#NEXUS

BEGIN TAXA;

DIMENSIONS NTAX=10;

TAXLABELS

Rhombomylus

Paromomyidae

Carpolestidae

Plesiadapidae

Microsyopidae

Micromomyidae

Omomyidae

Adapidae

Cynocephalidae

Tupaia

;

ENDBLOCK;

BEGIN CHARACTERS;

DIMENSIONS NCHAR=150;

FORMAT DATATYPE=STANDARD MISSING=? GAP=- SYMBOLS="0123";

CHARLABELS

[1] 'd1 Third lower incisor i3 '

[2] 'd2 Second lower incisor i2 '

[3] 'd3 Third upper incisor I3 '

[4] 'd4 Size of first lower incisor i1 crown '

[5] 'd5 Orientation of first lower incisor i1 crown '

[6] 'd6 Form of first lower incisor i1 crown '

[7] 'd7 Margoconid on first lower incisor i1 crown '

[8] 'd8 Size of first upper incisor I1 crown '

[9] 'd9 Accessory cuspules on first upper incisor I1 crown '

[10] 'd10 Lower canine c1 '

[11] 'd11 Upper canine C1 '

[12] '13d Lower second premolar p2 '

[13] 'd15 Upper first premolar P1 '

[14] 'd16 Upper second premolar P2 '

[15] 'd17 Mesiodistal crown length of lower fourth premolar p4 '

[16] 'd18 Lower fourth premolar p4 talonid basin '

[17] 'd19 Lower fourth premolar p4 talonid cusps '

[18] 'd20 Lower fourth premolar p4 cristid obliqua '

[19] 'd22 Lower fourth premolar p4 paraconid '

[20] 'd23 Lower fourth premolar p4 metaconid '

[21] 'd24 Crest between protoconid and cristid obliqua on the lower fourth premolar p4'

[22] 'd25 Lower fourth premolar p4 crown exodaenodonty '

[23] 'd27 Upper third premolar P3 protocone '

[24] 'd28 Upper third premolar P3 conules '

[25] 'd30 Upper fourth premolar P4 conules '

[26] 'd32 Upper third premolar P3 metacone '

[27] 'd33 Upper third premolar P3 metastyle '

[28] 'd34 Upper fourth premolar P4 metacone '

[29] 'd35 Upper fourth premolar P4 metastyle '

[30] 'd36 Upper third premolar P3 parastyle '

[31] 'd37 Upper fourth premolar P4 parastyle '

[32] 'd39 Upper third premolar P3 crown shape index buccal length lingual length '

[33] 'd40 Upper fourth premolar P4 shape index buccal length lingual length '

[34] 'd41 Relative size of P3 compared to P4 crown area '

[35] 'd42 Relative size of P4 compared to M1 crown area '

[36] 'd43 Upper fourth premolar P4 postprotocingulum '

[37] 'd45 Upper fourth premolar P4 postprotocrista '

[38] 'd46 Upper fourth premolar P4 parastylar lobe '

[39] 'd47 Upper fourth premolar P4 protocone lobe '

[40] 'd48 Trigonid height on the lower first and second moars m1 2 '

[41] 'd49 Lower molars height '

[42] 'd50 Lower molar buccal cingulids '

[43] 'd51 Lower molar trigonid lengths '

[44] 'd52 Lower molar paraconid height '

[45] 'd53 d52 Lower molar paraconid expression '

[46] 'd54 Lower molar enamel '

[47] 'd55 Lower first and second molars m1 2 state of hypoconulid and entoconid '

[48] 'd56 Lower first and second molars m1 2 entoconid notch between the entoconid and hypoconulid '

[49] 'd57 Lower first and second molars m1 2 hypoconulid notch between the hypoconulid and hypoconid '

[50] 'd58 Mesial inflection of the lower molar trigonids '

[51] 'd59 Basal breadth of lower first and second molar m1 2 trigonids '

[52] 'd61 Breadth of the lower third molar m3 talonid '

[53] 'd62 Size of the lower third molar m3 hypoconulid '

[54] 'd63 Talonid of lower molars '

[55] 'd65 Curving lower molar paracristids '

[56] 'd66 . Stepped postvallid on lower first molar m1 '

[57] 'd67 Upper and or lower molar cusps '

[58] 'd68 Relative size of upper third molar M3 '

[59] 'd69 Relative length of of lower third molar m3 '

[60] 'd70 Stylar shelf of upper molars '

[61] 'd71 M1 or M2 postprotocingulum ('

