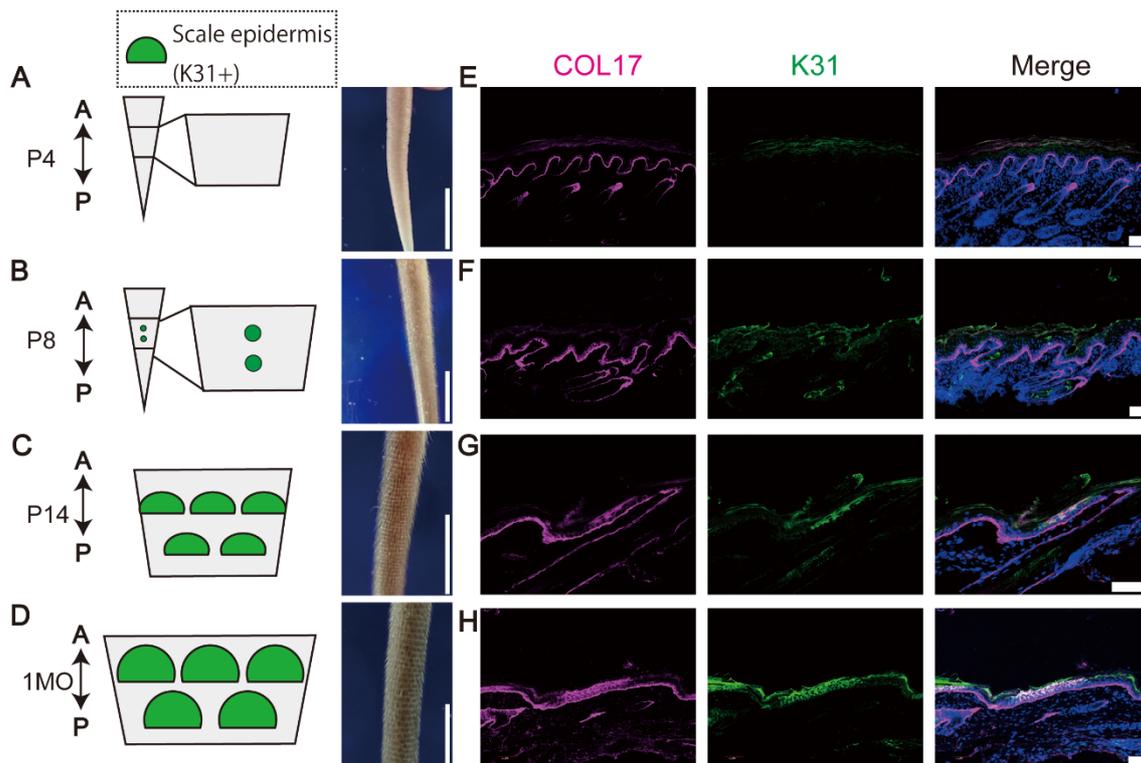




Title	Collagen XVII deficiency alters epidermal patterning
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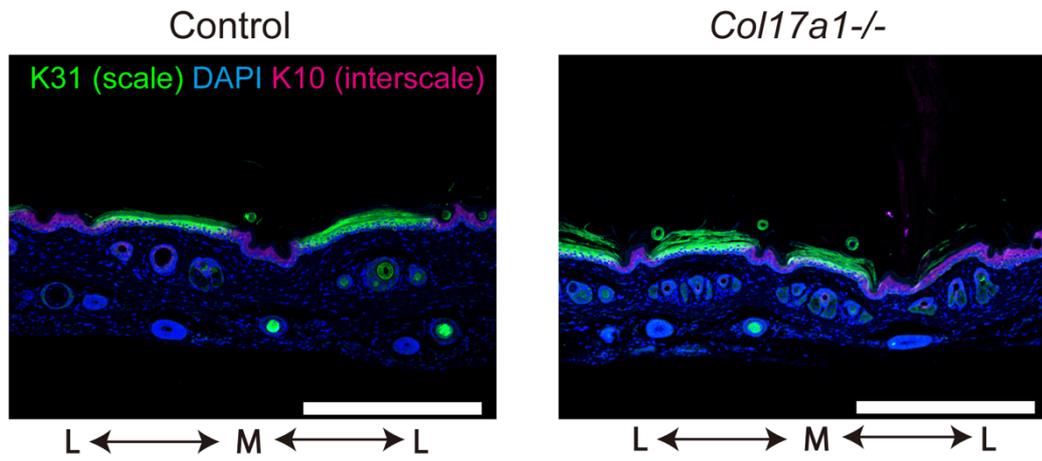




