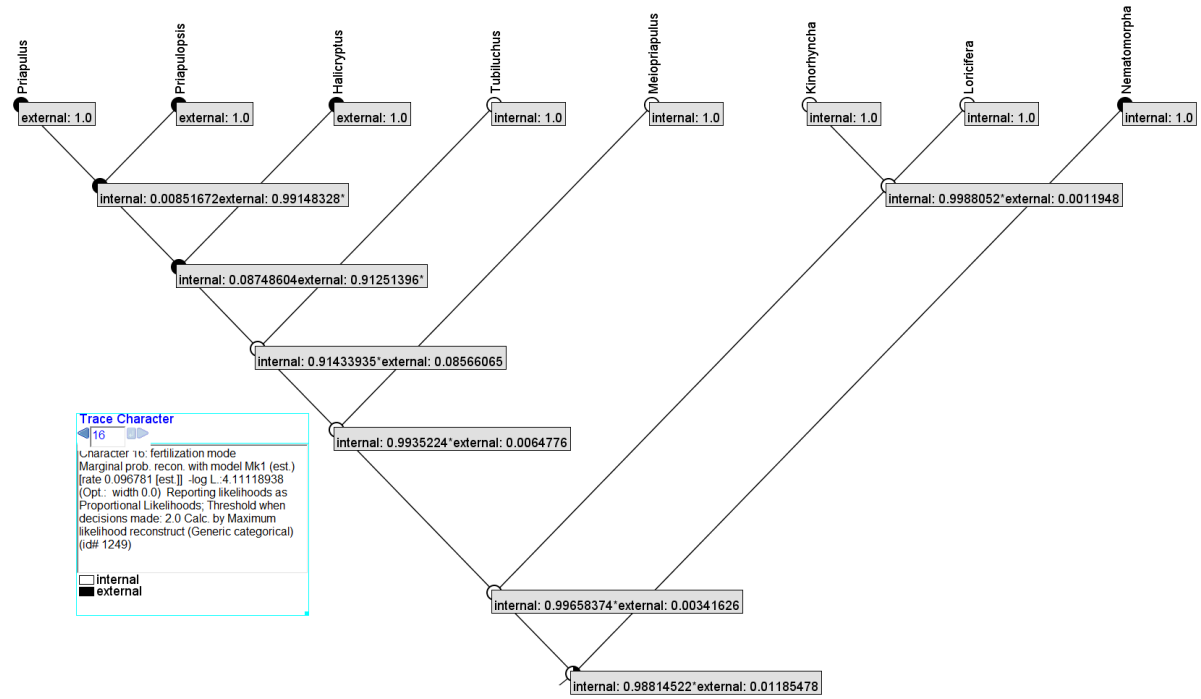
Supplementary figure S42 Likelihoods of the character states on the nodes of the combined 80% occupancy matrix tree calculated by Mesquite for the character ‘two structures lateral of anus’.



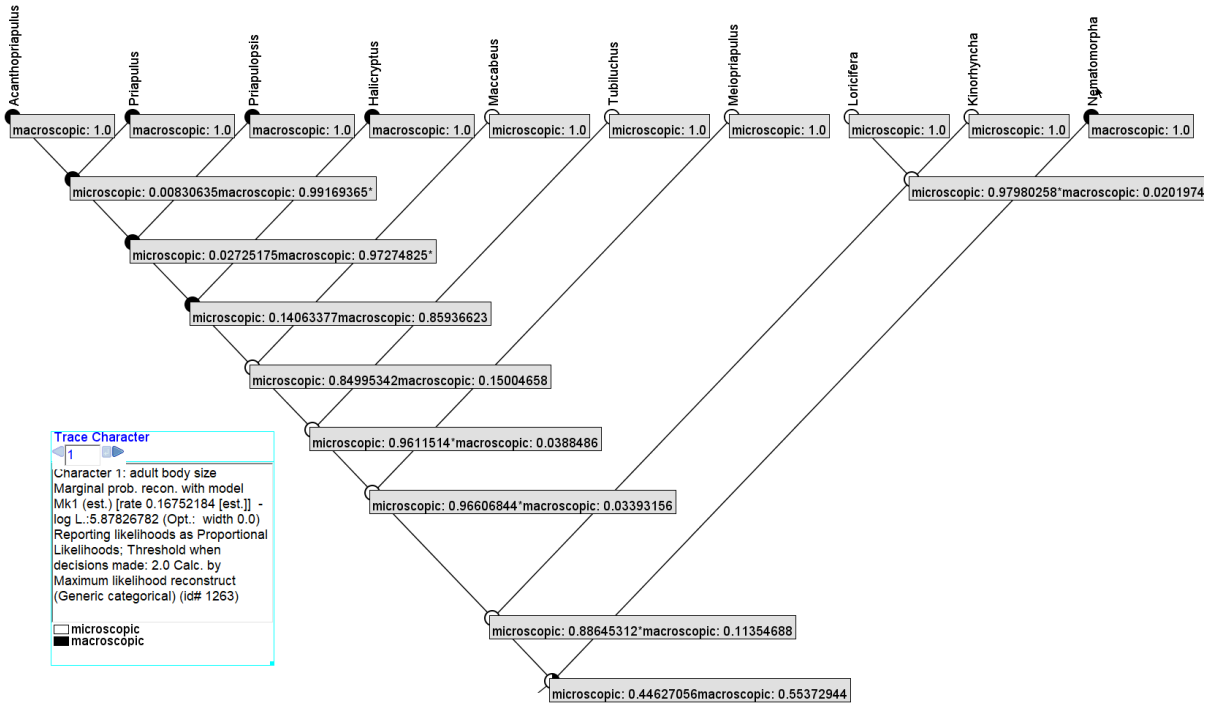
Supplementary figure S43 Likelihoods of the character states on the nodes of the combined 80% occupancy matrix tree calculated by Mesquite for the character ‘sexual dimorphism’.



