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Commentary on: Berger-Karin C, Hendricks U, Geyer-Lippmann J. Comparison of natural and artificial aging of ballpoint inks. J Forensic Sci 2008;53(4):989–92.

Sir,

We would like to comment on this study recently published in JFS. It is a short technical note proposing an artificial aging technique for the dating of ballpoint pen inks. This is a very difficult and controversial topic, and we are worried about the nature of this paper. The scientific content can be misleading and can actually be seriously questioned considering the following remarks:

- Two of the cited references are not relevant to the subject and were probably not read by the authors. In the cited papers, Aginsky (1) and Andermann and Neri (2) did not report about solvent evaporation but about dyes analysis. Aginsky did actually publish several papers about solvent evaporation that could have been cited instead (3–6).
- The data points on the figures are barely recognizable and the curve functions are not formulated. What the authors actually call a "very good correspondence" in Fig. 1 is unsubstantiated, as the curves do not have the same shape at all (only the decreasing-increasing tendencies are approximately the same). The scales for the *y* and *x* axes do not correspond between the compared figures. Moreover, the data point values, representing single measurements are considerably different and the curve fitting is obviously not good (i.e., the correlation coefficients R^2 are probably not approaching 1). It can also be noted that Figs. 1*a* and 2*b* are exactly the same representation (redundancy). The fact that each data point was represented by three correlated values (i.e., lozenge, square, and triangle) should have been explained by the authors, as they apparently yield the same information and add confusion to the figures.
- The SD measured on an ink standard (i.e., 0.06–0.07) represents an error that is not negligible in comparison with the apparent changes of phenoxyethanol in the figures. It is not specified if the SD can be extrapolated to all data points; however, it would be important to control that the error will not increase when the measured quantity decreases as was observed by Horwitz (7) in his evaluation of analytical methods.
- The authors analyzed 13 inks but showed results only for three selected inks (numbered 356, 359, and 364). The variations between the 13 different inks are probably considerable as was demonstrated in another work published in the same journal (8). This should be explained and discussed.
- The authors additionally proposed other compounds such as phthalic acid ester to help in the age determination of inks. However, they do not state precisely which aging phenomenon it follows (e.g., polymerization, evaporation, etc.). The graphical representation (Fig. 5a) does not help to understand what we are supposed to see (i.e., representation of the increase and then decrease of the peak area ratio of phthalic acid ester to phenoxyethanol). As ink 356 is a fast aging ink, the phenoxyethanol does not diminish significantly after 1 month anymore as explained earlier in the paper. So what is the meaning of such a curve? How would the curve look when only representing the phthalic acid ester peak area? The graphic representation is actually based on only six single measurements (no error measurements). The relevance of this curve can therefore be questioned, and except for the maximum at about 400 days, the represented *y*-values correspond to at least two *x*-values (i.e., two possible age determinations): for example, a value of 0.1 ± 0.07 would correspond similarly to approximately 0, 30, 190, or 750 days! This cannot be valid. The accelerated aging curve (Fig. 5*b*) is again quite different from the natural aging (Fig. 5*a*). The values obtained are lower (and the scale is not the same for both figures).

The authors propose several ideas to differentiate fast aging and slow aging inks but their experimental data is not validly represented and/or discussed. These data are insufficient to draw any conclusions about any potential of the method for ink dating purposes. Bügler et al.'s (8) latest publication in the same journal offers, in contrast, a very valuable and informative publication on the subject. We are sorry to see this type of paper published while the influence of storage conditions on ink aging has not been addressed sufficiently in the literature. This lack of information on the subject must be filled before proposing such methods for practical caseworks. These are preliminary and unconvincing results from development research performed in a laboratory on controlled samples without due warnings about potential shortcomings. They cannot be used or even compared with results obtained in real situations on uncontrolled specimens of limited size, unknown composition, and undefined storage conditions. This can leave an undeserved feeling that these methods are ready for implementation when the task of ensuring their scientific validity is still far away (9). We would like to emphasize the ethical guidelines previously discussed by Brunelle and Cantu (10) in this journal and their warning that *forensic scientists should not attempt to examine actual criminal or civil cases until they have been tested.*

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