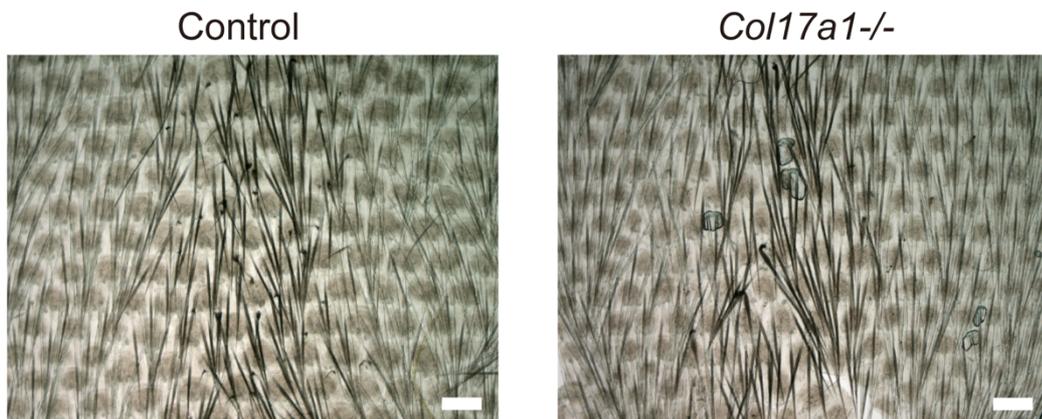
Supplementary Figure 1. Development of murine tail scales.

(A-D) Schematic diagrams of scales (K31+, green) in mouse tail epidermis and representative images of tail skin at P4 (A), P8 (B), P14 (C), and 1-month-old (1MO, D). Scale bar: 5 mm. (E-H) COL17 and K31 staining of tail skin (with DAPI nuclear counterstain) at P4 (E, n=3), P8 (F, n=3), P14 (G, n=3), and 1MO (H, n=4). Scale bar: 60 μ m. Note that COL17 is present at the dermo-epidermal junction.