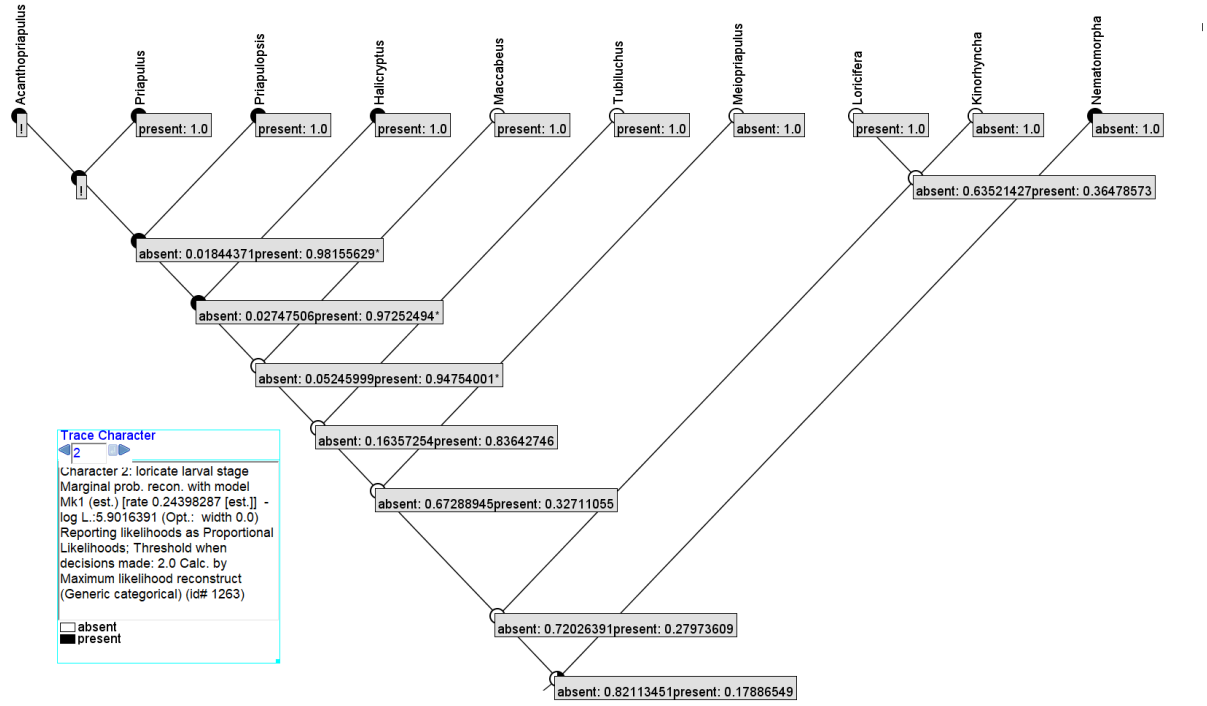
Supplementary figure S44 Likelihoods of the character states on the nodes of the combined 80% occupancy matrix tree calculated by Mesquite for the character ‘polythyridium’.



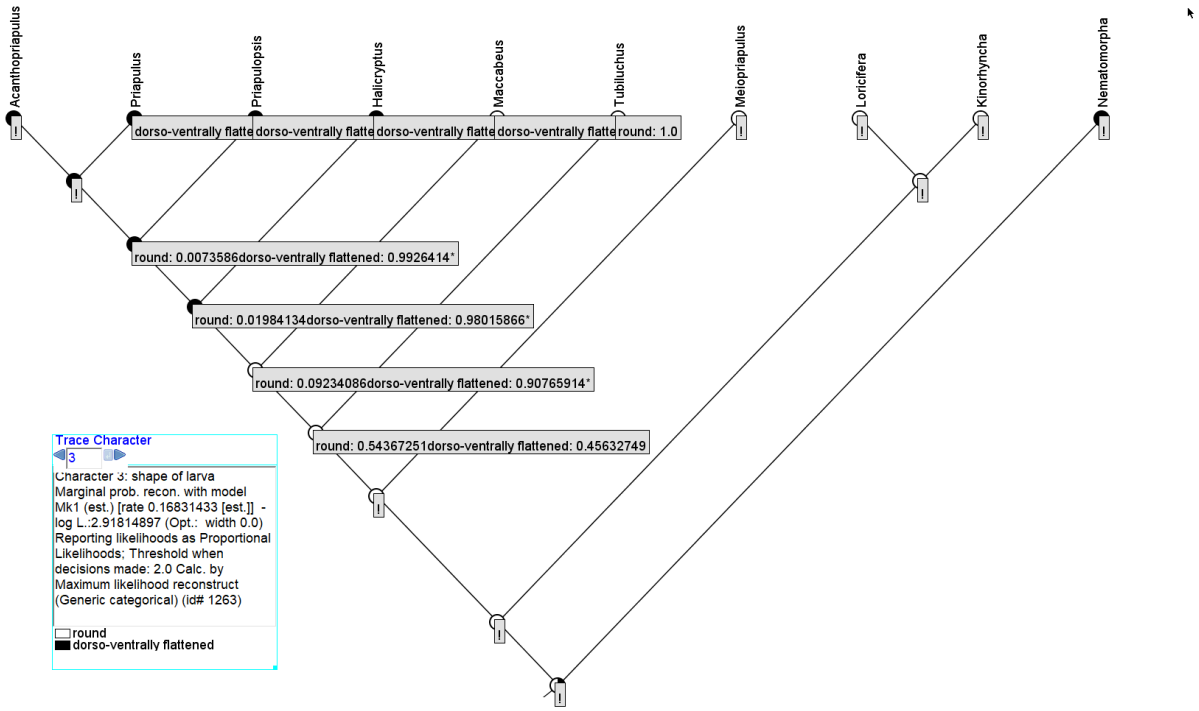
Supplementary figure S45 Likelihoods of the character states on the nodes of the combined 80% occupancy matrix tree calculated by Mesquite for the character ‘fertilization mode’.



