

SELECTION - EXERCISES



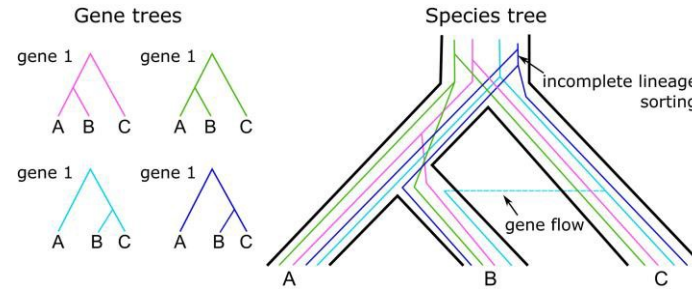
HAND-IN II

- Two parts:
 - Part 1: selection tests - either a given dataset or DIY hypothesis
 - Part 2: Nielsen and Slatkin textbook, chapter 9 - all exercises
- Time until the 30th October (just over two weeks)



NEXT (NEXT) WEEK

- ILS



- Paper discussions are making a comeback!

Pervasive incomplete lineage sorting illuminates speciation and selection in primates

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- Hand-in II discussion

Hand-in 2 - Selection using dN/dS

In this hand-in you will analyse some data and test for selection (Part 1) and you will also do the theoretical exercises of the Nelson and Nelson book (Chapter 9 Part 3, Part 4, Part 5). You can choose one out of two options.

Option A: you will analyse the 1000 data set for selection using the phylogenetic concepts and tools you have learned during the last 14 sessions on Friday. Then you will have to answer some questions (Part 2). Make sure to include detailed information on how the analysis was performed (the example, which software was used and the results of the analysis).

Option B: you can formulate an hypothesis about selection (Part 1) and you will also do the theoretical exercises of the Nelson and Nelson book (Chapter 9 Part 3, Part 4, Part 5). You must write a report with Part 1 (Part 1 A or B) and Part 2. For Part 2 you must comment the result or show the calculations to get the results. If the final result is the only thing provided, Part 2 is going to be failed. This report must be uploaded on Brightspace in PDF format before Sunday, 26th of October at 15:00 pm. (each group needs a report).

Part 1

Option A: Molecular phylogenetics of the Medicago genus and patterns of molecular evolution of the NORK protein

Background for the study

Legumes have the ability to form symbiotic associations with soil bacteria in a symbiotic group of bacteria called rhizobia and thereby use atmospheric N₂ as a source of nitrogen. Here we focus on the phylogeny of the plant genus *Medicago* and on a particular gene in the bacterial symbiotic nitrogen-fixing pathway, the *NORK* gene. The gene *NORK* (Nodulation Receptor Kinase) is required to transduce a complex signal initiated by rhizobial Nod factors and start the symbiotic relationship. The C-terminal region of the extracellular domain contains three conserved EGF-like repeats (E1-E3) which are motifs involved in ligand binding.

Data

The alignment of a fragment of the *NORK* coding sequence (CDS) gene of 12 species of the *Medicago* genus and 8 other species within the Leguminosae family is provided in MEGA format (see below).

