

Comprehensive molecular and cellular studies suggest avian scutate scales are secondarily derived from feathers, and more distant from reptilian scales

Ping Wu¹, Yung-Chih Lai^{1,2}, Randall Widelitz¹, Cheng-Ming Chuong^{1,2,3*}

¹Department of Pathology, Keck School of Medicine, Univ. Southern California, Los Angeles, CA 90033

²Integrative Stem Cell Center, China Medical University Hospital, China Medical University, Taichung 40402, Taiwan

³International laboratory for Wound Repair and Regenerative Research, Graduated Institute of Clinical Medicine, National Cheng Kung University, Tainan, Taiwan.

Supplementary

Figure. S1. List of 86 annotated alligator genes among the 102 chicken *feather-associated genes*

ADAM12, CCDC170, GGT5, KLHL4, NTN3, RUSC2, TEK, ADAMTSL2, GLIS1, LIMCH1, OSR1, SATB2, ADCY5, CLGN, EPB41L3, LOXL3, SIM1, TLN2, AFF3, CPLX2, EPHA5, HBE, LRIG1, PAMR1, LC22A16, TMTC1, CPXM2, ESM1, HPGD, LRRC16A, PDE1A, SMOG1, Ahrr, DNAH10, HRH2, LRRC4C, PGBD5, SOX18, TPD52L1, ALCAM, DRAXIN, FAT3, HSPA4L, Lrrn1, PGM5, ST8SIA6, TSPO2, ANO1, EFEMP1, FBLN1, IGF2, PHLDB2, STEAP3, UBASH3B, ARHGAP25, EMX2, FLNB, JUN, MMEL1, PPP4R4, STK10, ZIC1, ARHGEF3, *foxp2*, KCNH5, MSANTD1, RAI2, STRA6, ZIC3, FRMD3, KCNS2, MYOCD, RGMA, SYNDIG1, ZP2, BEND5, FST, KIAA2022, NEFM, RND3, SYT6, GAD2, KIFAP3, NT5E, RUNX3, TBX15

Figure. S2. List of 135 annotated alligator genes among the 170 chicken *scale-associated genes*

GSN, FKBP9, ATF4, COL2A1, MDK, COL16A1, SCARF2, PPM1D, HIF1A, MEOX2, SNCAIP, AQP1, P4HA3, FKBP7, SVEP1, FAM101B, PIEZO2, ADAMTS3, SLIT2, WBSCR17, SELM, GTF2IRD1, CACNA1G, HTRA3, FAM46A, BCL6, LMO4, ST3GAL1, CD82, CHST15, IGFBP2, IGSF10, PLBD2, FKBP14, TBX4, TMEM47, NPTX2, NDRG1, RNF34, PRKD1, PANK1, TSHZ1, DVL1, CDH13, ARSI, TLE1, WASF3, IL17REL, KIAA0226L, TPCN1, DACT2, SULT1E1, ATCAY, SLITRK4, NFKBIA, TMEM132E, PDLIM5, KIAA0513, TMEFF2, TPST1, NFATC2, KLHL25, DOCK5, TRIM47, SOHO-1, ZFPM1, DCLK2, SFRP4, COL17A1, FRMPD4, KCNMB4, ASTN1, ELFN1, PITPNM3, PRDM6, CDH1, CDKL1, MDGA2, ATP6AP1L, PLCB1, NTNG1, SHOX, GALNT5, GLRA4, RTN4RL1, PROX1, PKP2, PITX1, LHX9, IL18, PIK3R5, DACH1, CADM2, NT5C1A, NPAS2, SBK1, ADARB2, CHAC1, OPRD1, GABRA1, PI16, RHOV, ASPHD2, TPH2, TFAP2B, CDKN2C, VWC2, STK32A, DRD5, PPM1H, TOX, MOV10L1, RCAN2, PYROXD2, GPR143, Wnt10a, SCN4B, CALCR, MGAT4C, SLC17A9, VGLL1, PRDM12, PTPRO, TMEM215, TEKT5, AJAP1, GLIS3, Wnt3, NRG3, TRPM6, GRIN2C, ADCYAP1R1, SLC34A2, KY, Gnot1