

Supplementary S1 – Character matrix

xread

137 18

Ambystoma_mexicanum 000--00--000010--000?000001100-110010000000000000--00-0-00000-0000-0002000000110000000-0-----0-000000000011000-20000-0000000100-00-00-10--
Ascaphus_truei 0111011001000011000010010010-0-1[0 1]0020000000001000-00-0-00020-0200-1222000000110000000-00011?00113001100111112-11110-0110001011001000101-0
Rhinophrynus_dorsalis 000-000--0101010-000?0050100-0-000000000001101110-00-0-00100-2020-120220110010000000311201--00000001000200112-21110-010101000100110001111
Xenopus_laevis 000--00--0101010-00000010100-0-002000000201101110-00-0-0100002021112220110000100000321201--00100000010210101001110-0101000002-00-0001101
Pipa_carvalhoi000--00--0101010-00000010100-0-002000000201101110-00-0-0000002020-122210110000100010321201--00000000010210103001110-0101000000-00-0001100
Alytes_obstetricans 0011011001001011000000020000-0-100000100001001100-0100-11110-11110122100110001001010001001000011111110211110001111-011100101101100011101
Alytes_muletensis ??110110010???11000000020000-0-100000100001001100-0100-11110-11110122100110001000010001001000011111110211110001111-011100101101100011101
Bombina_maxima 1011011001001011000000020000-0-100000000001001100-0101111110-111101220001100000000100010010000111011110211110001110-010100001101100011100
Bombina_orientalis 1011011001001011000000020000-0-100000000001001100-0101111110-111101220001100010000100010010000111011110211110001110-010100001101100011100
Bombina_variegata 1011011001001011000000020000-0-100000000001001100-0101111110-111101220001100010000100010010000111011110211110001110-010100001101100011100
Discoglossus_galganoi 1011011001000011000000020000-0-100000000001001000-0100-11110-111101220001100010000100010010000111111110211110001110-011100001101100011100
Discoglossus_scovazzi ??110110010???1100000002100?????0000000001001000-0100-11110-11110???00011?00?000100?1101?0011110???????110001110-01110????????????????
Discoglossus_pictus 1011011001000011000000020000-0-100000000001001000-0100-11110-111101220001100010000100010010000111111110211110001110-011100001101100011100
Pelodytes_caucasicus 1010011101000111100000030000-0-1110001?-20110111101100-011110111101220001110000002100010001000111001?102101010100110010100111111100011100
Spea_bombifrons 0010111101000011100000030000-0-110000100101101110-1100-01011011110122100111000000010001100100011100110020010101?1110?1010?01111100011100

Spea multiplicata

??101111010???111000??100111
00?0000100?11001000111001?????0101010111001000??????????????????

Pelobates fuscus

0010111001101111100000031101111010000200201101111011010010110111101222
1011100000001010110010201110011102001110101110110111111100011100

Megophrys montana 000--010010011111000000301011110100011?-

20110111101101?0101?1111012200?11200000001000110110201110?1?0020011101011100
10100101111100011100

;