Additionally, a phylogeny (Fig. 1) of the genus *Medicago* (available as a network tree at <https://www.phylo.org>) that can be viewed in MEGA. The phylogeny described here is based on 1000 data set. Molecular phylogenetics supports the morphologically based taxonomy. Transfer of the reclassified leguminosae species into the genus *Medicago* L. Part 1 (see 2021_2022_2023_2024_2025_2026_2027_2028_2029_2030_2031_2032_2033_2034_2035_2036_2037_2038_2039_2040_2041_2042_2043_2044_2045_2046_2047_2048_2049_2050_2051_2052_2053_2054_2055_2056_2057_2058_2059_2060_2061_2062_2063_2064_2065_2066_2067_2068_2069_2070_2071_2072_2073_2074_2075_2076_2077_2078_2079_2080_2081_2082_2083_2084_2085_2086_2087_2088_2089_2090_2091_2092_2093_2094_2095_2096_2097_2098_2099_2100_2101_2102_2103_2104_2105_2106_2107_2108_2109_2110_2111_2112_2113_2114_2115_2116_2117_2118_2119_2120_2121_2122_2123_2124_2125_2126_2127_2128_2129_2130_2131_2132_2133_2134_2135_2136_2137_2138_2139_2140_2141_2142_2143_2144_2145_2146_2147_2148_2149_2150_2151_2152_2153_2154_2155_2156_2157_2158_2159_2160_2161_2162_2163_2164_2165_2166_2167_2168_2169_2170_2171_2172_2173_2174_2175_2176_2177_2178_2179_2180_2181_2182_2183_2184_2185_2186_2187_2188_2189_2190_2191_2192_2193_2194_2195_2196_2197_2198_2199_2200_2201_2202_2203_2204_2205_2206_2207_2208_2209_2210_2211_2212_2213_2214_2215_2216_2217_2218_2219_2220_2221_2222_2223_2224_2225_2226_2227_2228_2229_2230_2231_2232_2233_2234_2235_2236_2237_2238_2239_2240_2241_2242_2243_2244_2245_2246_2247_2248_2249_2250_2251_2252_2253_2254_2255_2256_2257_2258_2259_2260_2261_2262_2263_2264_2265_2266_2267_2268_2269_2270_2271_2272_2273_2274_2275_2276_2277_2278_2279_2280_2281_2282_2283_2284_2285_2286_2287_2288_2289_2290_2291_2292_2293_2294_2295_2296_2297_2298_2299_2300_2301_2302_2303_2304_2305_2306_2307_2308_2309_2310_2311_2312_2313_2314_2315_2316_2317_2318_2319_2320_2321_2322_2323_2324_2325_2326_2327_2328_2329_2330_2331_2332_2333_2334_2335_2336_2337_2338_2339_2340_2341_2342_2343_2344_2345_2346_2347_2348_2349_2350_2351_2352_2353_2354_2355_2356_2357_2358_2359_2360_2361_2362_2363_2364_2365_2366_2367_2368_2369_2370_2371_2372_2373_2374_2375_2376_2377_2378_2379_2380_2381_2382_2383_2384_2385_2386_2387_2388_2389_2390_2391_2392_2393_2394_2395_2396_2397_2398_2399_2400_2401_2402_2403_2404_2405_2406_2407_2408_2409_2410_2411_2412_2413_2414_2415_2416_2417_2418_2419_2420_2421_2422_2423_2424_2425_2426_2427_2428_2429_2430_2431_2432_2433_2434_2435_2436_2437_2438_2439_2440_2441_2442_2443_2444_2445_2446_2447_2448_2449_2450_2451_2452_2453_2454_2455_2456_2457_2458_2459_2460_2461_2462_2463_2464_2465_2466_2467_2468_2469_2470_2471_2472_2473_2474_2475_2476_2477_2478_2479_2480_2481_2482_2483_2484_2485_2486_2487_2488_2489_2490_2491_2492_2493_2494_2495_2496_2497_2498_2499_2500_2501_2502_2503_2504_2505_2506_2507_2508_2509_2510_2511_2512_2513_2514_2515_2516_2517_2518_2519_2520_2521_2522_2523_2524_2525_2526_2527_2528_2529_2530_2531_2532_2533_2534_2535_2536_2537_2538_2539_2540_2541_2542_2543_2544_2545_2546_2547_2548_2549_2550_2551_2552_2553_2554_2555_2556_2557_2558_2559_2560_2561_2562_2563_2564_2565_2566_2567_2568_2569_2570_2571_2572_2573_2574_2575_2576_2577_2578_2579_2580_2581_2582_2583_2584_2585_2586_2587_2588_2589_2590_2591_2592_2593_2594_2595_2596_2597_2598_2599_2600_2601_2602_2603_2604_2605_2606_2607_2608_2609_2610_2611_2612_2613_2614_2615_2616_2617_2618_2619_2620_2621_2622_2623_2624_2625_2626_2627_2628_2629_2630_2631_2632_2633_2634_2635_2636_2637_2638_2639_2640_2641_2642_2643_2644_2645_2646_2647_2648_2649_2650_2651_2652_2653_2654_2655_2656_2657_2658_2659_2660_2661_2662_2663_2664_2665_2666_2667_2668_2669_2670_2671_2672_2673_2674_2675_2676_2677_2678_2679_2680_2681_2682_2683_2684_2685_2686_2687_2688_2689_2690_2691_2692_2693_2694_2695_2696_2697_2698_2699_2700_2701_2702_2703_2704_2705_2706_2707_2708_2709_2710_2711_2712_2713_2714_2715_2716_2717_2718_2719_2720_2721_2722_2723_2724_2725_2726_2727_2728_2729_2730_2731_2732_2733_2734_2735_2736_2737_2738_2739_2740_2741_2742_2743_2744_2745_2746_2747_2748_2749_2750_2751_2752_2753_2754_2755_2756_2757_2758_2759_2760_2761_2762_2763_2764_2765_2766_2767_2768_2769_2770_2771_2772_2773_2774_2775_2776_2777_2778_2779_2780_2781_2782_2783_2784_2785_2786_2787_2788_2789_2790_2791_2792_2793_2794_2795_2796_2797_2798_2799_2800_2801_2802_2803_2804_2805_2806_2807_2808_2809_2810_2811_2812_2813_2814_2815_2816_2817_2818_2819_2820_2821_2822_2823_2824_2825_2826_2827_2828_2829_2830_2831_2832_2833_2834_2835_2836_2837_2838_2839_2840_2841_2842_2843_2844_2845_2846_2847_2848_2849_2850_2851_2852_2853_2854_2855_2856_2857_2858_2859_2860_2861_2862_2863_2864_2865_2866_2867_2868_2869_2870_2871_2872_2873_2874_2875_2876_2877_2878_2879_2880_2881_2882_2883_2884_2885_2886_2887_2888_2889_2890_2891_2892_2893_2894_2895_2896_2897_2898_2899_2900_2901_2902_2903_2904_2905_2906_2907_2908_2909_2910_2911_2912_2913_2914_2915_2916_2917_2918_2919_2920_2921_2922_2923_2924_2925_2926_2927_2928_2929_2930_2931_2932_2933_2934_2935_2936_2937_2938_2939_2940_2941_2942_2943_2944_2945_2946_2947_2948_2949_2950_2951_2952_2953_2954_2955_2956_2957_2958_2959_2960_2961_2962_2963_2964_2965_2966_2967_2968_2969_2970_2971_2972_2973_2974_2975_2976_2977_2978_2979_2980_2981_2982_2983_2984_2985_2986_2987_2988_2989_2990_2991_2992_2993_2994_2995_2996_2997_2998_2999_3000_3001_3002_3003_3004_3005_3006_3007_3008_3009_3010_3011_3012_3013_3014_3015_3016_3017_3018_3019_3020_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Enjoy the vacation!





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