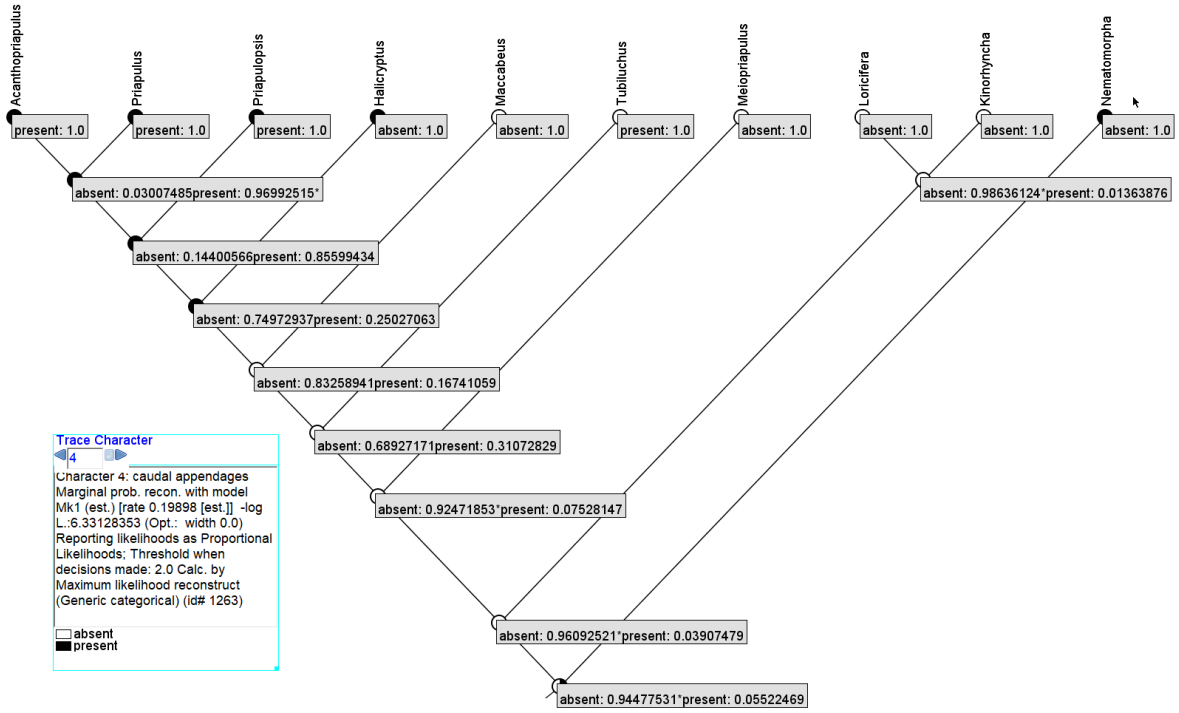
Supplementary figure S46 Likelihoods of the character states on the nodes of the combined 80% occupancy matrix tree with inferred positions of *Acanthopriapulus* and *Maccabeus* calculated by Mesquite for the character 'adult body size character'.



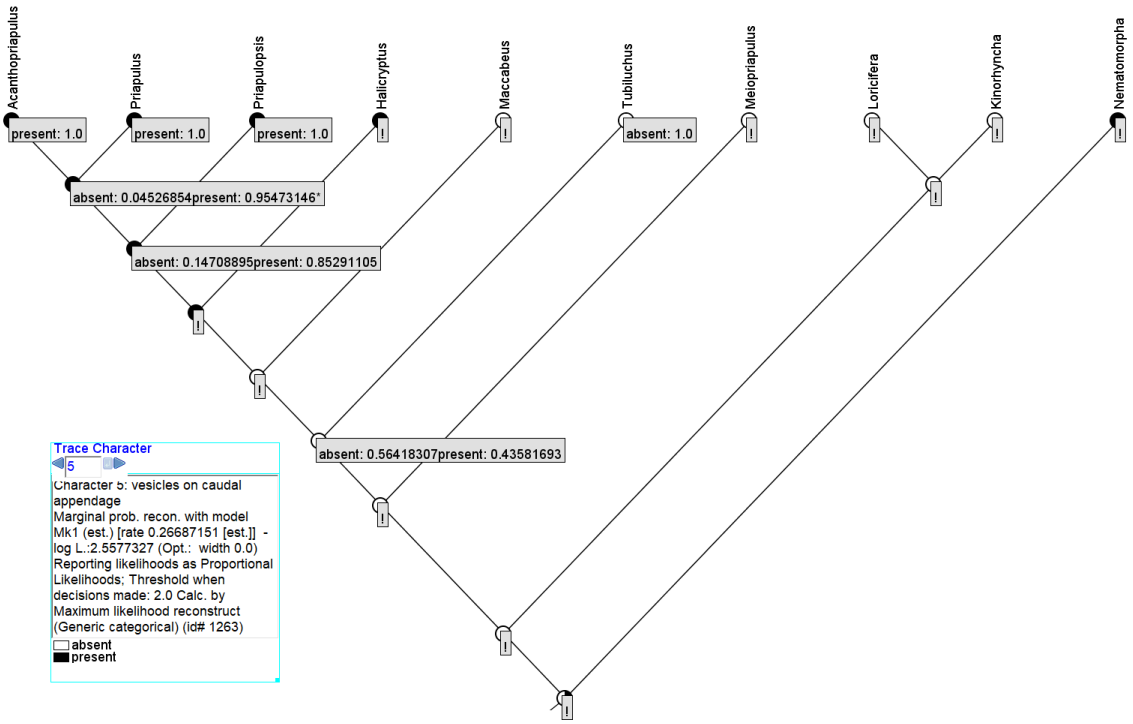
Supplementary figure S47 Likelihoods of the character states on the nodes of the combined 80% occupancy matrix tree with inferred positions of *Acanthopriapulus* and *Maccabeus* calculated by Mesquite for the character 'loricate larval stage'.



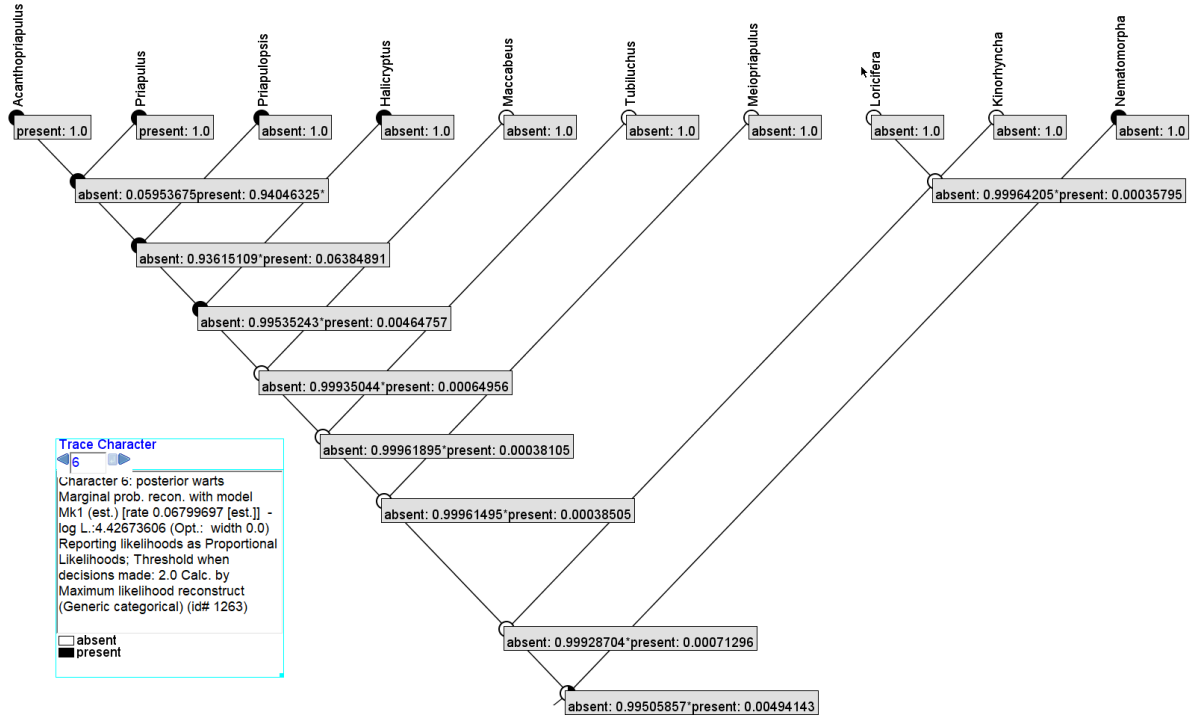
Supplementary figure S48 Likelihoods of the character states on the nodes of the combined 80% occupancy matrix tree with inferred positions of *Acanthopriapulus* and *Maccabeus* calculated by Mesquite for the character 'shape of larva'.