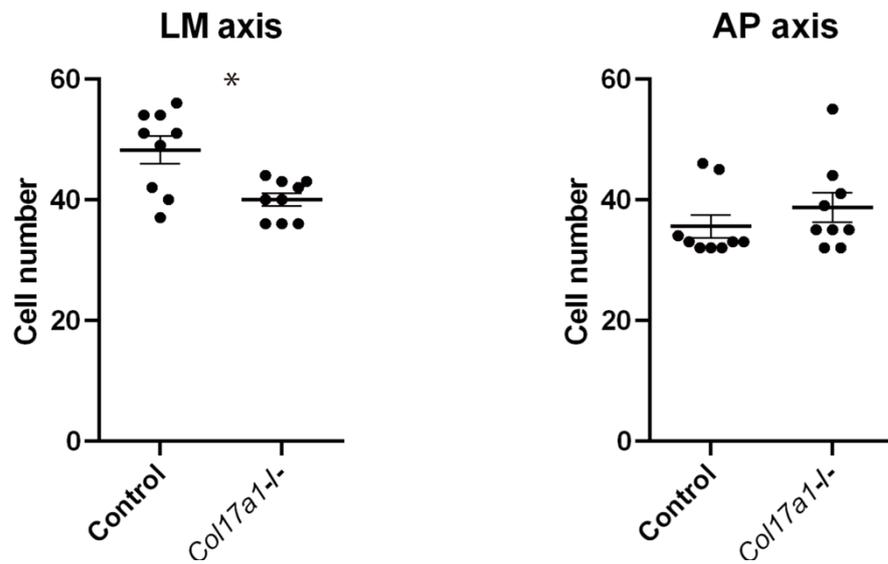
A



B

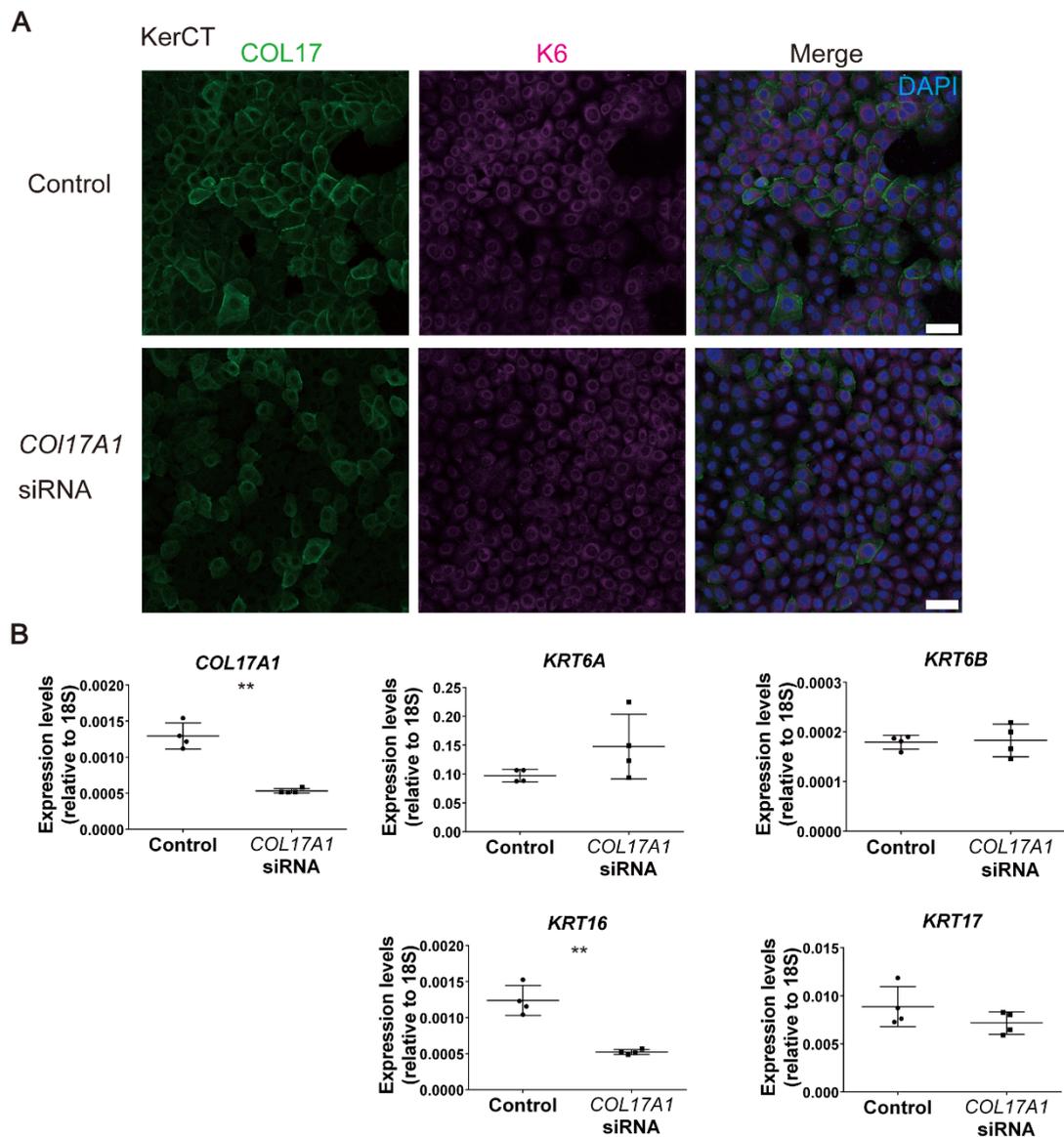


C



Supplementary Figure 2. Slender *Col17a1*^{-/-} tail scales.

(A) Images showing K31 and K10 staining of *Col17a1*^{-/-} and control tail skin samples at 1MO (n=4). Scale bar: 500 μ m. (B) Phase-contrast images of *Col17a1*^{-/-} and littermate control tail epidermis at 1MO (n=4). Scale bar: 500 μ m. (C) Quantification of cell number at the basal epidermis on the LM or AP axis. *0.01<p<0.05, Mann-Whitney test.



