

**Table S1. Example of model organisms in subterranean biology.** Model were selected based on two criteria: i) Organisms/groups with at least 20 papers listed in the Web Of Science; ii) Organisms/groups with at least two research labs focusing on them. Lab = Is the species reared in laboratory conditions and kept in stable cultures?; Habitat = Aq.: aquatic; Terr.: terrestrial; Lab = is the species commonly reared in the lab? Gen = Is a genome/transcriptome for the species available?; Level = Population: research on the species mainly based on comparing different populations; Species: research on the organism mainly based on comparison of different species; No. Species = Number of species in the genus/group. WoS = Number of paper in Web of Science; GeneBank = Number of sequence available in GeneBank; Ref = reference in which the species is suggested as a model system; \* the organism have not been yet referred as model in the literature.

Higher taxonomy	Species/Group	Ecology	Habitat	Lab	Gen	Level	Examples of applications	No. species	WoS	Gene Bank	Ref
Porifera	<i>Lycopodina hypogea</i> (=A. hypogea)	Subterranean exclusive	Aq.	no	no	Population	Nervous system evolution, developmental biology (Adamska, 2016; Borchellini et al. 2020); micro-eukarya interactions (Dupont et al. 2013; 2014); trophic ecology (Rastorgueff et al. 2011)	1	20	150	Godefroy et al. 2019
Malacostraca	<i>Gammarus minus</i>	Surface/ Subterranean	Aq.	yes	yes	Population	Subterranean adaptation (Carlini et al. 2017; MacAvoy et al. 2016), ecotoxicology (Chapman 2017), microbiome (Moriarty 2017), phylogeography (Carlini et al. 2009)	1	82	670	Fong 2019
	<i>Niphargus</i> spp.	Surface/ Subterranean	Aq.	no	no	Species	Subterranean adaptation (Trontelj et al. 2009; Copilas-Ciocianu et al. 2018), phylogeny and phylogeography (Fišer et al. 2012; Perez-Moreno et al. 2017), niche-based studies (Fišer et al. 2012), ecotoxicology (Avramov et al. 2013)	411, mostly subterranean	200	5517	Fišer 2019
	<i>Asellus aquaticus</i>	Surface/ Subterranean	Aq.	yes	yes	Population	Subterranean adaptation (Protas et al. 2011; Stahl et al. 2015), phylogeography (Sworobowicz et al. 2015), ecotoxicology (Bloor 2010)	1	609	22864	Protas & Jeffery 2012; Verovnik & Konec 2019
	<i>Proasellus</i> spp.	Surface/ Subterranean	Aq.	no	yes	Species	Trophic ecology (Francois et al. 2016), physiology (Mermillod-Blondin et al. 2013), ecotoxicology (Mösslacher 2000), phylogeography (Eme et al. 2013), community ecology (Weitowitz et al. 2019)	76	67	3148857	-
	<i>Aegla</i> spp.	Surface/ Subterranean	Aq.	no	no	Population/ Species	Phylogeography (Loretán et al. 2020), morphological adaptation (Fernandes & Bichuette, 2013, Marchiori et al. 2015)	90	201	3195	Cogo et al. 2018
	Cambaridae ( <i>Cambarus</i> , <i>Procambarus</i> , <i>Orconectes</i> , <i>Troglocambarus</i> )*	Surface/ Subterranean	Aq.	no	yes	Species	Phylogeography (Buhay et al. 2007), subterranean adaptation (Mejia Ortiz & Hartnoll, 2005; Cooper et al. 2001) molecular mechanisms (Stern & Crandall. 2018), behavior (Li & Cooper, 2002), ecotoxicology (Mathews et al. 1977), invasive species (Mouser et al. 2019)	ca. 40 cave species out of ca. 200	124*	1177	-
	Atyidae ( <i>Typhlatya</i> , <i>Troglocaris</i> , <i>Spelaecaris</i> , <i>Styglocaris</i> )*	Subterranean exclusive	Aq.	no	no	Species	Phylogeography (Jurado-Rivera et al. 2017, Zakšek et al. 2009), trophic ecology (Chávez-Solis et al. 2020), adaptation (Jugović et al. 2010, Bilandžija et al. 2017)	19	21	794	-
Remipedia	Remipedia*	Subterranean exclusive	Aq.	no	yes	Species	Arthropod evolution (Lozano-Fernandez et al. 2016), venom (von Reumont et al. 2014), nervous system (Fanenbruck et al. 2004, Stemme et al. 2013), phylogeography (Neiber et al. 2011)	30	105	109807	-