[62] 'd72 Position of M1 2 conules '

[63] 'd73 M1 2 metaconules '

[64] 'd74 Relative sizes of metacone and paracone on M1 2 '

[65] 'd75 M1 2 hypocone '

[66] 'd76 M1 2 protocone position '

[67] 'd77 M1 2 precingulum '

[68] 'd78 Upper molar post and metacingula '

[69] 'd79 Upper molar centrocrista '

[70] 'd80 M1 parastylar lobe '

[71] 'd82 Orientation of the preparacrista on M1 2 '

[72] 'c1 Structure of the auditory bulla '

[73] 'c2 Relations of the entotympanic '

[74] 'Form of the External Auditory Meatus EAM '

[75] 'c5 Presence of branches of the internal carotid artery ICA '

[76] 'c6 Posterior carotid foramen position or the position of the entry of the internal carotid artery and or nerves into the middle ear '

[77] 'c8 Width of the central stem and relative size of the hypotympanic sinus '

[78] 'c9 Cranial and snout proportions '

[79] 'c10 Presence of a postorbital bar '

[80] 'c11 Presence of a mastoid process '

[81] 'c12 Number of jugular posterior lacerate foramina '

[82] 'c15 Supraorbital foramen '

[83] 'c16 Nasal flare '

[84] 'c17 Diameter of the infraorbital foramen '

[85] 'c18 Contact between lacrimal and palatine in the orbit '

[86] 'c19 Lacrimal tubercle '

[87] 'c20 Size of the optic foramen '

[88] 'c21 Foramen rotundum '

[89] 'c22 Position of the lacrimal foramen '

[90] 'c23 Cochlear window '

[91] 'c26 Fattened area on medial promontorium '

[92] 'ps2 Lesser tuberosity on humerus '

[93] 'ps4 Deltopectoral crest of humerus '

[94] 'ps5 Radial and or olecranon fossa of humerus '

[95] 'ps7 Supinator crest of humerus '

[96] 'ps8 Capitulum of humerus '

[97] 'ps9 Attachment for m. teres major on humerus '

[98] 'ps10 Trochlea of humerus '

[99] 'ps12 Shape of radial head '

[100] 'ps13 Radial head central fossa '

[101] 'ps14 Lateral lip on the radial head '

[102] 'ps15 Ridge on the distal end of the anterior radius '

[103] 'ps16 Ulnocarpal articulation '

[104] 'ps17 Olecranon process of ulna '

[105] 'ps19 Scaphoid and lunate '

[106] 'ps21 Nails '

[107] 'ps22 Flexor sheath ridges on the manual proximal phalanges '

[108] 'ps23 Groove for m. flexor fibularis '

[109] 'ps24 Groove on astragalar body '

[110] 'ps25 Height of the borders of the astragalar trochlea '

[111] 'ps26 Length of astragalar neck '

[112] 'ps28 Calcaneocuboid articulation with distal calcaneus '

[113] 'ps29 Distal end of calcaneus '

[114] 'ps30 Plantodistal process on the entocuneiform '

[115] 'ps33 Greater trochanter on the femur '

[116] 'ps34 Lesser trochanter on the femur '

[117] 'ps35 Third trochanter on the femur '

[118] 'ps36 Patellar groove on the femur '

[119] 'ps37 Distal femur '

[120] 'ps40 Medial malleolus on tibia '

[121] 'ps41 Tibial plateau '

[122] 'ps42 Humerofemoral index humerus length femoral length 100 '

[123] 'ps43 Brachial index radius length humerus length 100 '

[124] 'ps45 Capitular tail on humerus '

[125] 'ps46 Cross sectional shape of the radial shaft '

[126] 'ps47 Manual intermediate phalanges '

[127] 'ps48 Non hallucal terminal phalanges '

[128] 'ps49 Manual proximal phalanges '

[129] 'ps50 Metatarsal I facet on the entocuneiform '

[130] 'ps51 Peroneal process on metatarsal I '

[131] 'ps52 Medial process of metatarsal I '

[132] 'ps53 Ilium '

[133] 'ps54 Pubic symphysis '

[134] 'ps55 Anterior inferior iliac spine '

[135] 'ps60 Lumbar transverse processes '

[136] 'ps62 Proximal end of fibula '

[137] 'ps63 Height of ridges on the patellar groove on the femur '

[138] 'ps64 Prehensile hand proportions '

[139] 'ps65 Metatarsal I torsion '

[140] 'ec1 circular fissure separating olfactory peduncles from neocortex '