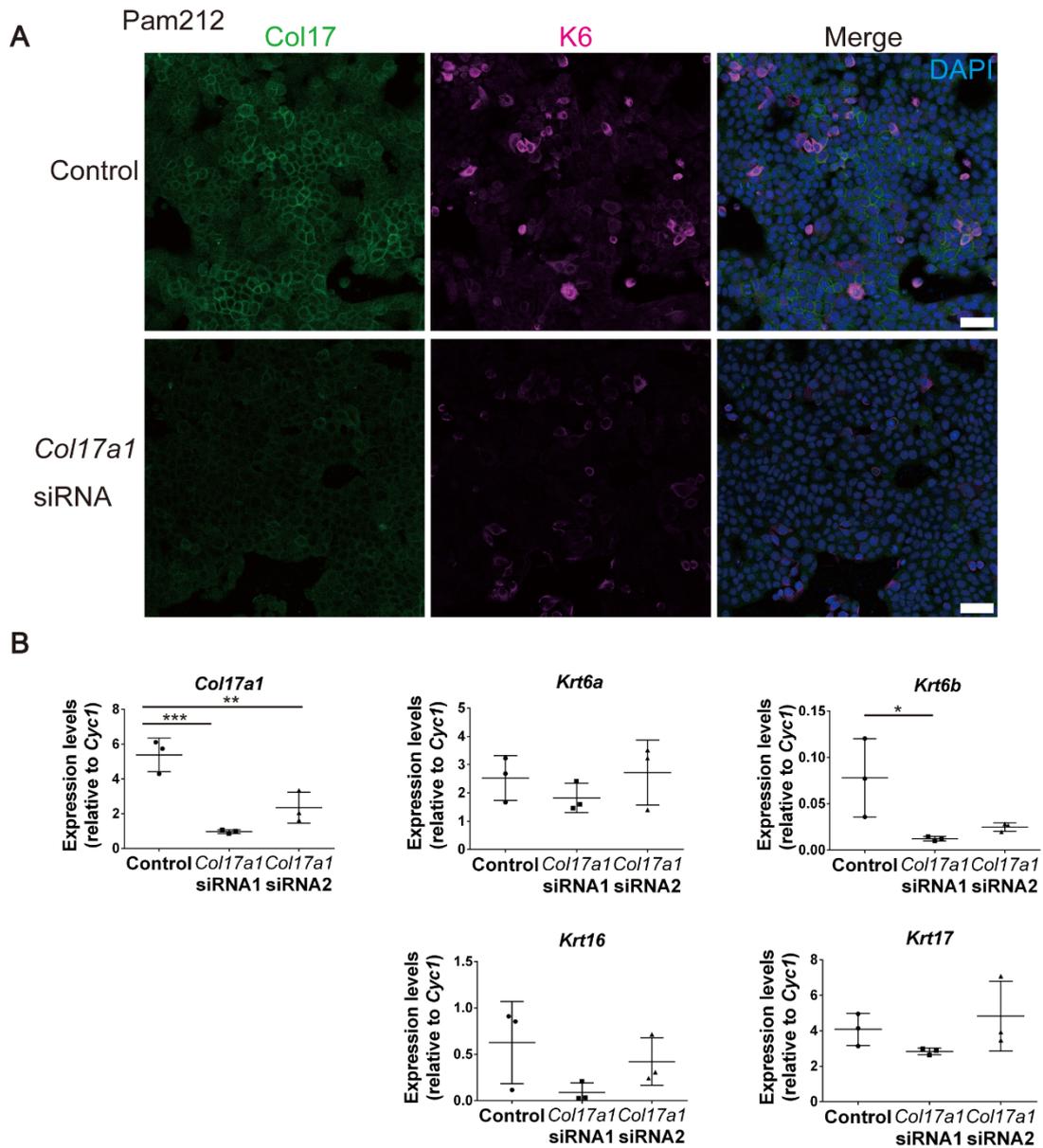
Supplementary Figure 3. *COL17A1* knockdown on immortalized human epidermal keratinocytes (KerCT cells).

(A) COL17 and K6 staining of *COL17A1*-knocked down KerCT cells (n=3).

Scale bar: 50 μ m. (B) Gene expression of *COL17A1*, *KRT6A*, *KRT6B*, *KRT16*,

and *KRT17* in the cells treated with *COL17A1* siRNA or mock (n=4).

**0.001<p<0.01, Student's t-test.



Supplementary Figure 4. *Col17a1* knockdown on murine epidermal keratinocytes (PAM212 cells).

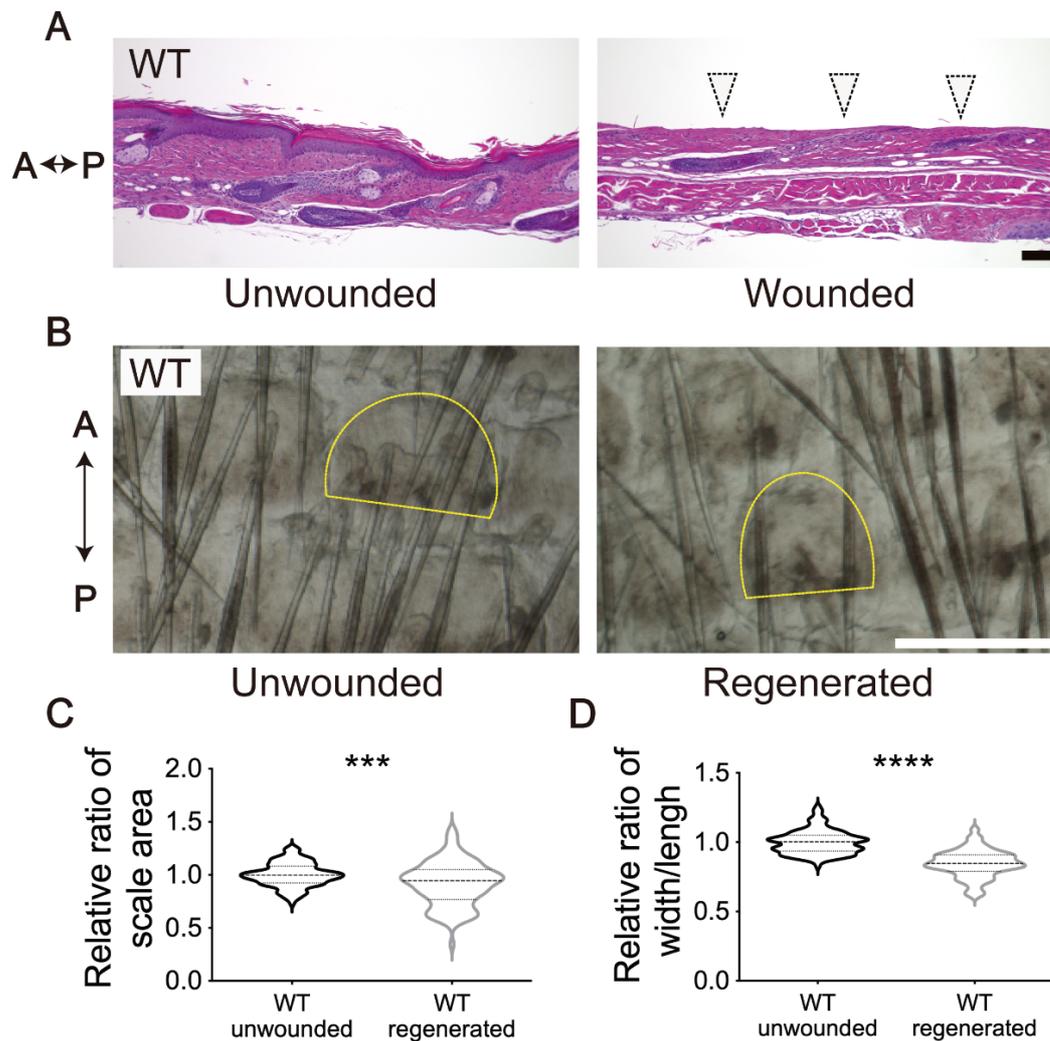
(A) Col17 and K6 staining of *Col17A1*-knocked down PAM212 cells (n=3).