cnames

{0 Epidermal_melanocytes melanocytes_elongated_and_forming_orthogonal_mesh
melanocytes_of_irregular_shape_not_forming_reticulation;
{1 Larval_subdermal_serous_glands absent_present;
{2 Keratodonts absent_present;
{3 Labial_ridges single_row_of_keratodonts double_rows_of_keratodonts;
{4 Distal_anterior_labial_ridge row_broad very_short_and_median;
{5 Keratinized_jaw_sheaths absent_present;
{6 Oral_lips_ absent_present;
{7 Upper_lip_papillation papillation_continuous broad_diastema_present;
{8 Lower_lip_papillation papillation_complete_without_gap_diastema_in_papillation;
{9 Oral_orifice wide_narrow;
{10 Eye_position dorsolateral_lateral;
{11 Dermis_layers Single-layered_dermis double-layered_dermis;
{12 Vena_caudalis_dorsalis absent_present;
{13 Paired_venae_caudales_laterales short_long;
{14 Operculum_not_fused_to_abdominal_wall fused_to_abdominal_wall;
{15 Opercular_canal_ absent_present;
{16 Spiracle_position median_anterior sinistral median_posterior;
{17 Skin_expansion_posteriorly absent_present;
{18 Ventral_fin_morphology simple_modified_into_a_groove;
{19 Belly_sucker absent_present;
{20 Rectus_abdominis_reaches_the_origin_of_the_rectus_cervicis
reaches_as_further_as_the_ventral_platoquadrate_reaches_an_aponeurosis;
{21 M._subquadrate absent_present;
{22 M._subhyoide absent_present;
{23 M._geniohyoideus_origin_from_basibranchial_ceratobranchial_I/II_ceratobranchial_III
planum_hypobranchiale connective_tissue_lateral_to_glandula_thyroidea;
{24 M._tympanopharyngeus absent_present;
{25 Insertion_of_m._levator_arcuum_branchialium_IV
restricted_to_distal_parts_of_ceratobranchial_IV
insertion_reaching_medially_and_extending_on_proximal_parts_of_ceratobranchial_IV;
{26 M._transversus_ventralis_IV absent_present;
{27 M._interhyoideus_posterior_ absent_present;
{28 M._interhyoideus_posterior_development_thin_but_complete_sheath
loosely_spaced_fibers_in_restricted_areas_of_the_operculum
_extensive_and_strongly_developed;
{29 M._diaphragmatopraecordialis absent_present;

{30 M. diaphragmatopraecordialis and M. interhyoides posterior meeting m. interhyoideus posterior in smooth arch both muscles meeting in specific angled pattern ;

{31 M. constrictor branchialis I absent present;

{32 Interbranchial septum III musculature absent present;

{33 Interbranchial septum IV musculature absent present;

{34 M. subarcualis rectus II-IV one flat tract of fibers split into medial and lateral separate muscles;

{35 Single m. subarcualis obliquus origin single slip two clearly separate heads from ceratobranchialia II and III respectively three portions from ceratobranchialia II, III, IV;

{36 M. subarcualis rectus accessorius absent present;

{37 M. subarcualis rectus I number of slips one two three;

{38 M. subarcualis rectus I portion with origin from aponeurosis absent present;

{39 Insertion site of the m. subarcualis rectus I on medial parts of ceratohyal ventral muscle portion inserts laterally;

{40 Anterior insertion of m. subarcualis rectus II-IV on ceratobranchial I ceratobranchial II ceratobranchial III ;

{41 M. subarcualis rectus II-IV gap continuous discontinuous;

{42 Insertion of m. rectus cervicis far anteriorly [basibranchial] at processus branchiales II or III on proximal ceratobranchialia III and IV on ceratobranchial IV only ceratohyal;

{43 Mm. levatores arcuum branchialium I and II narrow wide gap between them very wide small gap between them or fused;

{44 M. levator arcuum branchialium III not split split into two crossing bundles split into two non-crossing bundles ;

{45 Larval jaw depressors originate from neurocranium (otic capsule) and dorsal fascia from palatoquadrate;

{46 M. hyoangularis absent present;

{47 Jaw depressors or portions thereof with post or suborbital origin jaw depressors originating exclusively preorbitally;

{48 M. suspensoriohyoideus absent present;

{49 Origin of m. suspensoriohyoideus from posterior base of processus muscularis from posterior palatoquadrate from otic capsule;

{50 M. interhyoideus and m. intermandibularis in close proximity well separated by a gap X-configuration;

{51 M. mandibulolabialis absent present;

{52 M. mandibulolabialis inserting soft tissue of lip inserting exclusively on cartilago labialis inferior;

{53 M. mandibulolabialis superior absent present;

{54 M. mandibulolabialis superior origin from medial edge of cartilago meckeli from posteroventral tip of cartilago labialis inferior;

{55 Origin of m. intermandibularis long a line on the ventral side of the cartilago meckeli corpus restricted to the medial face of the cartilago meckeli;

{56 Upper jaw without insertion of jaw muscles powered by jaw muscles;

{57 Larval m. levator mandibulae externus present as one muscle body two portions;

{58 Larval m. levator mandibulae externus inserts exclusively on lateral side of mandible main portion inserts on upper jaw cartilages soft tissue insertion;

