Fantastic [FeFe]-hydrogenases and where to find them

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Supplementary Material

# Supplementary Table 1

List of all [FeFe]-hydrogenases whose characterization has been reported as of December 2021. The same acronym/identifier has been used in Figure 1 of the main text. The identifier begins with two letters that represent the organism source, followed by an acronym that refers to the specific enzyme (either a monomer or a protein complex). Wherever possible, it has been chosen to match previous literature. The group classification is according to (Greening et al., 2016). The type of characterization available is simplified for consistency and clarity, additional information can be found in the cited literature. In some cases, the cited literature is necessarily a selection, and it is not intended to be exhaustive.

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| **Organism** | **Acronym/identifier** | **Group** | **NCBI sequence ID** | **First report year** | **Characterization available, reference(s)** |
| *Acetobacterium woodii* | AwHydABCD | A3 | WP014357048.1 | 2012 | Purification (native) (Schuchmann and Muller, 2012) |
| AwHydA2(HDCR) | A4 | WP014355220.1 | 2013 | Purification (native) (Schuchmann and Muller, 2013)Purification (recombinant) (Leo et al., 2021) |
| *Caldanaerobacter subterraneus* | CasHydABCD | A3 | WP009609852.1 | 2004 | Purification (native) (Soboh et al., 2004)Used for synthetic biology (Kelly et al., 2015) |
| *Caldicellulosiruptor bescii* | CbHydABCD | A3 | WP015907776.1 | 2016 | Purification (Poudel et al., 2016) |
| *Chlamydomonas moewusii* | CmHydA1 | A1 | n/a | 2008 | Purification (native), spectroscopy (Kamp et al., 2008)Transcriptomics (Yang et al., 2013) |
| *Chlamydomonas reinhardtii* | CrHydA1 | A1 | XP001693376.1 | 1993 | Purification (native) (Happe and Naber, 1993)Purification (recombinant) (Girbal et al., 2005;King et al., 2006;Sybirna et al., 2008;von Abendroth et al., 2008;Kuchenreuther et al., 2010)Purification (semi-synthetic) (Berggren et al., 2013;Esselborn et al., 2013)Expression regulation (Happe and Kaminski, 2002)X-ray crystallography (Mulder et al., 2010;Swanson et al., 2015)Spectroscopy, mutagenesis, electrochemistry (Goldet et al., 2009;Silakov et al., 2009;Mulder et al., 2013;Mulder et al., 2014;Senger et al., 2016;Kertess et al., 2017;Lampret et al., 2017;Meszaros et al., 2020) |
| CrHydA2 | A1 | XP001694503.1 | 2003 | Expression regulation (Forestier et al., 2003)Purification (recombinant) (King et al., 2006)Purification (semi-synthetic) (Engelbrecht et al., 2021) |
| *Chlorella fusca* | CfHydA | A1 | CAC83290.1 | 2002 | Purification (native) (Winkler et al., 2002) |
| *Chlorella variabilis* | CvHydA1 | A1 | XP005848612.1 | 2011 | Expression regulation, *in vivo* function (Meuser et al., 2011)Purification (semi-synthetic), (Engelbrecht et al., 2017) |
| *Chlorococcum submarinum* | CsHydA | A1 | n/a | 2008 | Purification (native), spectroscopy (Kamp et al., 2008) |
| *Clostridium acetobutylicum* | CaHydA1 | A1 | WP010963357.1 | 1996 | Gene identification, expression regulation (Gorwa et al., 1996)Purification (recombinant) (Girbal et al., 2005;King et al., 2006;von Abendroth et al., 2008;Morra et al., 2015)Physiology and metabolism (Demuez et al., 2007;Klein et al., 2010;Cooksley et al., 2012;Du et al., 2021)Spectroscopy, mutagenesis, electrochemistry (Goldet et al., 2009;Lautier et al., 2011;Morra et al., 2016b;Ratzloff et al., 2018) |
| CaHydA2 (CaHydB) | B | WP010966505.1 | 2006 | Purification (recombinant) (King et al., 2006) |
| *Clostridium autoethanogenum* | CaHytA-E/FdhA | A4 | WP023162857.1 | 2013 | Purification (native) (Wang et al., 2013a) |
| *Clostridium beijerinckii* | CbA5H (Cbei\_1773) | A1 | WP026887313.1 | 2016 | Purification (recombinant), spectroscopy (Morra et al., 2016a)Purification (semi-synthetic), spectroscopy, electrochemistry (Corrigan et al., 2020)X-ray crystallography, mutagenesis, electrochemistry (Winkler et al., 2021) |
| Cbei\_1773, Cbei\_4110, Cbei\_0327, Cbei\_1901, Cbei\_4000, Cbei\_3796 | n/a | n/a | 2014 | Expression regulation (Morra et al., 2014;Arizzi et al., 2021) |