Scale bar: 50 μ m. (B) Gene expression of *Col17a1*, *Krt6A*, *Krt6b*, *Krt16*, and

Krt17 in the cells treated with *Col17a1* siRNA or mock (n=3).

*** $0.0001 < p < 0.001$, ** $0.001 < p < 0.01$, * $0.01 < p < 0.05$, One-way ANOVA test

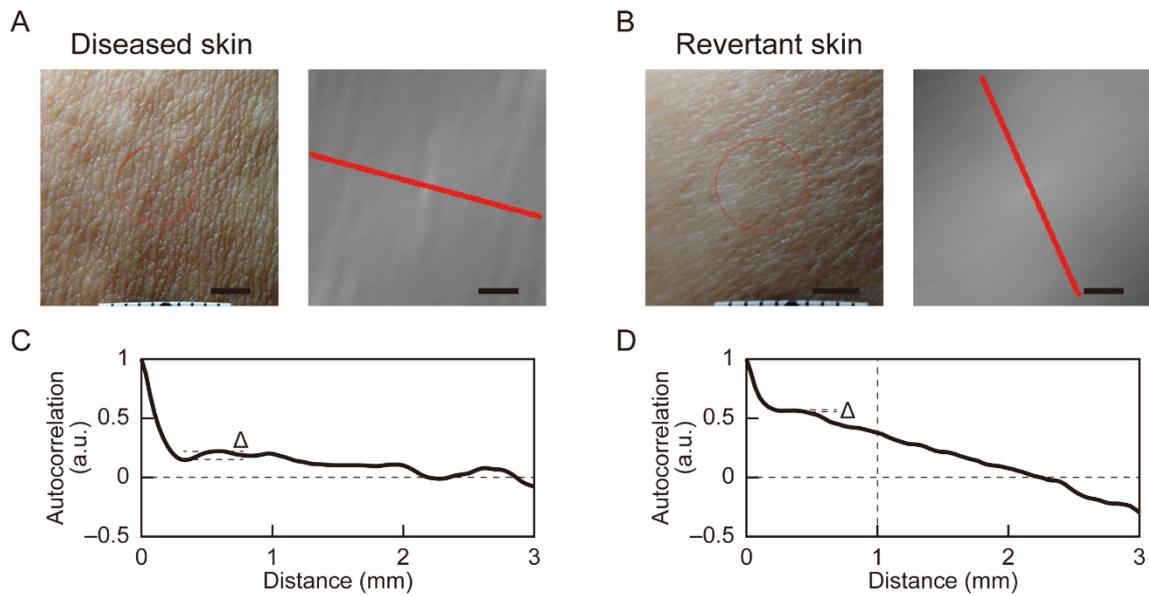
followed by Tukey's test.



Supplementary Figure 5. Superficial wounding on the tail and slender tail scales after skin regeneration.

