

Supplementary table S1: Potential Hb variants in each zone in *Sebia* Capillary-2 electrophoresis

| Zones | Potential Hb variants |
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| Z1 | Hb Santa Ana (free alpha chain), Hb Mizuho (minor peak), Hb delta A'2, Hb alpha A2, Hb T-Cambodia, "Savaria" Hb A2 variant, "Chad" Hb A2 variant, "Arya" Hb A2 variant, "Hasharon" Hb A2 variant, "Fort de France" Hb A2 variant, "Ottawa" Hb A2 variant, "Shimonoseki" Hb A2 variant, "Stanleyville II" Hb A2 variant, "O-Indonesia" Hb A2 variant, "G-Norfolk" Hb A2 variant, "San Antonio" Hb A2 variant, "Handsworth" Hb A2 variant, "Matsue-Okii" Hb A2 variant, "Memphis" Hb A2 variant, "Q-Iran" Hb A2 variant, "G-Waimanalo" Hb A2 variant, "Russ" Hb A2 variant, "Q-India" Hb A2 variant, "Montgomery" Hb A2 variant, "Watts" Hb A2 variant, "G-Pest" Hb A2 variant, "Winnipeg" Hb A2 variant, "Queens" Hb A2 variant, "Inkster" Hb A2 variant, "Chapel Hill" Hb A2 variant, "Q-Thailand" Hb A2 variant, "Park Ridge" Hb A2 variant. |
| Z2 | Hb C , Hb F-Hull, Hb F-Texas-I, Hb Constant Spring, Hb C-Harlem (C-Georgetown), "Boumerdes" Hb A2 variant, "Bassett" Hb A2 variant, "Tarrant" Hb A2 variant, "Manitoba I" Hb A2 variant, "St. Luke's" Hb A2 variant, "Setif" Hb A2 variant, "Sunshine Seth" Hb A2 variant, "Titusville" Hb A2 variant, "Swan River" Hb A2 variant, "Manitoba II" Hb A2 variant, "Val de Marne" Hb A2 variant |
| Z3 | Hb A2 , Hb Chad (E-Keelung), Hb O-Arab, Hb E-Saskatoon, "Dallas" Hb A2 variant*, "Toulon" Hb A2 variant*, "Bonn" Hb A2 variant*, "Chicago" Hb A2 variant*, "Fontainebleau" Hb A2 variant*, "Hekinan" Hb A2 variant*, "Mosella" Hb A2 variant*, "Aztec" Hb A2 variant*, "Frankfurt" Hb A2 variant*, "M-Boston" Hb A2 variant*, "Owari" Hb A2 variant*, "Twin Peaks" Hb A2 variant*, "Conakry" Hb A2 variant*, "Gouda" Hb A2 variant*, "Jura" Hb A2 variant, "Nouakchott" Hb A2 variant |
| Z4 | Hb E , Hb Seal Rock, Hb Köln (Ube-1), Hb Buenos Aires (minor peak), Hb M-Saskatoon (minor peak), Hb A2-Babinga, Hb G-Siriraj, Hb Agenogi, Hb Sabine, Hb Santa Ana, Hb Savaria, "M-Iwate" Hb A2 variant, "Wayne" Hb A2 variant (peak 1), denatured Hb C |
| Z5 | Hb S , Hb Arya, Hb Hasharon (Sinai), Hb Dhofar (Yukuhashi), Hb Shimonoseki (Hikoshima), Hb O-Indonesia (Buginese-X), Hb Ottawa (Siam), Hb Fort de France, Hb Montgomery, Hb G-Copenhagen, Hb S-Antilles, Hb Handsworth, Hb S-Oman (peak 2), Hb Hamadan, Hb Russ, Hb Stanleyville II, "Lombard" Hb A2 variant, "Tatras" Hb A2 variant, "Cemenelum" Hb |