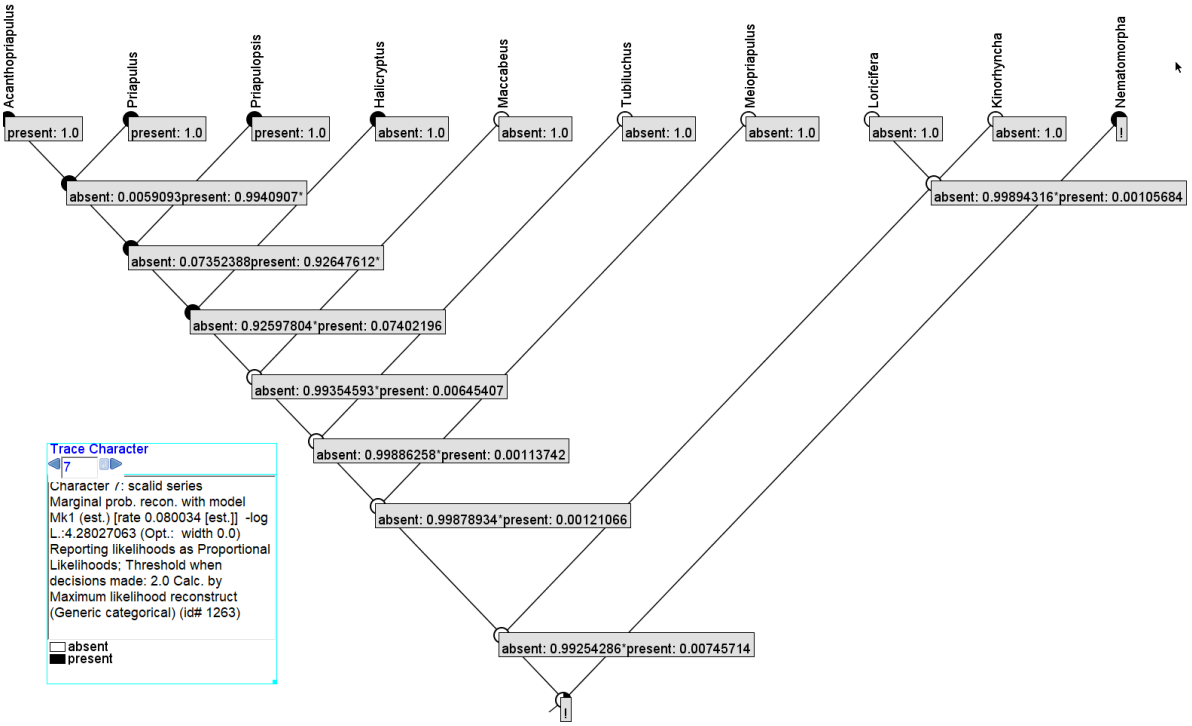
Supplementary figure S49 Likelihoods of the character states on the nodes of the combined 80% occupancy matrix tree with inferred positions of *Acanthopriapulus* and *Maccabeus* calculated by Mesquite for the character 'caudal appendage'.



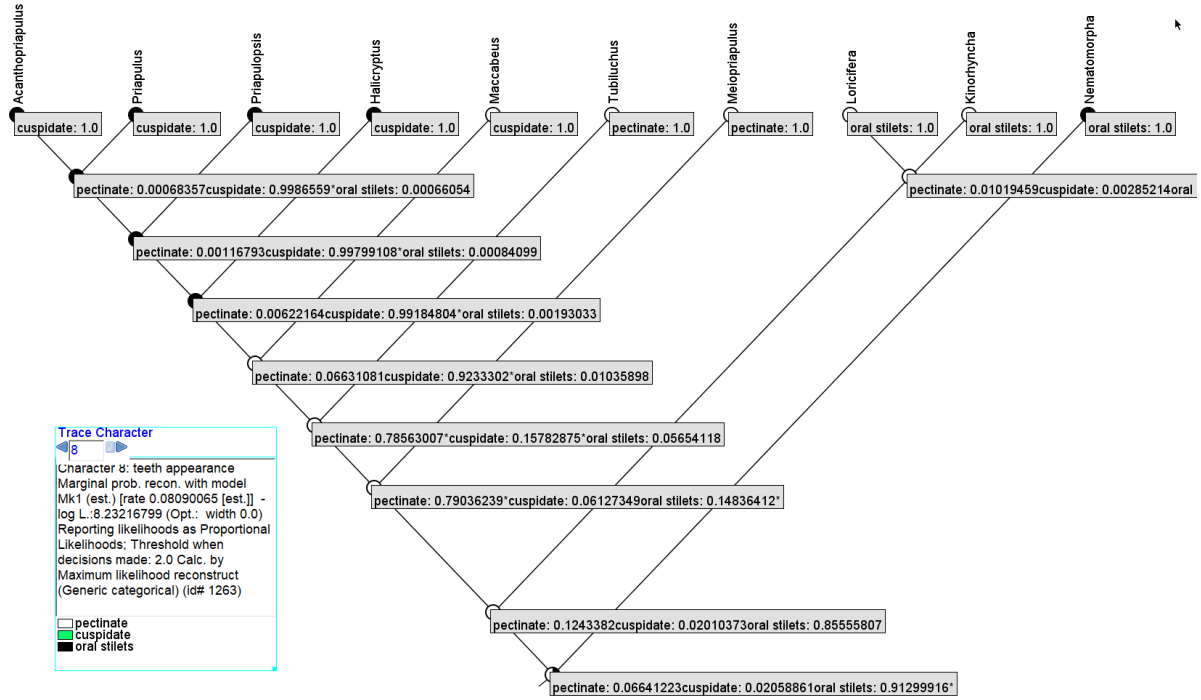
Supplementary figure S50 Likelihoods of the character states on the nodes of the combined 80% occupancy matrix tree with inferred positions of *Acanthopriapulus* and *Maccabeus* calculated by Mesquite for the character 'vesicles on caudal appendage'.