[141] 'ec2 olfactory bulbs, orientation retative to the cerrebrum '

[142] 'ec3 sylvian fissure '

[143] 'ec4 anterior lobe of the neocortex '

[144] 'ec5 Lateral fissure '

[145] 'ec6 midbrain exposure '

[146] 'ec7 quadrigeminate tubercles '

[147] 'ec8 inferior colliculi '

[148] 'ec9 nerve II, location of the optic chiasma '

[149] 'ec10 location of the brain case in the skull '

[150] 'ec11 temporal lobes '

;

STATELABELS

1

' present '

' absent ',

2

' present and small '

' absent '

' present and enlarged and or larger than i1 ',

3

' present '

' absent ',

4

' similar to other incisors or premolars if i2 3 are not present '

' larger than other incisors or premolars if i2 3 are not present ',

5

' procumbent to horizontal '

' essentially vertical',

6

' simple and not laterally compressed '

' laterally compressed with no broad flattened dorsal surface '

' laterally compressed with a broad flattened medial or dorsal surface '

' multicuspate and comb like ',

7

' absent '

' present ',

8

' not markedly enlarged relative to other incisors or premolars if I2 3 are missing '

' markedly enlarged relative to other incisors or premolars if I2 3 are missing',

9

' absent '

' posterocone present but no apical cuspules '

' posterocone and small cuspules developed around the tip with no strong apical division '

' strong apical division into an anterocone and laterocone in addition to the presence of a posterocone ',

10

' larger than adjacent teeth '

' smaller than adjacent teeth '

' absent ',

11

' double rooted '

' single rooted '

' absent ',

12

' double rooted '

' single rooted '

' absent ',

13

' present '

' absent ',

14

' double rooted '

' single rooted '

' absent '

' triple rooted ',

15

' somewhat smaller than that of the lower first molar m1 '

' subequal to that of m1 '

' p4 m1 '

' m1 p4 ',

16

' not basined '

' basined ',

17

' one distinct cusp '

' all cusps poorly defined '

' two well defined cusps '

' three well defined cusps ',

18

' joins postvallid near midline of tooth or more lingually '

' joins postvallid near buccal margin of trigonid '

' absent ',

19

' indistinct with a short paracristid present '

' distinct and cuspate '

' paraconid and paracristid absent or weak ',

20

' absent '

' present ',

21

' present and continuous '

' present but not continuous from the postvallid to the cristid obliqua'

' absent with no comparable crest on the postvallid ',

22

' not exodaenodont with no lobe development '

' slightly exodaenodont with a little lobe development '

' moderately exodaenodont with the distal lobe developed more than the mesial lobe',

23

' present '

' absent ',

24

' absent '

' one present '

' two present ',

25

' absent '

' one large conule present '

' one small paraconule present '

' both conules present and strong ',

26

' absent '

' present ',

27

' present '

' absent ',

28

' absent '

' present ',

29

' present '

' absent ',

30

' present '

' absent ',

31

' present '

' absent ',

32

' >2.0 '

' 1.8-2.0 '

' <1.7 ',

33

' >1.8 '

' <1.8 ',

34

' >0.6 '

' <0.6 ',

35

' 0.90-0.98 '

' >0.98 '

' <0.9 ',

36

' absent '

' present ',

37

' absent '

' present ',

38

' large and projecting '

' small and not projecting ',

39

' shorter mesiodistally than wide '

' equally long and wide ',

40

' tall relative to talonid '

' similar height to talonid ',

41

' high crowned index 0.79 '

' low crowned index.79 ',

42

' anterobuccal precingulid '

' cingulid on trigonid and talonid '

' absent with no buccal cingulid or precingulid ',

43

' trigonids become less mesiodistally compressed from m1 '

' mesiodistal length does not change from m1 3 '

' trigonids become more mesiodistally compressed from m1 3',

44

' lower than metaconid '

' subequal to or taller than the metaconid ',

45

' distinct from paracristid '

' indistinct from paracristid ',

46

' smooth'

' crenulated',

47

' unpaired '

' paired '

' twinned',

48

' present '

' absent ',

49

' weakly present to absent '

' distinctly present ',

50

' absent '

' present ',

51

' not swollen at the base '

' swollen basally ',

52

' much narrower than trigonid '

' similar in breadth to trigonid or wider ',

53

' similar to that of m1 2'

' larger than that of m1 2 but not developed into a lobe'

' larger than that of m1 2 and developed into a lobe ',

54

' hypoconid taller than entoconid '

' entoconid taller than hypoconid ',

55

' absent '