(A) Hematoxylin and eosin staining of the tail skin just after wounding (n=4). The wounded skin lacks epidermis and papillary dermis (arrowheads). Scale bar: 100 μ m. (B) Whole-mount phase-contrast imaging of WT tail epidermis 3 months after wounding (n=4). Scale bar: 500 μ m. (C, D) Quantification of the size and shape of tail scales. The scale area (C) and width/length (D) of WT tail scales after skin

regeneration are shown (n=119 scales from unwounded areas and 106 scales from regenerated areas from four WT mice). *** $0.0001 < p < 0.001$, **** $p < 0.0001$, Welch's t-test.



Supplementary Figure 6. Quantification on the epidermal patterns of diseased and revertant JEB skin.

(A, B) The position of the spot with a radius of 3 mm for quantification (red circle, left). The images are taken from Figure 6B. The two-dimensional autocorrelation function for the epidermal pattern with the red line perpendicular to the characteristic direction (right). The one-dimensional autocorrelation is calculated along the line for the diseased (A) and revertant (B) skin. Scale bars: 3 mm (left) and 1 mm (right). (C, D) One-dimensional autocorrelation function in the diseased skin (C) and the revertant skin (D). The peak height (Δ) is defined as the difference of the first local minimum and local maximum in the range of the distance less than 1 mm.

Supplementary Table 1. Tail length and width of *Col17a1*^{-/-} and control mice.

	Control tail length (cm)	Control tail width (cm)	<i>Col17a1</i> ^{-/-} tail length (cm)	<i>Col17a1</i> ^{-/-} tail width (cm)
Littermates 1	6.3	0.35	5.8	0.32
Littermates 2	6.7	0.46	5.4	0.35
Littermates 3	6.7	0.45	5.0	0.36
Littermates 4	6.0	0.35	5.2	0.33

Supplementary Table 2.**Relative ratio of width/length of****hCOL17+; Col17a1^{-/-} and littermate control tail scales at 1MO**

Littermate control	hCOL17+; Col17a1 ^{-/-}
1.14	0.797
1.17	0.848
1.16	0.968
1.24	0.933
1.09	1.09
0.921	1.06
1.21	0.891
1.05	0.892
1.1	0.974
1.07	0.841
1.01	0.909
0.995	0.876
1.04	0.95
0.975	0.795
1.17	0.779
0.935	0.945
1.07	0.82
1.07	0.9
1.15	0.807
1.11	0.76
0.754	1.03
0.876	0.915
0.957	0.805
1.12	0.857
1.04	0.927
0.932	0.809
0.935	0.902
1.03	0.886
1.04	0.799
0.963	0.865
1.15	0.831
1.17	0.888
1.15	0.848
1	0.758
1.01	0.617
1.19	0.691
0.981	0.728
1.03	0.844
0.945	0.952
1.07	0.779
1.14	0.85

1.14	0.782
1.07	0.719
1.06	0.837
1.24	0.925
1.18	0.903
1.05	0.964
1.11	1.01
1.04	0.987
1.08	1.01
1.02	0.921
1.03	0.924
1.05	1.01
0.981	0.94
0.99	0.954
0.908	0.962
1.01	1
1.07	0.774
1.08	0.852
0.893	0.967
1.03	0.936
0.805	1.08
1.04	1.04
1.03	0.929
1.07	1.04
1.2	1.01
1.11	1.18
0.828	1.22
0.974	0.865
1.12	0.911
1.12	0.901
1	0.972
1.02	0.823
1.11	0.92
1.22	1.25
0.975	1.11
0.967	1.08
1.05	0.962
1.17	0.982
1.08	0.968
0.958	1.16
1.06	0.98
1.01	1.07
1.11	0.982
0.939	0.798
0.976	1.19

1.06	0.96
0.93	1.06
0.906	1.09
1.26	1.21
1.12	0.905
0.857	0.845
1.23	1.02
0.995	0.891
1.16	1.07
1.03	1.03
0.962	0.968
1.22	1.34
1.05	0.892
1.05	0.979
1.15	1.09
0.938	0.936
1.12	0.959
1.04	1.03
1.16	1.02
0.963	0.937
1.01	1.15
1.08	0.999
0.869	0.852
1.03	0.872
1.07	0.945
1.18	0.875
0.961	0.948
1.05	0.948
1.03	0.987
1.11	0.994
1.09	0.937
0.981	0.874
1.11	0.699
1.15	0.888
1.3	1.04
1.07	1.19
0.928	1.05
1.08	1.04
0.988	0.934
1.08	1.03
1.06	0.915
1.11	0.968
1.04	0.918
0.891	1.14
1.08	1.02