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| | A2 variant, "Jackson" Hb A2 variant, "Hopkins-II" Hb A2 variant, "J-Broussais" Hb A2 variant (alpha 2), denatured Hb O-Arab |
| Z6 | Hb D , Hb Memphis, Hb Leiden, Hb Muravera, Hb D-Bushman, Hb G-Norfolk, Hb S-Oman (peak 1), Hb Matsue-Oki, Hb Osu Christiansborg, Hb D-Punjab (D-Los Angeles), Hb G-Waimanalo (Aida), Hb Muskegon, Hb D-Ibadan, Hb Buenos Aires (minor peak), Hb Q-India, Hb Lepore (Lepore-BW), Hb Q-Iran, Hb Summer Hill, Hb G-Philadelphia, Hb D-Ouled Rabah, Hb Yaizu, Hb San Antonio, Hb Watts, Hb Ferrara, Hb Köln (Ube-1), Hb Fort Worth, Hb Korle-Bu (G-Accra), Hb G-Taipei, Hb D-Iran, Hb St. Luke's, Hb GCoushatta (G-Saskatoon), Hb Inkster, Hb Winnipeg, Hb Zürich, Hb G-Pest, Hb Queens (Ogi), Hb Setif, Hb P-Nilotic, Hb Sunshine Seth, Hb Titusville, "Le Lamentin" Hb A2 variant, "J-Meerut" Hb A2 variant, "J-Rajappen" Hb A2 variant, "J-Anatolia" Hb A2 variant, "J-Oxford" Hb A2 variant, "Ube 2" Hb A2 variant, "J-Broussais" Hb A2 variant (alpha 1), "J-Toronto" Hb A2 variant, "Mexico" Hb A2 variant, "J-Tongariki" Hb A2 variant, "Neuilly-sur-Marne" Hb A2 variant, "J-Paris-I" Hb A2 variant (alpha 2), "J-Habana" Hb A2 variant, "J-Paris-I" Hb A2 variant (alpha 1), "Wayne" Hb A2 variant (peak 2), denatured Hb E |
| Z7 | Hb F , Hb Willamette, Hb Alabama, Hb Chapel Hill, Hb Park Ridge, Hb Porto Alegre, Hb Q-Thailand (G-Taichung), Hb Sabine, Hb Bassett, Hb Rampa, Hb G-San José, Hb Barcelona, Hb Geldrop Santa Anna, Hb Richmond, Hb Boumerdes, Hb Swan River, Hb Burke, Hb Tarrant, Hb Presbyterian, Hb Manitoba II, Hb Manitoba I, Hb Port Phillip, "J-Rovigo" Hb A2 variant, denatured Hb S, denatured Hb D-Punjab |
| Z8 | Hb Lansing, Hb Hinsdale, Hb Ypsilanti (Ypsi - peak 1), Hb Alberta, Hb Val de Marne (Footscray), Hb Kempsey, Hb Shelby (Hb Leslie), Hb Atlanta, Hb Ypsilanti (Ypsi - peak 2), Hb Rainier, Hb Athens-GA (Waco), Hb Debrousse |
| Z9 | Hb A , Hb Olympia, Hb Gorwihl (Hinchingsbrooke), Hb Phnom Penh*, Hb Silver Springs*, Hb La Coruna*, Hb Bougardirey-Mali*, Hb Dallas*, Hb Toulon*, Hb Austin*, Hb Bonn*, Hb Buenos Aires (Bryn Mawr, major peak)*, Hb Chicago*, Hb Okayama*, Hb Fontainebleau*, Hb Raleigh*, Hb Hekinan*, Hb Mosella*, Hb Aztec*, Hb Little Rock*, Hb Frankfurt*, Hb Bethesda*, Hb M-Boston (M-Osaka)*, Hb Brisbane (Great Lakes)*, Hb Mizuho*, Hb Grange Blanche*, Hb San Diego*, Hb M-Saskatoon (main peak)*, Hb Malmö*, Hb Minneapolis Laos*, Hb Owari*, Hb Rhode Island (Southwark)*, Hb Twin Peaks*, Hb Wood*, Hb Conakry*, Hb |

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| | Coimbra (Ingelheim)*, Hb Linköping (Meilahti)*, Hb Templeuve*, Hb Alzette*, Hb Ty Gard*, Hb Gouda*, Hb Syracuse*, Hb Fort Dodge, Hb Camperdown, Hb Jura |
| Z10 | Hb Nouakchott, Hb Wayne (peak 1), Hb M-Iwate (M-Kankakee), Hb Camden (Tokuchi), Hb Hope |
| Z11 | Hb Vaasa, Hb Providence (X-Asn peak), Hb Tacoma, Hb Corsica, Hb K-Woolwich, Hb Lombard, Hb Andrew Minneapolis, Hb Fannin Lubbock, Hb Kaohsiung (New York), Hb Osler (Fort Gordon), Hb Himeji, Hb Jackson, Hb Tatra, "I (I-Texas)" Hb A2 variant |
| Z12 | Hb Bart's , Hb Cemenelum, Hb Wayne (peak 2), Hb Hopkins-II, Hb J-Calabria (J-Bari), Hb J-Tongariki, Hb Providence (X-Asp peak), Hb J-Meerut (J-Birmingham), Hb J-Broussais (Tagawa-I - alpha 2), Hb J-Rajappen, Hb Grady (Dakar), Hb Le Lamentin, Hb J-Anatolia, Hb Hikari, Hb J-Broussais (Tagawa-I - alpha 1), Hb J-Chicago, Hb J-Toronto, Hb J-Oxford (I-Interlaken), Hb Ube-2, Hb J-Meinung (J-Bangkok), Hb Neuilly-sur-Marne, Hb Mexico (J-Paris-II), Hb J-Paris-I (J-Aljezur - alpha 1), Hb J-Habana, Hb J-Baltimore (N-New Haven), Hb J-Paris-I (J-Aljezur - alpha 2), Hb K-Ibadan |
| Z13 | Hb N-Baltimore, Hb J-Rovigo, Hb J-Norfolk (Kagoshima), Hb J-Kaohsiung (J-Honolulu) |
| Z14 | Hb N-Seattle |
| Z15 | Hb I (I-Texas), Hb H |

* Hidden peak