' present ',

56

' absent '

' present ',

57

' relatively acute '

' blunter',

58

' >0.9 '

' <0.9 ',

59

' m3<m2\_ '

' m3>m2\_ ',

60

' broad '

' narrow and expressed only as a buccal cingulum ',

61

' absent '

' weak'

' pronounced',

62

' central or closer to protocone than to paracone or metacone '

' apressed to paracone or metacone ',

63

' present '

' absent ',

64

' paracone metacone '

' cusps are subequal '

' metacone paracone ',

65

' absent '

' present as a true hypocone coming off the cingulum ',

66

' central on the tooth '

' skewed mesiobuccally ',

67

' absent '

' present and connects to postcingulum in at least some specimens '

' present and does not connect to the postcingulum in any specimens ',

68

' not continuous '

' continuous ',

69

' not v shaped '

' v shaped ',

70

' projects beyond the plane of the mesiolingual corner of the tooth'

' does not project beyond the plane of the mesiolingual corner of the tooth ',

71

' angled buccally '

' straight',

72

' membranous or bony but non petrosal in origin '

' no suture separating bulla from petrosal and or no developmental evidence for additional elements ',

73

' no entotympanic is present '

' entotympanic contacts the petrosal medially '

' entotympanic contacts the basioccipital medially '

' no medial contact ',

74

' not expanded into a tube '

' expanded into a bony tube ',

75

' grooves for at least the promontorial branch no tubes '

' tubes present for one or both arteries '

' ICA absent ',

76

' posteromedial '

' posterolateral ',

77

' broad with the hypotympanic sinus restricted '

' narrow with the hypotympanic sinus expansive ',

78

' long snout long neurocranium '

' reduced snout more bulbous and shorter neurocranium ',

79

' absent'

' postorbital process of the frontal is present but doesn t meet zygomatic '

' complete postorbital bar present ',

80

' no strong tubercle or inflation in the mastoid region '

' strong tubercle or inflation in the mastoid region ',

81

' single'

'dual ',

82

' absent '

' present',

83

' flare laterally at the caudal extent with a wide contact with the frontal '

' do not flare laterally at the caudal extent with a narrow contact with the frontal ',

84

' large'

' small',

85

' present'

' obscured by maxillofrontal contact ',

86

' absent'

' present',

87

' small '

'moderate '

'large ',

88

' absent'

' present',

89

' on orbital rim '

' on face '

' in orbit',

90

' not shielded '

' shielded by an arterial tube '

' shielded by a bony septum ',

91

' absent'

' present',

92

' gracile '

' protrudes medially away from humeral shaft ',

93

' positioned anterior '

' lateral',

94

' distinct '

' indistinct to absent ',

95

' broad and well developed '

' reduced to absent',

96

' spindle shaped '

' ball like',

97

' not distinct '

' present as a distinct protrusion on the crest leading down from the lesser tuberosity ',

98

' only a medial edge present '

' both medial and lateral edges are present and trochlea and capitulum are well separated by a distinct gap ',

99

' ovoid with the ratio of mediolateral breadth anteroposterior breadth greater than 1.26'

' round with the ratio of mediolateral breadth anteroposterior breadth less than 1.26 ',

100

' flat'

' deeply excavated ',

101

' broad but limited to the lateral side '

' narrow and more extensive ',

102

' absent'

' present raised and canted ',

103

' mediolaterally and dorsopalmarly extensive occuring in a transverse plane '

' limited to radial and palmar aspects of distal ulna lying in a proximodistal plane ',

104

' similar in length to the height of the semilunar notch with the ratio of olecranon process length semilunar notch height greater than 0.8 '

' very reduced with the ratio of olecranon process length semilunar notch height less than 0.75 ',

105

' unfused '

' fused ',

106

' absent'

' present on at least one digit ',

107

' absent'

' present but poorly demarcated '

' present and very well demarcated ',

108

' on the astragalus on the midline '

' shifted laterally '

' absent',

109

' shallowly grooved '

' narrow and more deeply grooved '

' not grooved at all medial and lateral guiding ridges absent ',

110

' subequal'

' lateral border much higher than medial ',

111

' less than 30% of total length of the bone '

' more than 30% of total length of the bone ',

112

' flat'

' a concave pit ',

113

' not elongate '

' elongate ',

114

' strong '

' reduced or absent',

115

' taller than femoral head '

' comparable in proximal extent to femoral head '

' markedly shorter than femoral head ',

116

' not enlarged and not extensive medially '

