

Table S7. Data matrix of petrotympanic characters scored for extant mysticetes used in phylogenetic analyses. Matrix can be downloaded from project page associated with this manuscript at MorphoBank ([www.morphobank.org](http://www.morphobank.org)).

|                                   | 1          | 1111111112 | 2222222223 | 3333333334 | 44444444 |
|-----------------------------------|------------|------------|------------|------------|----------|
| Taxon/Node                        | 1234567890 | 1234567890 | 1234567890 | 1234567890 | 12345678 |
| <i>Mammalodon colliveri</i>       | 0000000??0 | 0?0?????00 | 0000?0011? | ?01010?0?0 | 000??000 |
| <i>Eomysticetus whitmorei</i>     | 000?000??0 | 00?????000 | 00?000011? | 0100010010 | ??00?000 |
| <i>Balaenoptera acutorostrata</i> | 0011011110 | 0100211121 | 1010011200 | 0101001010 | 00110111 |
| <i>Balaenoptera bonaerensis</i>   | 0011011210 | 0100011121 | 1010011200 | 0110101111 | 00110101 |
| <i>Balaenoptera borealis</i>      | 0011011110 | 0000010121 | 0010011200 | 0110001111 | 11112101 |
|                                   |            | 2          | 1          |            |          |
| <i>Balaenoptera edeni</i>         | 0011011210 | 0000010121 | 0010011200 | 0110001110 | 01112111 |
| <i>Balaenoptera musculus</i>      | 0011011111 | 1010010201 | 0010011200 | 1111001111 | 01110011 |
|                                   | 1          |            |            |            |          |
| <i>Balaenoptera omurai</i>        | 0011011?10 | 0000010111 | 0110011100 | 011???1010 | ??110101 |
| <i>Balaenoptera physalus</i>      | 0011011210 | 0010010201 | 0010011200 | 11110011?1 | 0011?011 |
|                                   |            | 1          | 1          | 2          |          |
| <i>Megaptera novaeangliae</i>     | 0011011210 | 0000200112 | 0010011200 | 00110111?0 | 11121001 |
|                                   | 1          | 1          |            |            |          |
| <i>Eschrichtius robustus</i>      | 0011000200 | 0000000112 | 0000021202 | 0201000100 | 11201121 |
|                                   |            |            |            | 1          |          |
| <i>Caperea marginata</i>          | 1011000020 | 0001010003 | 001011011? | 010?101010 | 0?20?010 |
| <i>Balaena mysticetus</i>         | 1111000020 | 0001100310 | 0011110111 | 0010011020 | 01200002 |
|                                   | 1          |            |            |            |          |
| <i>Eubalaena</i> sp.              | 1111000020 | 0001200300 | 0011110111 | 0010011020 | 11200002 |
|                                   | 1          |            |            |            |          |