

Operational adaptations in Beutel & Gorb (2001) matrix:

Operational adaptations were made in the terminal groups, the group-names were updated and edited according to the most recent information and the two matrices were standardized for comparison.

- 1) “Chilopoda” and “Symphyla” were removed,
- 2) “Lepism.-Nicolet.” instead of “Tricholepidion” was chosen as the standard for Zygentoma because it contains less missing data, the monophyly of Zygentoma is strongly supported in most recent studies (Blanke et al., 2014; Song et al., 2016),
- 3) “Grylloblatodea” was treated as “Xenonomia”, the monophyly of Xenonomia is strongly supported in several studies (Beutel & Gorb, 2006; Terry & Whiting, 2005; Wipfler et al., 2011) and Mantophasmatodea was not known until Klass et al. (2002),
- 4) “Ensifera”, instead of “Caelifera” was chosen as a standard for Orthoptera because it contains less missing data, the monophyly of Orthoptera is strongly supported in several studies (Beutel & Gorb, 2001; Flook & Rowell, 1997, 1999; Song, 2010, 2015; Zhang et al., 2013),
- 5) “Heteroptera” was chosen as the standard for Hemiptera, considering that the monophyly of this suborder is less contested than the monophyly of the others suborders, besides that the monophyly of Hemiptera is strongly supported in several studies (Beutel & Gorb, 2001; Cryan & Urban, 2012; Song et al., 2012, 2019). The main reason Orthoptera and Hemiptera are treated as sub-orders in the work Beutel & Gorb (2001) was for the study of the evolution of adhesive pad character within these orders and Hexapoda in general.

Beutel & Gorb (2001) adapted matrix (Nexus format):

#NEXUS

BEGIN DATA;

DIMENSIONS NTAX=32 NCHAR=115;

FORMAT DATATYPE = STANDARD GAP = - MISSING = ? SYMBOLS = "0 1 2 3 4 5 6 7";

MATRIX

Diplura 111000000-00100010000001000000000000100100-----0??0?00000000(12)
(01)0---00000(01)(02)-01000-01000000010100000000000000
Protura 110001000-0012--20100001000000000000100000-----0??0?0?000001210---
0000301-0?000-110?00000?000000000000000000

Collembola 110001000-00100020000001000001000000100000-----0??0?
00000111210---0000202000000-11000000000100000000000000

Archaeognatha 101000001000010100000000000000000000121100-----0?
000000000000010001000010000000-00010000010100000000000000

Zygentoma 101110111010010101010001010010000000121100-----0100000000(02)
(01)01011001000010000000-00020100020100000000000000

Ephemeroptera
1011101010100101010100010000100000011411010000000000000011000000021000210010000
14000000000022000020100100000001000

Odonata
10111011101001010201000100001100000112110100000000000001011000000(01)210001000000
00100000000010210000201011000000000000

Plecoptera
101110111010010102010001000011000001121101101(01)100(01)0000010000100001210002-
00000001000000000(01)022000020101101010000000

Dermoptera 111110111010010102010001000001100001121101101111020000010(01)
(01)0000001210001100000001200000000102201102010101(01)001000000

Blattodea
1011101111100101020100010000111001011411011011110100000100000000012100011000110010
000000001022000021101001010000000

Isoptera
101110111110010102010001000011100101141101101100000000010000000001210(01)011000110
010000000001022000021101011000000000

Mantodea
1011101111100101020100010000111001011411011010110100000100000000012100011000110010
000000001022000021101000010000000

Embioptera
111110111011010102010001000011110001121101101100000000010000100001210002-
000000010000000001022010020101010001000000

Orthoptera
1011101110100101020100010000011000111311111010110101000100000000012100011000000010
000000001022000020101000010000000

Phasmatodea
101110111010010102010001000011110101141101101011010100010000000001210001100000001
0000000001022001020101001010000000

Xenonomia 11111011101001010201000100001110000-14110-----?
0000000012100011000000010000000-010?2000020101000010000000
Zoraptera 10111011101001010201000100?001100?01111011?1100?0000??????0???00?
210102-00000011000???00010?2?00020101010000000000
Thysanoptera 10111011101001013-2101110(01)0001101?01111011011001000?
001001000000121110(12)1000000211000000001022000020111002000000000
Psocoptera 101110111010011102010111000111101?
011211011011001000000101100000012111011000000213000010001022000020101000100000001
Phthiraptera 111110111010011102010111000111101?0-11110-----00-0000000001211102-
000000213000000-010220000201010000(01)0002000
Hemiptera 10111011101001014-
1111110000110100112110110110010000001000000200121110(12)1000000215000000001022000
020101(01)0(01)(01)(01)0(01)00000
Neuroptera
10111011101001010201000100000110000114110110100010000211000000(23)111211102-
110000013100000001022000020111(01)0(01)000000000
Megaloptera
101110111010101020100010(01)000110000114110110100010000(01)111000002111211102-
11000001(16)1(01)0000101022000020111100001000000
Raphidioptera 10111011101010102010001000001100?
0114110110100010000111100000(23)111211102-
1100000161(01)0000101022000020111000001000000
Coleoptera
10111011101010102010001000001100001141101101100130001110110000001211102-
01000001(37)1(01)0000101022000020111(01)00001000000
Strepsiptera 1(01)111011--1001010-
010001000001100001141101101100101001110110000001211302---000000-1-??00(01)010?2?
00020111000001000000
Hymenoptera
1011101110100101020100010(01)1001100001141101101100100000010(01)10002001211(01)0110
00000013100010111022000020111001000000(01)00
Trichoptera 10111011101001010-01----
0010011000011411011110010000001010000(23)001211102-
0000000131111011112200002011110(01)(01)00000000

Lepidoptera

1011101110100101020100010010011000011411011111001000000100(01)000(123)001211102-
00000001311110111122000020111001200000000

Mecoptera

1011101110100101020100010010011000011411011111001000100100(01)1012001210102-
00000101(13)1111011102200012011100(01)000000000

Diptera

11001100100110000114110111110010201001001000(12)001211102-
0000010131111111102200002011(01)0(01)(02)000000(01)0

10111011101001010-

Siphonaptera

1111011101001010-11101100100110000-14112-----0111010001211102-
00000101(13)100111-11022000120111000100000000

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END;

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