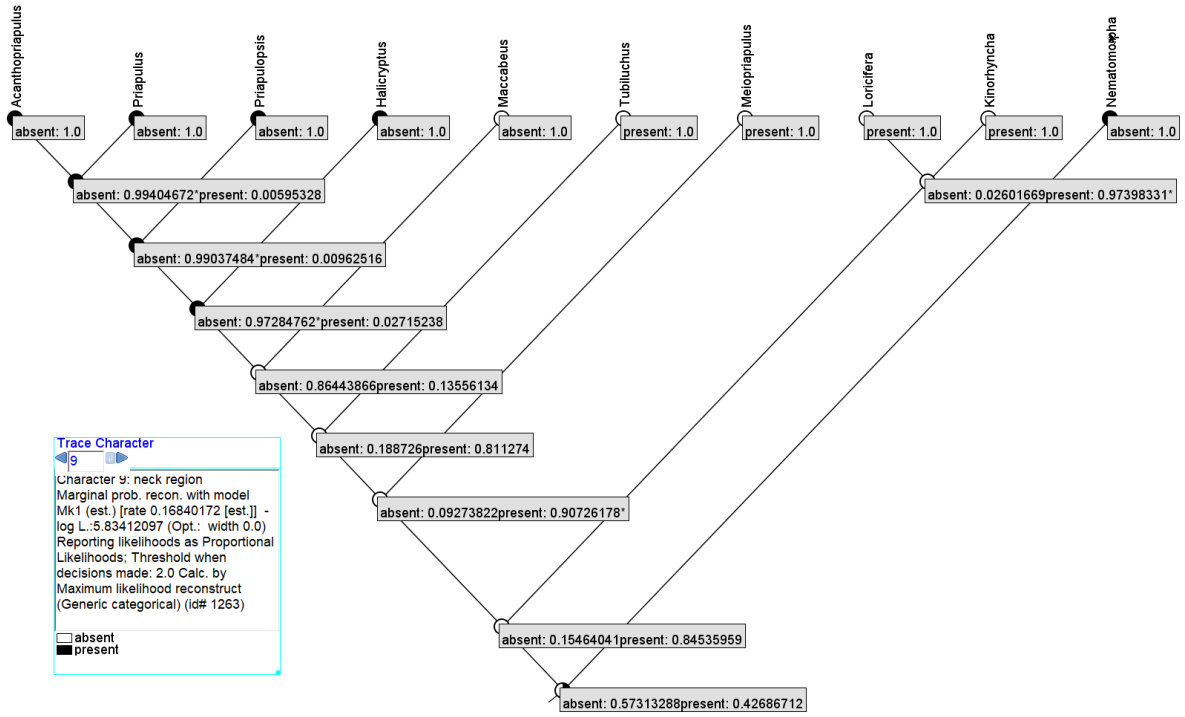
Supplementary figure S51 Likelihoods of the character states on the nodes of the combined 80% occupancy matrix tree with inferred positions of *Acanthopriapulus* and *Maccabeus* calculated by Mesquite for the character 'posterior warts'.



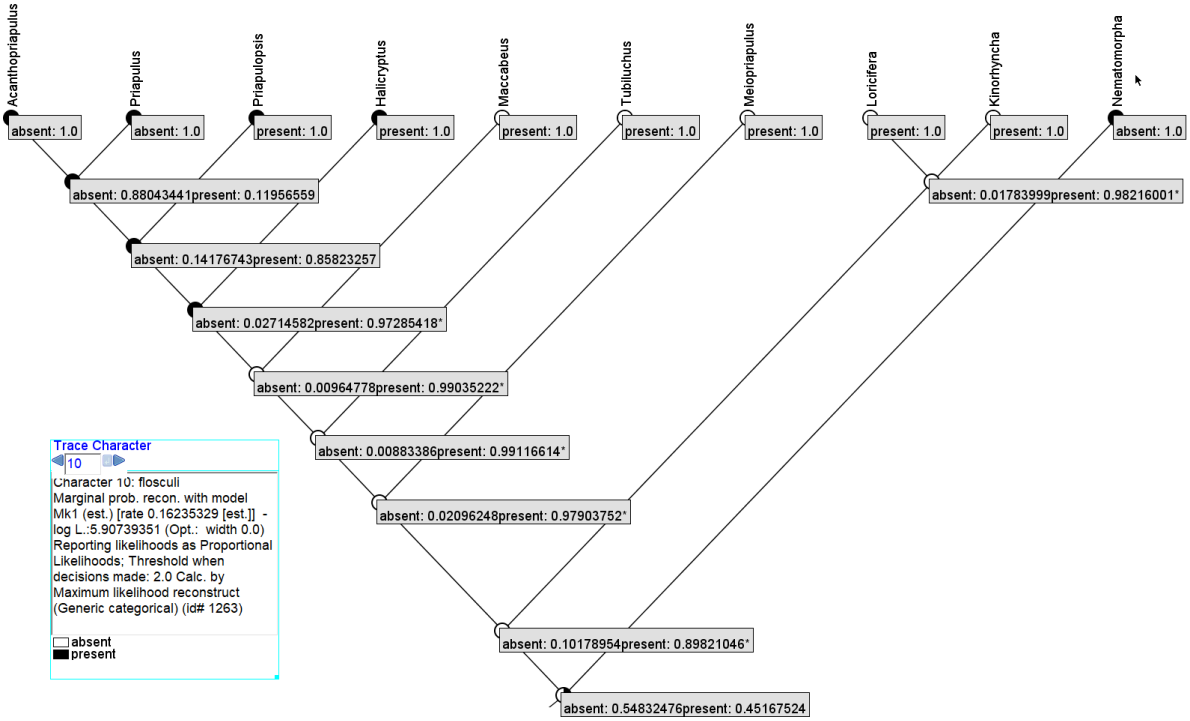
Supplementary figure S52 Likelihoods of the character states on the nodes of the combined 80% occupancy matrix tree with inferred positions of *Acanthopriapulus* and *Maccabeus* calculated by Mesquite for the character 'scalid series'.



