

## Supplementary material

**Table S1.** Experimental domains and codification of independent variables in the factorial rotatable design executed to study the optimal conditions for removing proteins different of collagen from the skin of small-spotted catshark. Recovered collagen (g collagen/ 100 g initial collagen in skin) in both skin residues and filtrated liquid obtained after filtration is also presented.

| Experiment number | T (°C) | NaOH (M) | t (h) | T cod      | NaOH cod | t cod      | Recovered collagen (g) in skin residue/100 g initial collagen | Recovered collagen (g) in filtrated liquid/100 g initial collagen |
|-------------------|--------|----------|-------|------------|----------|------------|---------------------------------------------------------------|-------------------------------------------------------------------|
| 1                 | 8.26   | 0.49     | 11.33 | -<br>1.000 | -1.000   | -<br>1.000 | 99.70                                                         | 16,61                                                             |
| 2                 | 20.74  | 0.49     | 11.33 | 1.000      | -1.000   | -<br>1.000 | 24,38                                                         | 78,21                                                             |
| 3                 | 8.26   | 1.61     | 11.33 | -<br>1.000 | 1.000    | -<br>1.000 | 92.05                                                         | 19,29                                                             |
| 4                 | 20.74  | 1.61     | 11.33 | 1.000      | 1.000    | -<br>1.000 | 5,25                                                          | 95,19                                                             |
| 5                 | 8.26   | 0.49     | 38.67 | -<br>1.000 | -1.000   | 1.000      | 84.38                                                         | 20,81                                                             |
| 6                 | 20.74  | 0.49     | 38.67 | 1.000      | -1.000   | 1.000      | 10,93                                                         | 92,68                                                             |
| 7                 | 8.26   | 1.61     | 38.67 | -<br>1.000 | 1.000    | 1.000      | 32,34                                                         | 61,38                                                             |
| 8                 | 20.74  | 1.61     | 38.67 | 1.000      | 1.000    | 1.000      | 0,00                                                          | 100                                                               |
| 9                 | 4.00   | 1.05     | 25.00 | -<br>1.682 | 0.000    | 0.000      | 59,75                                                         | 33,84                                                             |
| 10                | 25.00  | 1.05     | 25.00 | 1.682      | 0.000    | 0.000      | 4,24                                                          | 99,34                                                             |
| 11                | 14.50  | 0.10     | 25.00 | 0.000      | -1.682   | 0.000      | 91,41                                                         | 23,63                                                             |
| 12                | 14.50  | 2.00     | 25.00 | 0.000      | 1.682    | 0.000      | 0,00                                                          | 100                                                               |
| 13                | 14.50  | 1.05     | 2.00  | 0.000      | 0.000    | -<br>1.682 | 71,17                                                         | 31,18                                                             |
| 14                | 14.50  | 1.05     | 48.00 | 0.000      | 0.000    | 1.682      | 6,24                                                          | 95,19                                                             |
| 15                | 14.50  | 1.05     | 25.00 | 0.000      | 0.000    | 0.000      | 13,73                                                         | 87,00                                                             |
| 16                | 14.50  | 1.05     | 25.00 | 0.000      | 0.000    | 0.000      | 16,58                                                         | 96,25                                                             |
| 17                | 14.50  | 1.05     | 25.00 | 0.000      | 0.000    | 0.000      | 14,12                                                         | 84,81                                                             |
| 18                | 14.50  | 1.05     | 25.00 | 0.000      | 0.000    | 0.000      | 17,28                                                         | 82,81                                                             |
| 19                | 14.50  | 1.05     | 25.00 | 0.000      | 0.000    | 0.000      | 8,05                                                          | 92,07                                                             |
| 20                | 14.50  | 1.05     | 25.00 | 0.000      | 0.000    | 0.000      | 17,30                                                         | 84,10                                                             |

**Table S2.** Experimental domains and codification of independent variables in the factorial rotatable design executed to study the optimal conditions for extraction of acid soluble collagen from the skin of small-spotted catshark. Collagen yields (g lyophilized collagen obtained in each experimental conditions/100 g of initial collagen in skin) are also presented.

| Experiment number | T (°C) | Acetic acid (M) | t (h) | T cod  | Acetic cod | t cod  | Collagen yield (%) |
|-------------------|--------|-----------------|-------|--------|------------|--------|--------------------|
| 1                 | 8.26   | 0.36            | 11.33 | -1.000 | -1.000     | -1.000 | 18.33              |
| 2                 | 20.74  | 0.36            | 11.33 | 1.000  | -1.000     | -1.000 | 41.45              |
| 3                 | 8.26   | 0.84            | 11.33 | -1.000 | 1.000      | -1.000 | 25.17              |
| 4                 | 20.74  | 0.84            | 11.33 | 1.000  | 1.000      | -1.000 | 40.49              |
| 5                 | 8.26   | 0.36            | 38.67 | -1.000 | -1.000     | 1.000  | 22.43              |
| 6                 | 20.74  | 0.36            | 38.67 | 1.000  | -1.000     | 1.000  | 46.64              |
| 7                 | 8.26   | 0.84            | 38.67 | -1.000 | 1.000      | 1.000  | 33.78              |
| 8                 | 20.74  | 0.84            | 38.67 | 1.000  | 1.000      | 1.000  | 49.65              |
| 9                 | 4.00   | 0.60            | 25.00 | -1.682 | 0.000      | 0.000  | 19.28              |
| 10                | 25.00  | 0.60            | 25.00 | 1.682  | 0.000      | 0.000  | 48.42              |
| 11                | 14.50  | 0.20            | 25.00 | 0.000  | -1.682     | 0.000  | 30.50              |
| 12                | 14.50  | 1.00            | 25.00 | 0.000  | 1.682      | 0.000  | 43.50              |
| 13                | 14.50  | 0.60            | 2.00  | 0.000  | 0.000      | -1.682 | 19.97              |
| 14                | 14.50  | 0.60            | 48.00 | 0.000  | 0.000      | 1.682  | 37.07              |
| 15                | 14.50  | 0.60            | 25.00 | 0.000  | 0.000      | 0.000  | 33.10              |
| 16                | 14.50  | 0.60            | 25.00 | 0.000  | 0.000      | 0.000  | 36.93              |
| 17                | 14.50  | 0.60            | 25.00 | 0.000  | 0.000      | 0.000  | 40.90              |
| 18                | 14.50  | 0.60            | 25.00 | 0.000  | 0.000      | 0.000  | 45.69              |
| 19                | 14.50  | 0.60            | 25.00 | 0.000  | 0.000      | 0.000  | 39.94              |
| 20                | 14.50  | 0.60            | 25.00 | 0.000  | 0.000      | 0.000  | 39.26              |