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Ranges and changes of pH in zoological alcohol collections

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Maintenance of neutral pH is, besides avoiding evaporation and decreasing alcohol concentrations, the third and most complicated aspect regarding preservation fluids in natural history collections. The involved media contain little water and are often contaminated with organic substances, rendering the measurement of the current pH a problem in itself. If unacceptable values are found, restitution of neutral pH is likewise difficult, often requiring complete and repeated exchange of the preservation fluid. Due to its complexity and the lack of relevant expertise, this issue is often completely ignored.

In the context of an extensive screening in the wet collections of two large museums (Munich and Basel) before and after curation, the actual extent of the named problems was assessed and the involved methodology evaluated. The pH was measured with three methods, i. e. with a pH electrode before and after dilution with water and with pH-indicator paper.

The values found before curation ranged from 4.5 to 9.5 with about 14% of the samples in the acidic range below 6 and another 14% in the basic range above 8. There were remarkable analogies between the two collections. E.g. the vertebrates (fish, reptiles, mammals) ranged mostly below 7, whereas the crustaceans ranged entirely between 7 and 9 in both collections. The ants ranged all the way from 4.5 to 9.5 in Munich. Standard curatorial measures to reconstitute alcohol levels and concentration hardly improved the pH values.

With almost 1/3 of the samples outside the desired pH range (6-8) we still lack appropriate counter measures. We propose a new approach to avoid the problem altogether by stabilizing the pH with substrate-bound ion-exchange agents, e.g. an ampholyte provided with positively and negatively charged groups in form of pellets, sheets or sticks. Alternatively a combination of separate acidic and basic ion-exchange substrates could be employed.