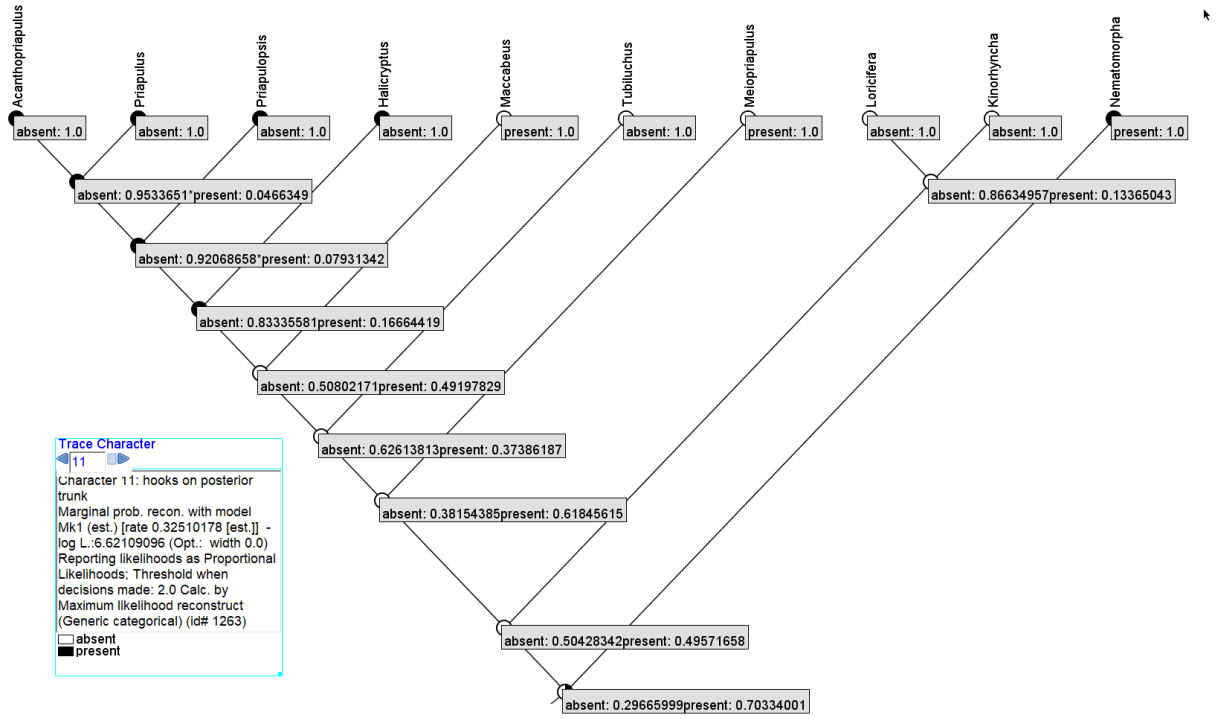
Supplementary figure S53 Likelihoods of the character states on the nodes of the combined 80% occupancy matrix tree with inferred positions of *Acanthopriapulus* and *Maccabeus* calculated by Mesquite for the character 'teeth appearance'.



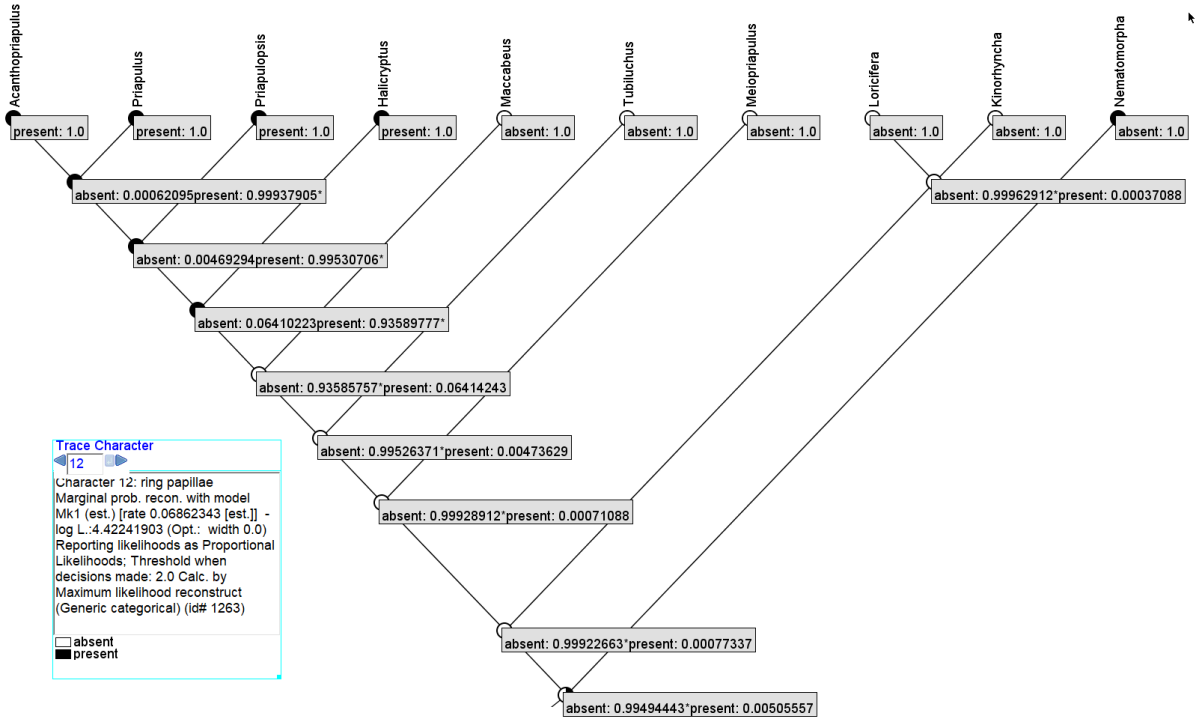
Supplementary figure S54 Likelihoods of the character states on the nodes of the combined 80% occupancy matrix tree with inferred positions of *Acanthopriapulus* and *Maccabeus* calculated by Mesquite for the character 'neck region'.