- {59 Functional_larval_m._levator_mandibulae_lateralis absent present;
- {60 M._levator_mandibulae_lateralis_inserts
in_tissue_close_to_posterodorsal_process_of_suprarostal_cartilage_or_adrostral_tissue
nasal_sac_insertion;
- {61 M._levator_mandibulae_internus_high_low anterior;
- {62
Insertion_of_the_larval_m._levator_mandibulae_internus_in_relation_to_jaw_articulation_
medial_lateral_broadly_across_articulation;
- {63 M._levator_mandibulae_longus_originates_dorsally_on_skull_
from_posterior_palatoquadrate_exclusively_from_arcus_subocularis;
- {64 M._levator_mandibulae_longus_in_one_portion superficialis_and_profundus_portions;
- {65 Profundus_and_superficialis_portions_of_m._levator_mandibulae_longus
broadly_overlapping_at_insertion not_overlapping_parallel;
- {66 Ramus_maxillaris_(cranial_nerve_V2)_lateral_to_m._levator_mandibulae_longus_
medial_to_the_muscle;
- {67 Ramus_mandibularis_(c.n._V3)_-_mandibulae_longus
posterior_(ventral)_to_m._levator_mandibulae_longus_between_portions_of_muscle
anterior_(dorsal)_to_the_muscle;
- {68 Ramus_mandibularis_(c.n._V3)_-_externus_group
posterior_(ventral)_to_m._levator_mandibulae_externus_group_
runs_through_the_externus_group_anterior_(dorsal)_to_the_externus_group;
- {69 Processus_anterolateralis_of_crista_parotica absent present
forms_larval_processus_oticus_;
- {70 Posterolateral_projections_of_the_crista_parotica absent process_present
expansive_flat_chondrifications_processus_otobranchialis;
- {71 Posterior_palatoquadrate_curvature flat_or_slightly_concave
clearly_concave_with_bulging_and_pronounced_margin;
- {72 Palatoquadrate_connection_to_trabecula_cranii caudal rostral;
- {73 Position_of_jaw_articulation suborbital preorbital;
- {74 Suspensorium high intermediate low ultralow;
- {75 Processus_ascendens stout thin absent;
- {76 Confluence_between_posterior_palatoquadrate_and_ventral_otic_capsule absent
processus_basalis_present palatobasal_connection_present;
- {77 Commissura_praefacialis absent present;
- {78 Commissurae_craniobranchiales absent present;
- {79 Processus_suboticus_quadrate absent present;
- {80 Processus_pseudopterygoideu absent short long;
- {81 Dorsal_connection_from_processus_muscularis_to_neurocranium ligament_only
ligament_and_pointed_processus_antorbitalis commissura_quadrate-orbitalis
high_commissura_quadrate-orbitalis;
- {82 Processus_muscularis absent present;
- {83 Anterolateral_base_of_processus_muscularis without_conspicuous_projection
bearing_ventrolateral_process;
- {84 Arcus_subocularis_with_smooth_and_sharply_delimited_lateral_margin
irregular_margin three_distinct_processes processus_lateralis_posterior;
- {85 Shape_of_arcus_subocularis_in_cross_section_
with_horizontal_or_rising_lateral_margin margin_sloping_ventrad_laterally
round_in_cross_section;
- {86 Cartilago_labialis_superior_(suprarostal_cartilage) absent present;