Hexapoda	<i>Dolichopoda</i> spp. *	Surface/ Subterranean	Terr.	no	no	Population/ Species	Subterranean adaptation (Sbordoni et al. 2000; Strauß & Sritih, 2017), ecotoxicology (Augustyniak et al. 2015)	ca. 50	72	1134	-
	<i>Trechus</i> spp.*	Surface/ Subterranean	Terr.	no	no	Population/ Species	Global change biology (Brandmayer et al. 2013, Rizzo et al. 2015), phylogeography (Contreras-Diaz et al. 2007, Faille et al 2013, Möst et al. 2020)	> 1000	127	1780	-
	Australian calcrete Dytiscidae ( <i>Paroster</i> , <i>Limbodesus</i> , <i>Nirridesus</i> , <i>Nirripiriti</i> )	Surface/ Subterranean	Aq.	no	yes	Species	Phylogeny and phylogeography (Cooper et al. 2002, Guzik et al. 2009), morphology (Alarie et al. 2009), trophic ecology (Sacco et al. 2020), subterranean adaptation (Jones et al. 2019), molecular mechanisms (Tierney et al. 2015), behavior (Langille et al. 2019)	>100 cave adapted	73*	1831*	Bilton et al. 2019.
Arachnida	<i>Meta menardi</i> (and related species)	Surface/ Subterranean	Terr.	no	no	Population/ Species	Subterranean adaptation (Hesselberg et al. 2019; Lipovšek et al. 2018), niche-based studied (Novak et al. 2010; Mammola & Isaia 2014, 2017), behaviour (Hesselberg et al. 2019), trophic ecology (Novak et al. 2010), silk studies (Lepore et al. 2012)	3	34	31	Hesselberg et al. 2019; Mammola et al. 2020
	<i>Dysdera</i> spp.	Surface/ Subterranean	Terr.	no	yes	Species	Subterranean adaptation (Arnedo et al. 2007), phylogeography (Macias-Hernandez et al. 2008), trophic ecology (Vizueta et al. 2019)	286	72	1928	Arnedo et al. 2007
	<i>Nesticus</i> spp. *	Surface/ Subterranean	Terr.	no	no	Species	Subterranean adaptation (Sanchez-Herrero et al. 2019), cryptic species, behaviour (Huber, 1993), phylogeography (Hedin 1997; Snowman et al. 2010)	279	54	323	-
Teleostei	<i>Astyanax mexicanus</i>	Surface/ Subterranean	Aq.	yes	yes	Population	Subterranean adaptation and mechanisms (Wilkens 1988; Jeffery 2009; Bilandžija et al. 2020), evolutionary history (Bradić et al., 2012; Gross 2012), nervous system (Rétaux et al. 2013), behaviour (Yoshizawa et al. 2010; Dubue et al. 2011), medicine (Riddle et al. 2018, Stockdale et al. 2018)	1	1426	251767	Wilkens, 2010; Protas & Jeffery 2012
	Amblyopsidae ( <i>Amblyopsis</i> , <i>Chologaster</i> , <i>Forbesichthys</i> , <i>Speoplatyrhinus</i> , <i>Typhlichthys</i> )	Surface/ Subterranean	Aq.	no	yes	Species	Subterranean adaptations (Poulson, 1963, Niemiller et al 2013a, Niemiller et al 2013b), phylogeny (Hart et al. 2020)	8	95	1509	Niemiller & Poulson, 2010
	<i>Phreatichthys andruzzii</i> *	Subterranean exclusive	Aq.	yes	no	Species	Behavior (Paglianti et al. 2006, Tartellin et al, 2011), subterranean adaptation (Berti et al. 2001), molecular mechanisms (Zhao et al. 2018, Stemmer et al. 2015, Ceinos et al. 2018)	1	33	62	-
	<i>Sinocyclocheilus</i> spp.	Surface/ Subterranean	Aq.	yes	yes	Population/ Species	Subterranean adaptation (Xiao et al. 2005), nervous system (Meng et al. 2018), molecular mechanisms adptation (Meng et al. 2013)	67	76	813399	Yang et al. 2016
	<i>Poecilia mexicana</i>	Surface/ Subterranean	Aq.	yes	yes	Population	Subterranean adaptation phylogeography (Plath et al. 2007), nervous system (McGowan et al. 2019), molecular mechanisms adptation (Passow et al. 2017)	1	205	79924	Kelley et al. 2012

Tetrapoda	<i>Hydromantes</i> spp.* (= <i>Speleomantes</i> spp.)	Surface/ Subterranean	Terr.	no	no	Species	Subterranean adaptation (Adams et al. 2019), nervous system (Dicke et al. 1997), behaviour, trophic ecology (Lunghi et al. 2018)	8	121	2255	-
	<i>Eurycea</i> spp.*	Surface/ Subterranean	Aq./ Terr.	no	no	Species	Phylogeography (Edgington et al 2016) subterranean adaptations (Phillips et al. 2017, Bendik et al. 2013; Edgington & Taylor, 2019), trophic ecology (Fenolio et al 2006), parasitology (McAlister & Bursley 2004)	ca. 30	414	3629	-
	<i>Proteus anguinus</i>	Subterranean exclusive	Aq.	no	yes	-	Subterranean adaptation, behaviour (Hervant et al. 2001, Schlegel et al 2009; Balázs et al. 2020), ageing and progenesis (Voituron et al. 2011), parasitology (Omar et al. 2019)	1	112	198	Aljančič et al. 2019
	<i>Calotriton</i> spp. (= <i>Euproctus</i> spp.)	Surface/ Subterranean	Aq./ Terr.	no	yes	Population/ Species	Trophic ecology (Manenti et al. 2020); phylogeography (Caccone et al. 1997, Rovelli et al. 2019), thermal biology (Trochet 2018), behaviour (Hervant et al. 2001)	3	121	894	-

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