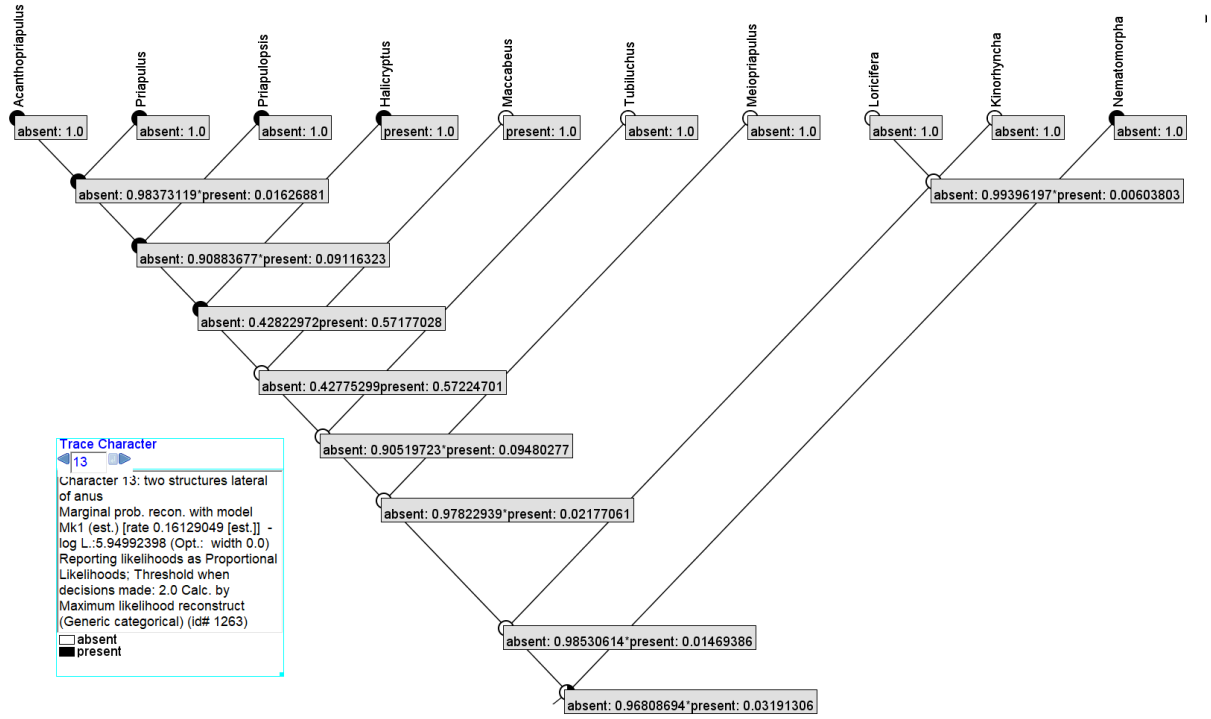
Supplementary figure S55 Likelihoods of the character states on the nodes of the combined 80% occupancy matrix tree with inferred positions of *Acanthopriapulus* and *Maccabeus* calculated by Mesquite for the character 'flosculi'.



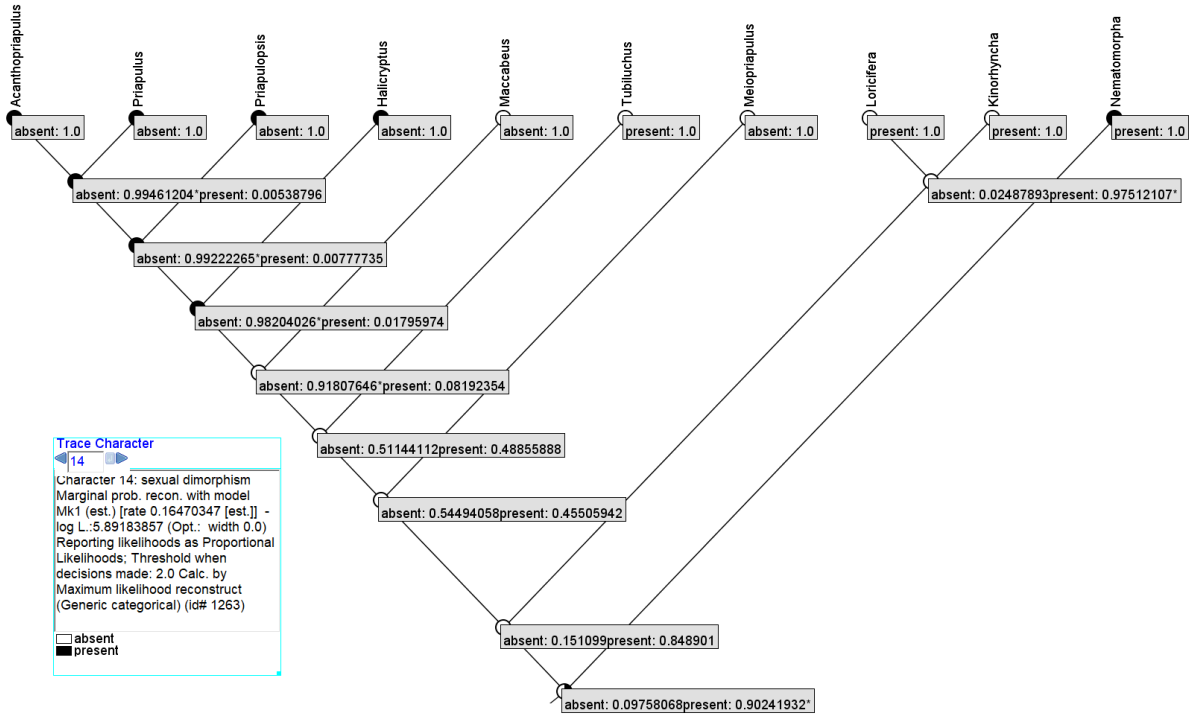
Supplementary figure S56 Likelihoods of the character states on the nodes of the combined 80% occupancy matrix tree with inferred positions of *Acanthopriapulus* and *Maccabeus* calculated by Mesquite for the character 'hooks on posterior trunk'.



