**Integument carotenoid-based colouration reflects contamination to perfluoroalkyl substances, but not mercury, in arctic black-legged kittiwakes**

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**Table S1. Loading of variables represented as Pearson correlation coefficients. Significant correlations are shown in bold.**

|  |  |  |
| --- | --- | --- |
| **Variable** | **PC1** | **PC2** |
| Bill\_Hue | **0.456148** | **-0.618685** |
| Bill\_Chroma | 0.140986 | **-0.871646** |
| Bill\_Brightness | 0.245106 | **0.911762** |
| Gape\_Hue | **0.871834** | 0.129488 |
| Gape\_Chroma | **0.825431** | 0.147239 |
| Gape\_Brightness | **0.304868** | **0.434084** |
| Tongue\_Hue | **0.859869** | -0.026688 |
| Tongue\_Chroma | **0.790521** | -0.123658 |
| Tongue\_Brightness | -0.174925 | **0.368393** |

**Table S2. Bivariate correlations among colorimetric variables. Significant correlations are shown in bold.**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | Bill\_Hue | Bill\_Chroma | Bill\_Brightness | Gape\_Hue | Gape\_Chroma | Gape\_Brightness | Tongue\_Hue | Tongue\_Chroma |
| Bill\_Chroma | **0.637** |  |  |  |  |  |  |  |
|  | **p<0.0001** |  |  |  |  |  |  |  |
| Bill\_Brightness | **-0.356** | **-0.803** |  |  |  |  |  |  |
|  | **p=0.011** | **p<0.0001** |  |  |  |  |  |  |
| Gape\_Hue | **0.291** | 0.063 | **0.309** |  |  |  |  |  |
|  | **p=0.040** | p=0.663 | **p=0.029** |  |  |  |  |  |
| Gape\_Chroma | 0.205 | 0.014 | **0.289** | **0.906** |  |  |  |  |
|  | p=0.153 | p=0.925 | **p=0.042** | **p<0.0001** |  |  |  |  |
| Gape\_Brightness | 0.090 | -0.077 | **0.397** | 0.199 | 0.157 |  |  |  |
|  | p=0.535 | p=0.595 | **p=0.004** | p=0.165 | p=0.275 |  |  |  |
| Tongue\_Hue | **0.380** | 0.118 | 0.185 | **0.606** | **0.488** | **0.309** |  |  |
|  | **p=0.007** | p=0.415 | p=0.199 | **p<0.0001** | **p<0.0001** | **p=0.029** |  |  |
| Tongue\_Chroma | **0.282** | 0.085 | 0.084 | **0.478** | **0.492** | 0.085 | **0.784** |  |
|  | **p=0.048** | p=0.556 | p=0.564 | **p<0.0001** | **p<0.0001** | p=0.559 | **p<0.0001** |  |
| Tongue\_Brightness | -0.052 | -0.041 | 0.199 | -0.044 | -0.1005 | **0.499** | -0.148 | **-0.394** |
|  | p=0.722 | p=0.776 | p=0.165 | p=0.760 | p=0.488 | **p<0.0001** | p=0.307 | **p=0.005** |

**Table S3. Loading of variables represented as Pearson correlation coefficients. Significant correlations are shown in bold.**

|  |  |  |
| --- | --- | --- |
| **Variable** | **PC1** | **PC2** |
| Astaxanthin | **0.346439** | **0.795927** |
| Zeaxanthin | **0.849124** | -0.107373 |
| Lutein | **0.705064** | **-0.440824** |
| Cryptoxanthin | **0.498827** | -0.200968 |
| Carotene | **-0.415161** | **-0.545547** |

**Table S4. Bivariate correlations among carotenoids. Significant correlations are shown in bold.**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | astaxanthin | zeaxanthin | lutein | cryptoxanthin |
| zeaxanthin | 0.252 |  |  |  |
|  | p=0.077 |  |  |  |
| lutein | -0.114 | **0.510** |  |  |
|  | p=0.431 | **p<0.0001** |  |  |
| cryptoxanthin | 0.060 | **0.298** | 0.139 |  |
|  | p=0.679 | **p=0.036** | p=0.336 |  |
| carotene | -0.239 | -0.119 | -0.174 | -0.018 |
|  | p=0.095 | p=0.412 | p=0.226 | p=0.902 |

**Table S5. Bivariate correlations among pollutants. Significant correlations are shown in bold.**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | PFOSlin | PFNA | PFDcA | PFUnA | PFDoA | PFTriA | PFTeA |
| PFNA | **0.741** |  |  |  |  |  |  |
|  | **p<0.001** |  |  |  |  |  |  |
| PFDcA | **0.748** | **0.811** |  |  |  |  |  |
|  | **p<0.001** | **p<0.001** |  |  |  |  |  |
| PFUnA | **0.773** | **0.707** | **0.917** |  |  |  |  |
|  | **p<0.001** | **p<0.001** | **p<0.001** |  |  |  |  |
| PFDoA | **0.580** | **0.517** | **0.731** | **0.786** |  |  |  |
|  | **p<0.001** | **p<0.001** | **p<0.001** | **p<0.001** |  |  |  |
| PFTriA | **0.426** | **0.439** | **0.598** | **0.634** | **0.730** |  |  |
|  | **p=0.002** | **p=0.001** | **p<0.001** | **p<0.001** | **p<0.001** |  |  |
| PFTeA | **0.342** | **0.444** | **0.580** | **0.592** | **0.617** | **0.698** |  |
|  | **p=0.015** | **p=0.001** | **p<0.001** | **p<0.001** | **p<0.001** | **p<0.001** |  |
| Hg | -0.027 | 0.171 | 0.050 | -0.022 | -0.066 | -0.001 | -0.023 |
|  | p=0.855 | p=0.236 | p=0.731 | p=0.879 | p=0.651 | p=0.994 | p=0.876 |