1.15	1.1
1.06	0.986
0.818	0.98
1.29	0.923
0.963	1.02
0.936	0.811
1.06	1.01
1.05	1.07
1.03	1.08
1.08	1.02
1.22	0.897
1.1	0.868
0.981	0.899
1.16	0.964
1	0.882
1.15	0.888
0.994	1.25
0.963	1.08
1.12	1.03
1.04	0.924
1	0.85
1.21	0.758
1.21	0.936
0.943	1.04
1.17	0.912
1.02	1.01
0.86	0.758
1.15	0.956
1.02	0.982
1.13	0.931
1.02	1.18
1.01	1.22
0.923	0.865
1.05	0.911
1.05	0.901
0.986	0.972
0.863	0.823
1.05	0.92
1.1	1.25
0.983	1.11
0.905	1.08
0.872	0.962
0.901	0.982
0.916	0.968
0.939	1.16

0.974	0.98
1	1.07
1.15	0.982
1.02	0.798
0.973	1.19
0.876	0.96
0.953	1.06
0.92	1.09
1.08	1.21
1.24	0.905
1.05	0.845
1.06	1.02
0.863	0.891
1.01	1.07
0.927	1.03
0.959	0.968
1.09	1.34
1.13	0.892
1.02	0.979
1.03	1.09
1.06	0.936
1.12	0.959
1.05	1.03
0.9	1.02
0.777	0.937
0.827	1.15
0.943	0.999
0.909	0.852
1.06	0.872
1.03	0.945
0.868	0.875
0.87	0.948
0.949	0.948
0.82	0.987
0.885	0.994
0.854	0.937
0.926	0.874
0.774	0.699
0.759	0.888
0.921	1.04
0.799	1.19
0.877	1.05
0.787	1.04
0.74	0.934
1	1.03

0.892	0.915
0.784	0.968
0.835	0.918
0.903	1.14
0.789	1.02
0.879	1.1
0.863	0.986
0.779	0.98
0.843	0.923
0.81	1.02
0.865	0.811
0.827	1.01
0.739	1.07
0.601	1.08
0.673	1.02
0.71	0.897
0.823	0.868
0.928	0.899
0.759	0.964
0.829	0.882
0.762	0.888
0.701	1.25
0.815	1.08
0.902	1.03
0.88	0.924
0.939	0.85
0.98	0.758
0.962	0.936
0.987	1.04
0.897	0.912
0.9	1.01
0.983	0.758
0.916	0.956
0.93	0.982
0.937	0.931
0.975	1.26
0.754	1.33
0.83	1.41
0.942	1.27
0.912	1.27
1.05	1.18
1.01	1.27
0.906	0.961
1.01	1.18
0.987	1.36

1.29
1.43
1.26
1.18
1.15
1.24
1.26
1.27
1.34
1.41
1.2
1.22
1.13
1.06
1.12
1.26
1.17
1.16
1.21
1.21
1.13
1.1
1.24
1.16
1.06
1.12
1.31
1.11
1.3
1.12
0.925
1.32
1.43
1.28
1.24
1.1
1.45
1.25
1.2
1.32
1.23
1.1
1.07
1.26
1.31

1.22
1.04
1.21
1.25
1.13
1.07
1.23
1.05
1.17
1.17
1.14
1.18
1.29
1.15
1.11
1.23
1.14
1.07
1.08
0.989
1.24
1.2
1.18
1.1
1.11
1.27
1.19
1.08
1.35
1.25
1.11
1.23
1.02
1.05
1.09
1.08
1.18
1.18
1.34
1
1.1
1.21
1.09
1.25
1.18

1.25
1.22
1.13

Supplementary Table 3.

**Relative ratio of width/length of
aPKC ζ KO and littermate control tail scales at 1MO**

Littermate control	aPKC ζ KO
1.1	1.43
1.18	1.14
1.09	1.32
1.07	1.16
1.1	1.06
1.13	1.18
1.2	0.967
1.08	1.07
1.05	1.17
1.02	1.14
1.06	1.31
1.03	0.969
1.12	1.11
0.984	1.08
1.26	1.03
1.04	1.23
1	1.03
1.02	1.01
1.29	1.12
1.14	1.33
1.28	1.11
0.986	0.962
1.14	1.37
0.862	1.14
1.05	0.856
1.21	1.01
1.15	1.07
0.88	1.22
1.14	1.08
1.09	0.899
1.06	1.06
1.33	0.982
1.12	1.06
0.982	1.03
1.09	1.19
0.923	1.19
0.985	0.978
1.27	1.08
1.09	1.22
1.14	1.45
1.13	1.16

1.02	1.19
1.21	1.03
1	1.27
1.32	1.3
1.18	1.1
1.12	1.21
1.01	1.14
1.15	1.14
1.2	1.11
1.29	1.03
1.19	0.97
1.04	1.12
0.967	0.853
1.2	0.881
1.21	1.22
1.18	1.19
1.05	0.967
1.08	0.969
1.04	1.2
1.02	1.09
1.09	0.984
0.892	0.962
0.995	1.01
1.11	1.19
1.31	1.24
1.37	1.32
1.05	1.17
1.15	1.05
1.03	1.03
1.07	0.91
0.979	1.12
1.1	1.07
1.18	1.03
1.08	1.04
1.14	1.14
1.02	1.12
1.07	1.1
1.42	0.928
1.22	1.28
1.17	1.03
1.18	0.929
0.982	1.01
1.03	1.02
1.15	1.2
1.2	1.28