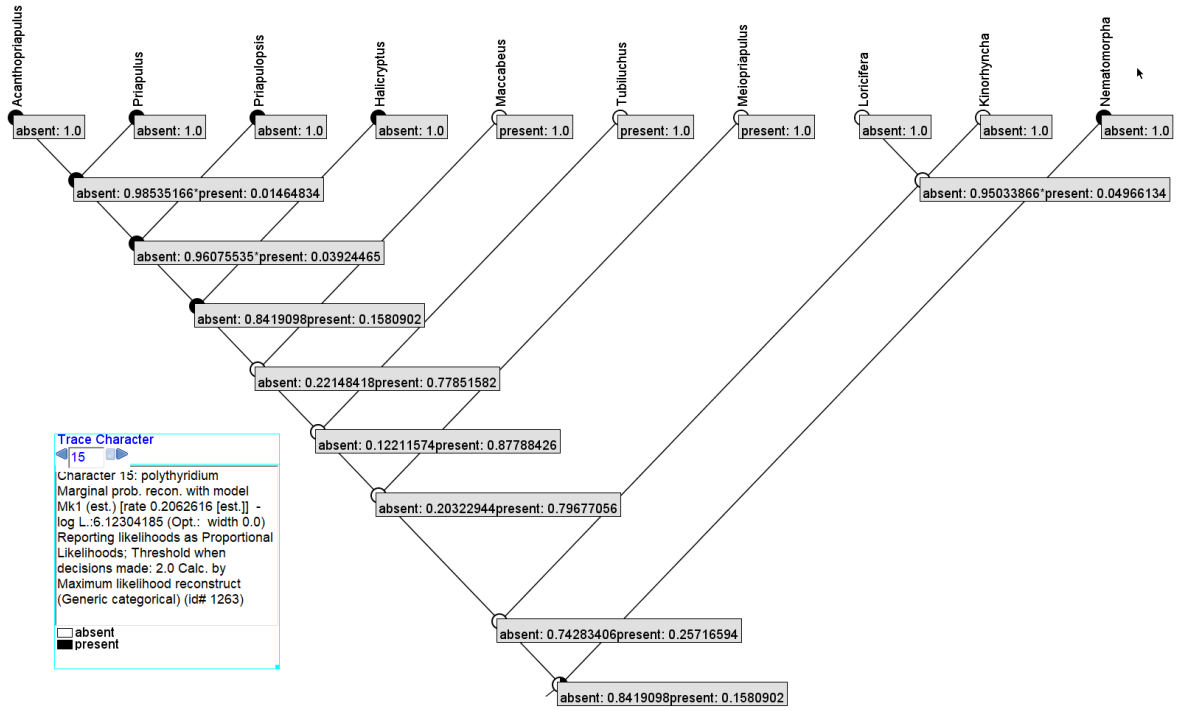
Supplementary figure S57 Likelihoods of the character states on the nodes of the combined 80% occupancy matrix tree with inferred positions of *Acanthopriapulus* and *Maccabeus* calculated by Mesquite for the character 'ring papillae'.



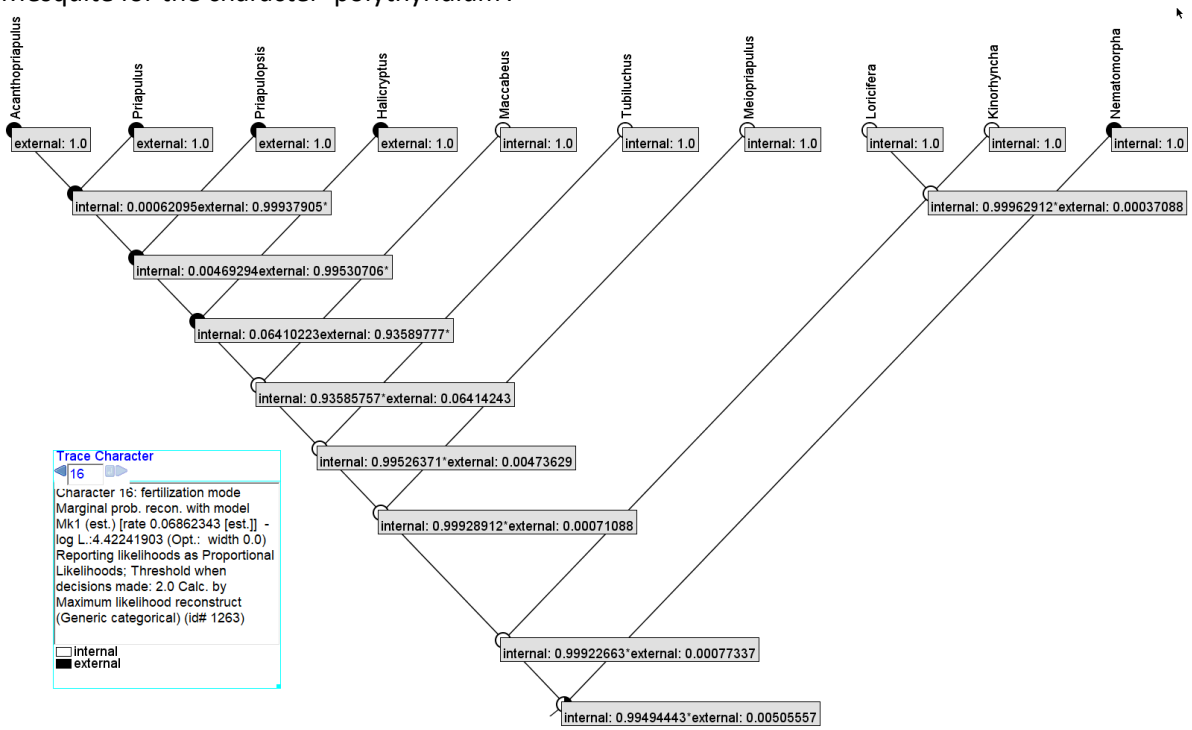
Supplementary figure S58 Likelihoods of the character states on the nodes of the combined 80% occupancy matrix tree with inferred positions of *Acanthopriapulus* and *Maccabeus* calculated by Mesquite for the character 'two structures lateral of anus'.



Supplementary figure S59 Likelihoods of the character states on the nodes of the combined 80% occupancy matrix tree with inferred positions of *Acanthopriapulus* and *Maccabeus* calculated by Mesquite for the character 'sexual dimorphism'.



Supplementary figure S60 Likelihoods of the character states on the nodes of the combined 80% occupancy matrix tree with inferred positions of *Acanthopriapulus* and *Maccabeus* calculated by Mesquite for the character 'polythyridium'.



Supplementary figure S61 Likelihoods of the character states on the nodes of the combined 80% occupancy matrix tree with inferred positions of *Acanthopriapulus* and *Maccabeus* calculated by Mesquite for the character 'fertilization mode'.