{87 Articulation_of_cartilago_labialis_superior_with_cornu_trabeculae_by_pars_corporis by_pars_alaris fused_into_rostral_plate;
{88 Pars_alaris_and_pars_corporis fused,_forming_smooth_margin_distally separated_by_deep_distal_notch
fused_proximally_and_distally,_with_a_small_fenestra_medially completely_free;
{89 Partes_corpores medially_separate_distal_confluence_present forming_medial_body;
{90 Posterior_processes_of_pars_alaris double single;
{91 Posterior_dorsal_process_of_pars_alaris
tapering_conically_or_ending_bluntly_not_expanded_terminally
expanded_terminally_almost_rectangular_in_lateral_view;
{92 Adrostral_cartilage absent present very_large_and_elongate;
{93 Partes_alares_and_corpores_of_cartilago_labialis_superior in_line concentric_lines;
{94 Lower_jaw_cartilage uniform
differentiated_into_distal_cartilago_labialis_inferior_and_proximal_cartilago_meckeli_;
{95 Orientation_of_lower_jaw_U-shaped_transverse;
{96 Distal_end_of_cartilago_meckeli cylindrical
with_stout_dorsal_and_ventral_processes_forming_a_shallow_articular_fossa
expanded_and_flattened_no_fossa;
{97 Admandibular_cartilage absent present;
{98 Cartilaginous_roofing_of_the_cavum_cranii_absent taenia_transversalis_present_only
taeniae_transversalis_et_medialis_(fenestrae_parietales) formation_of_tectum_parietale
tectum_of_cavum_cranii_almost_completely_chondrified taeniae_tecti_medialis_only;
{99 Perilymphatic_foramen one_foramen two_foramina;
{100 Parasphenoid without_processus_alares processus_alares_present;
{101 Vertebral_centra_formation perichordal epichordal;
{102 Distinct_medial_ossification_center_of_vertebral_centra_ventral_to_notochord absent
present;
{103 Number_of_presacral_vertebrae more_than_nine nine eight less_than_eight;
{104 Larval_ribs absent present;
{105 Ceratobranchial_I_and_hypobranchial_I fused articulation_present;
{106 Hypobranchial_skeletal_parts as_two_cylindrical_hypobranchialia
planum_hypobranchiale;
{107 Free_basihyal absent present;
{108 Basibranchial long short indistinguishably_fused_to_hyobranchial_elements absent;
{109 Hypobranchial_plates_articulate fused;
{110 Processus_urobranchialis absent short_not_reaching_beyond_hypobranchial_plates
very_long_reaching_beyond_hypobranchial_plates;
{111 Commissura_proximalis_I absent present;
{112 Commissura_proximalis_II absent present;
{113 Commissura_proximalis_III absent present;
{114 Spicula_short_or_absent_present_and_long;
{115 Reticulating_cartilaginous_connections_between_spicula_III_and_IV absent present;
{116 Processus_branchialis open closed;
{117 Ceratohyal_without_diarthrotic_articulation_with_palatoquadrate_slender_medial_part
diarthrotic_articulation_present_medial_part_broad;
{118 Processus_postcondylaris_of_ceratohyal absent present;
{119 Cartilaginous_projections_along_ceratobranchialia absent present;
{120 Accessory_longitudinal_bars_of_cartilage_dorsal_to_ceratobranchialia_II_and_III
absent present;

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{121 Endolymphatic_spaces
extend_into_vertebral_canal_for_less_than_half_of_the_vertebral_column
extending_into_more_than_half_of_vertebral_canal_;
{122 Intracranial_endolymphatic_system anterior_intracranial_processus_ascendens_absent
anterior_processus_ascendens_present;
{123 Cleft_between_hyal_arch_and_branchial_arch_I closed open;
{124 Internal_gill_filaments absent present;
{125 Ligamentum_cornuquadratum absent present;
{126 Ligamentum_cornuquadratum_insertion inserting_on_ala_of_cartilago_labialis_superior
inserting_on_cornu_trabeculae;
{127 Ligamentum_mandibulosuprarostrale absent present;
{128 Ventral_valvular_velum absent present;
{129 Ventral_valvular_velum continuous discontinuous;
{130 Glottis_position_posterior anterior;
{131 Nostrils_open_in_larval_stages_closed_in_larval_stages;
{132 Forelimb_erupts_out_of_limb_pouch_outside_peribranchial_space
limb_erupts_from_pouch_into_peribranchial_chamber;
{133 Larval_lungs vestigial_absent functional_present;
{134 Branchial_food_traps absent present;
{135 Branchial_food_traps_continuity continuous divided_crescentic_;
{136 Secretory_ridges_absent present;
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tread
(0 (1 ((2 (3 4)) ((5 ((7 8 9) (10 12))) (13 14 (16 17)))))))*
(0 (1 ((2 (3 4)) ((5 ((7 8 9) (10 12))) (13 14 (16 17)))))))*
(0 (1 ((2 (3 4)) ((5 ((7 8 9) (10 12))) (14 13 (16 17)))))))*
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proc /;
comments 0
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Supplementary_S2_Complete_optimization

