

Table S1. Evidence for distribution of air sacs and tracheal compression in adults across hexapod orders. In most cases, there are only data for a few species in each order. Only one or two representative publications are listed, though often more could be shown.

Order or Family	Air Sacs	Tracheal Compression	Link to Image or video
Protura	None. (Dittrich and Wipfler, 2021; Herhold et al. 2023)	No data	
Collembola	None (Dittrich and Wipfler, 2021)	No data	
Diplura	None (Dittrich and Wipfler, 2021)	No data	
Archaeognatha	None (Dittrich and Wipfler, 2021)	No data	
Zygentoma	None (Dittrich and Wipfler, 2021; Herhold et al. 2023)	No. Synchrotron x-ray; n=1	
Odonata	Extensive. (Weis-Fogh, 1964; Herhold et al. 2023)	Yes. Synchrotron x-ray; 2 species dragonfly (n=4 each) and 1 damselfly (n=2) (Westneat et al., 2006)	X-ray Video Link FigShare: https://figshare.com/articles/media/Insect_Respiration_X-ray_Videos/22082384?file=39223100
Ephemeroptera	Alimentary air sac (Herhold et al. 2023)	No. Synchrotron x-ray; n=1	
Dermaptera	None. (Jaglarz et al., 2019; Herhold et al. 2023)	Yes. Synchrotron x-ray; 1 species, n=3 (Westneat et al., 2006)	
Plecoptera	Alimentary air sac (Herhold et al. 2023)	No data	
Zoraptera	no data	No data	
Orthoptera	Extensive. (Harrison et al., 2013; Herhold et	Yes. synchrotron x-ray; 3 species n>4, grasshoppers and crickets	X-ray Video Link FigShare: https://figshare.com/articles/media/Insect_Respiration_X-ray_Videos/22082384?file=39220226

	al. 2023)	Westneat et al. 2003 (Harrison et al., 2013)	
Grylloblattodea	None (Herhold et al. 2023)	No data	
Mantophasmatodea	No data	No data	
Phasmatodea	None. (Strauß, 2021; Herhold et al. 2023)	No data	
Embiidina	Alimentary air sac (Herhold et al. 2023)	No data	
Blattodea	No air sacs observed in 10/11 species (7 of 8 species shown in FigShare); also (Dittrich and Wipfler, 2021; Herhold et al. 2023)	Yes. Synchrotron x-ray; <i>Blattella germanica</i> (Westneat et al., 2006)	X-ray Video Link FigShare: https://figshare.com/articles/media/Insect_Respiration_X-ray_Videos/22082384?file=39223763 X-ray images of 8 cockroach species FigShare link: 10.6084/m9.figshare.22121633
Mantodea	Dittrich and Wipfler 2021 report no air sacs; Herhold et al. report air sacs in head of one species. <i>Hierodula membranacea</i> , a large flying species, has air sacs (Kerry et al., 1987)	Yes. Synchrotron x-ray; 1 species (Westneat et al., 2006)	X-ray Video Link FigShare: https://figshare.com/articles/media/Insect_Respiration_X-ray_Videos/22082384?file=39223766
Psocodea	None. (Mukerji and Sen-sarma, 1955)	No data	
Hemiptera	Air sacs in a flying but not a nonflying species.	Yes. N > 3 animals <i>Oncopeltus</i> sp.	

	(Miller, 1961) (Wigglesworth, 1954)		
Thysanoptera	None. (Polilov and Smakov, 2016)	No data	
Hymenoptera (Vespidae)	No data	No data	
Hymenoptera (Formicidae)	Air sacs in each tagma (Keister 1963) (see synchrotron images, also (Meyer, 1989))	Yes. Synchrotron x-ray; head and thorax of 3 ant species. Westneat et al. 2003	Air sacs in head of male ant, Link FigShare: 10.6084/m9.figshare.22089179 X-ray Video Link FigShare: https://figshare.com/articles/media/Insect_Respiration_X-ray_Videos/22082384?file=39220211
Hymenoptera (Apidae)	(Meyer, 1989)	Yes. Synchrotron x-ray; <i>Bombus</i> and <i>Apis</i> sp. (Westneat et al., 2006)	X-ray Video Link FigShare: https://figshare.com/articles/media/Insect_Respiration_X-ray_Videos/22082384?file=39220220
Raphidioptera	No data	No data	
Neuroptera	None in <i>Chrysopa pallens</i> (Zhao et al., 2022) But reported for large fliers (Newport, 1851)	No data	
Megaloptera	No data	No data	
Strepsiptera	No data	No data	
Coleoptera (Carabidae)	None. See synchrotron videos Thoracic and abdominal ais sacs were reported in tiger beetles (Yeager and Spangler, 1995)	Yes. Synchrotron x-ray; 4 carabid species. Westneat et al. 2003 Socha et al. 2008 Hochgraf et al. 2019	X-ray Video Links FigShare: https://figshare.com/articles/media/Insect_Respiration_X-ray_Videos/22082384?file=39220214 https://figshare.com/articles/media/Insect_Respiration_X-ray_Videos/22082384?file=39220217
Coleoptera (Buprestidae)	Extensive. (Miller, 1966)	No data	
Coleoptera	Extensive. (Miller,	Yes. 2 species.	https://askabiologist.asu.edu/sites/default/files/

(Scarabaeidae)	1966)		games/beetle-dissection/play.html
Coleoptera (Curculionidae)	None. (Miller, 1966)	No data	
Coleoptera (Cerambycidae)	None. (Miller, 1966)	No data	
Coleoptera (Tenebrionidae)	None. (Pendar et al., 2019; Raś et al., 2018)	Yes. (Pendar et al., 2015)	
Mecoptera	None. (Herford, 1938; Wigglesworth, 1935)	Yes. (Herford, 1938)	
Diptera	In head and thorax. (Manning and Krasnow, 1993)	Yes. Multiple animals and species. (Westneat et al., 2006) (Hale et al., 2006)	X-ray Video Link FigShare: https://figshare.com/articles/media/Insect_Respiration_X-ray_Videos/22082384?file=39220229
Lepidoptera	Extensive. (Lowe et al., 2013; Newport, 1851)	Yes. Synchrotron x-ray; 2 species. N=6 each.	
Trichoptera	No data	No data	

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