| *Clostridium butyricum* | HydA2, HydA8, HydB2, HydB3 | n/a | n/a | 2015 | Expression regulation (Calusinska et al., 2015) |
| *Clostridium pasteurianum* | CpI | A1 | WP004455619.1 | 1971 | Purification (native) (Nakos and Mortenson, 1971)Purification (recombinant) (Kuchenreuther et al., 2010)Purification (semi-synthetic) (Esselborn et al., 2013)X-ray crystallography (Peters et al., 1998;Lemon and Peters, 1999;Esselborn et al., 2016;Duan et al., 2018;Esselborn et al., 2019;Artz et al., 2020)Spectroscopy, mutagenesis, electrochemistry (Chen et al., 2002;Cornish et al., 2011;Bingham et al., 2012;Winkler et al., 2017;Artz et al., 2020;Morra et al., 2021) |
| CpII | A | WP003446424.1 | 1978 | Purification (native) (Chen and Blanchard, 1978)Spectroscopy (Adams and Mortenson, 1984)Expression regulation (Therien et al., 2017)Purification (recombinant), spectroscopy, electrochemistry (Artz et al., 2020) |
| CpIII | B | WP003447632.1 | 2017 | Expression regulation (Therien et al., 2017)Purification (recombinant), spectroscopy, electrochemistry (Artz et al., 2020) |
| *Clostridium perfringens* | CpHydA | A1 | WP011593109.1 | 1999 | Expression regulation (Kaji et al., 1999)Purification (recombinant), spectroscopy (Morra et al., 2016c) |
| *Desulfovibrio fructosovorans* | DfHnd | A1 | WP005996594.1 | 1995 | Gene identification, enzyme activity (Malki et al., 1995)Purification (native), spectroscopy (Kpebe et al., 2018) |
| DfHydAB | A3 | WP005990603.1 | 1998 | Purification (native) (Casalot et al., 1998)Gene knockout (Casalot et al., 2002) |
| *Desulfovibrio vulgaris* Hildenborough | DvH (DdH) | A1 | WP010939057.1 | 1971 | Gene identification, purification (native) (Legall et al., 1971;Voordouw and Brenner, 1985)Gene knockout (Pohorelic et al., 2002)Spectroscopy, electrochemistry (Vincent et al., 2005;Albracht et al., 2006;Roseboom et al., 2006;Goldet et al., 2009;Birrell et al., 2016;Rodriguez-Macia et al., 2017;Rodriguez-Macia et al., 2018)X-ray crystallography, spectroscopy (Nicolet et al., 1999;Nicolet et al., 2001;Rodriguez-Macia et al., 2020) |
| *Megasphaera elsdenii* | MeHydA | A1 | WP014016432.1 | 1979 | Purification (native) (Vandijk et al., 1979)Purification (semi-synthetic), spectroscopy, protein engineering (Esselborn et al., 2013;Caserta et al., 2016;Caserta et al., 2018) |
| *Moorella thermoacetica* | MtHydABC | A3 | WP011393219.1 | 2013 | Purification (native) (Wang et al., 2013b) |
| *Peptoclostridium acidaminophilum* | PaHymABCD | A | CAC39231.1 | 2003 | Expression regulation (Graentzdoerffer et al., 2003) |
| *Ruminococcus albus* | RaHydABC, RaHydA2, RaHydS | A3, B, C | WP002853139.1, WP002848990.1, WP002849014.1 | 2014 | Expression regulation, purification (native) (Zheng et al., 2014) |
| *Solobacterium moorei* | SmHydA | A1 | WP028077982.1 | 2019 | Purification (semi-synthetic) (Land et al., 2019) |
| *Syntrophomonas wolfei* | SwHyd1ABC | A3 | WP011640436.1 | 2017 | Purification (recombinant) (Losey et al., 2017) |
| *Syntrophus aciditrophicus* | SaHydAB | A3 | WP011417004.1 | 2020 | Purification (recombinant) (Losey et al., 2020) |
| *Thermoanaerobacter kivui* | TkHydA2(HDCR) | A4 | AIS53140.1 | 2018 | Purification (native) (Schwarz et al., 2018) |
| *Thermoanaerobacter mathranii* | TamHydS | C | WP013150113.1 | 2019 | Purification (semi-synthetic) (Land et al., 2019;Land et al., 2020) |
| *Thermoanaerobacterium saccharolyticum* | TsHydABCD/Hyd2/HfsB/HfsD | C, C, B, A | WP014758976.1, WP014758428.1, ACU11597.1, ACA51661.1 | 2009 | Expression regulation, gene knockout (Shaw et al., 2009) |
| *Thermotoga maritima* | TmHydS | C | WP004081666.1 | 2018 | Purification (semi-synthetic), spectroscopy (Chongdar et al., 2018) |
| TmHydABC | A3 | WP004081677.1 | 1999 | Purification (native) (Verhagen et al., 1999;Schut and Adams, 2009)Purification (semi-synthetic), spectroscopy, electrochemistry (Chongdar et al., 2020)X-ray crystallography (Furlan et al., 2021) |
| *Tetradesmus obliquus* | ToHydA | A1 | CAC34419.1 | 2001 | Expression regulation, purification (native) (Florin et al., 2001) |
| *Volvox carteri* | VcHydA1, VcHydA2 | A1, A1 | XP002948487.1, XP002948483.1 | 2015 | Expression regulation, purification (recombinant) (Cornish et al., 2015) |

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