' enlarged and extended medially beyond the level of the head ',

117

' distal to lesser trochanter '

' the same level as the lesser trochanter ',

118

' triangular and narrow mediolaterally relative to its distal extent '

' rectangular and wide mediolaterally relative to its distal extent ',

119

' deep with no anterior extension of patellar ridges '

' very deep with anterior extension of patellar ridges '

' shallow',

120

' long'

' short',

121

' with the lateral condyle projecting further proximally than the medial condyle '

' with the medial and lateral condyles projecting to a similar extent proximally ',

122

' between 70 and 150 '

' greater than 150 '

' less than 70 ',

123

' less than 120 '

' greater than 120 ',

124

' present'

' very reduced to absent ',

125

' rounded '

' flattened',

126

' short and broad '

' tall and narrow',

127

' shallow proximally and distally '

' deep proximally and shallow distally '

' deep proximally and distally '

' mediolaterally wide and dorsoventrally flattened ',

128

' longer than intermediate phalanges '

' shorter than intermediate phalanges ',

129

' mediolaterally narrow '

' mediolaterally broad '

' saddle shaped ',

130

' small'

' extensive ',

131

' small medially rather than proximally extended'

' large mediolaterally restricted and proximally extended ',

132

' blade like '

' rod like ',

133

' long'

' short',

134

' large'

' very small to absent ',

135

' long and projecting ventrally beyond centrum '

' short and lateral to centrum not projecting ventrally beyond centrum',

136

' large'

' reduced ',

137

' subequal '

' medial higher than lateral ridge '

' lateral higher than medial ridge ',

138

' absent with the proximal phalanx short relative to metacarpal '

' present with the proximal phalanx long relative to metacarpal ',

139

' absent'

' present ',

140

' present '

' absent',

141

' dorsal '

' downwards ',

142

' absent '

' present ',

143

' absent '

' present ',

144

' absent '

' present ',

145

' present '

' absent ',

146

' exposed '

' not exposed ',

147

' not inflated '

' inflated ',

148

' located in a posterior position (just anterior to the pyriform lobe) '

' located in an anterior position (just posterior to the olfactory peduncles) ',

149

' anterior extention posterior to the posterior edge of the orbit level '

' extending anterior to the posterior edge of the orbit ',

150

' absent '

' present',

;

MATRIX

Rhombomylus 111------2 2212013011 0?000{01}0{01}00 0210010110 0010100010 0011001011 0-121001-1 -0012-?001 00-0?02000 ?000000?00 0??1?01110 000?000100 1000?0?1?? 01??010?00 00000?0110

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Carpolestidae 0001021130 1101200211 0201111101 0111111110 0021000101 1121110011 2100102001 11?0001001 0010110102 111101111? 1??0012000 0001110121 ?010101020 011110011? ??????????

Plesiadapidae 1011021131 1110301220 200111111{01} {01}11021111{01} 1021000101 1121111011 210000{12}101 ???1201001 0010100012 11{01}0011011 10000?1101 010{01}110121 0000111010 000{01}?01000 1011000100

Microsyopidae 1111020111 011001{12}001 1010001011 0201011000 1010001111 0010100101 1100112001 10?0000011 000000??10 011001?111 1????????? ?????????? 0????????? ?????????0 000101-100

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Omomyidae 1010110110 111101{12}0{01}1 1000001011 1200211100 1120000100 10{12}01{01}0111 1100002001 1100111120 0010?12?11 1110011111 1????1?010 1110101010 02?0??3?21 00?0??2?10 111111-011

Adapidae 1010100000 10000{01}1{01}{01}1 0000000010 0210011100 1{01}20000100 101011{01}111 1000{01}1{12}101 1100111121 000{01}112?11 1110011111 1000010110 1111101010 0200103021 0000002111 1{01}{01}111-011

Cynocephalidae 0200030000 0{02}12113111 201031111{01} 101??00111 0220012010 0100000000 0002000011 0021200011 1101001020 010011{01}001 1111102120 0101200120 1011012110 1111111001 0011{01}{01}1010

Tupaia 0200000100 1110301{02}11 20{01}0001011 100??11000 0210002000 0001100100 0?12110010 0020100020 1111012101 0000100000 0000100000 0000000000 000100{01}000 1000000001 001011-0?0

;

ENDBLOCK;

BEGIN ASSUMPTIONS;

OPTIONS DEFTYPE=UNORD POLYTCOUNT=MINSTEPS;

TYPESET \* default = ORD: 47 53 61 64;

ENDBLOCK;