1.09	1.25
1.11	1.15
1.16	1.21
1.11	1.14
1.39	1.24
0.939	1.17
0.968	1.51
1.13	1.46
1.06	0.973
1.09	0.972
1.24	0.941
1.03	1.25
1.09	1.2
1.16	1.05
1.11	1.06
0.999	1.17
1.24	1.15
1.24	1.08
0.925	1.32
1.19	1.07
1.26	1.06
1.45	1.07
1.28	0.881
1.32	1.08
1.29	1.23
0.969	1.08
0.996	1.07
1.03	1.17
1.06	1.04
0.993	1.2
1.01	1.25
1.16	1.16
0.828	0.886
1.01	0.899
1	0.854
0.865	0.807
0.907	1
0.904	0.879
1.07	0.806
0.904	0.889
1.08	0.867
0.97	0.846
0.925	0.871
0.978	0.918
1	0.926

0.991	1.01
0.985	0.97
0.784	1
0.879	0.985
0.84	0.835
0.803	0.782
1.05	0.933
0.852	0.953
1.01	0.82
0.741	0.795
0.914	0.989
0.866	0.832
0.875	0.781
1.02	0.818
0.832	0.886
1.04	0.869
0.781	0.901
1.2	0.912
0.978	0.844
0.978	0.769
0.899	0.807
0.779	0.832
0.904	0.947
0.993	0.832
0.854	1.1
1.02	1.04
0.879	0.973
0.956	0.869
0.956	0.849
0.962	1.05
0.955	0.767
0.983	0.994
0.921	0.915
0.999	0.88
0.976	1.02
1.01	0.843
0.934	0.783
0.869	0.94
0.853	0.977
0.964	0.888
0.872	0.933
1.04	0.737
0.828	0.9
1.05	0.888
0.805	0.795

0.878	0.838
1	0.858
0.856	1.12
0.934	0.96
0.952	0.933
0.993	0.772
0.935	1.1
1.09	0.858
0.927	1.11
0.993	1.17
0.904	0.938
1.06	1.01
0.87	0.836
1.14	0.78
0.952	0.886
0.961	1.01
1.01	0.843
0.973	0.978
1	0.951
0.817	0.932
0.93	0.964
1.06	0.938
0.922	0.943
0.881	0.903
1.05	0.994
0.935	1.02
0.925	1.11
0.882	1.19
0.759	1.04
1.12	0.953
1.14	0.858
0.922	0.956
0.978	1.02
0.922	0.726
0.819	0.891
0.762	0.89
0.943	0.995
1.21	1.15
1.03	1.08
0.892	0.935
0.863	0.733
0.844	0.853
0.871	0.887
0.995	0.797
0.919	0.836

1.05	0.778
0.978	0.726
0.831	0.834
1.06	0.808
1	0.9
0.902	0.889
0.885	0.925
1.02	0.807
1.02	0.883
0.981	0.89
0.808	0.965
0.949	0.776
0.909	0.837
0.808	0.789
0.997	0.859
0.97	0.832
0.895	0.965
0.955	0.65
0.856	0.953
0.819	0.904
0.889	0.699
0.806	0.878
0.819	0.799
0.924	0.875
0.856	0.993
0.891	0.967
0.987	0.906
0.919	0.9
0.936	0.779
0.899	0.922
0.963	0.818
0.892	0.832
0.809	0.812
0.896	1.04
0.819	0.85
1	0.826
1.09	1.01
0.955	0.749
0.782	0.939
0.956	0.879
0.973	0.981
1.03	0.898
1.01	0.936
0.88	0.797
0.798	0.801

0.715	0.875
0.819	0.89
0.829	0.869
0.987	0.898
0.956	0.883
0.962	0.891
1.06	0.898
1.03	0.797
0.808	0.764
0.856	0.799
0.763	0.783
0.885	0.853
0.866	0.802
0.88	0.861
0.864	0.882
0.875	0.942
0.929	0.807
0.716	0.853
0.866	0.864
0.898	0.723
1	0.856
1.03	0.734
0.881	0.999
0.862	0.76
0.852	0.832
0.809	0.751
0.819	0.868
0.9	0.899
0.864	0.797
1.06	0.778
0.987	0.915
0.929	0.967
0.819	0.76
0.828	0.687
	0.942
	0.848
	0.794
	1.09
	0.768
	0.864
	0.869
	0.95
	0.802
	0.825
	0.952

1.05
0.79
0.753
0.787
0.759
0.926