

SHORT COMMUNICATION

CHEMOTAXONOMY OF *NUPHAR LUTEA* (L.) SM.

E. C. BATE-SMITH

A.R.C. Institute of Animal Physiology, Babraham, Cambridge

(Received 8 September 1967)

IN A SURVEY of the phenolic constituents of the dicotyledons¹ it was reported that ellagic acid was present in the leaves of the yellow water lily *Nuphar lutea* (L.) Sm. and in those *Nymphaea capensis* Thunb. In the light of later evidence of the importance of ellagic acid as a character in plant systematics, the former species has been re-examined, especially in regard to a reaction with nitrous acid which is diagnostic of the presence in the unhydrolysed tissue of "ellagitannins", which are presumed to be esters or glycosides of hexahydroxydiphenic acid or, in the case of glycosides, of ellagic acid itself.

The test is, in fact, the first step in the Hoepfner reaction for chlorogenic acid, which is carried out by treating the methanolic extract of the leaves with a small volume of dilute (e.g. 5 per cent) acetic acid and a similar small volume of 5 per cent aqueous sodium nitrite. When ellagitannins are present the green solution slowly becomes muddy brown, then bottle-green, and eventually, after an hour or more, chocolate-brown or blood-red. A portion of a leaf of *Nuphar lutea* behaved in just this way, indicating that the ellagic acid present in the hydrolysate was, in fact, derived from ellagitannin originally present in the fresh leaf tissue.

Ellagic acid was identified in the hydrolysate by chromatography in Forestal solvent, and confirmed by spectrophotometric comparison with an authentic specimen (λ_{\max} 254 nm in methanol shifting to 278 nm on addition of KOH). The previously reported presence of luteolin was also confirmed (λ_{\max} 349 nm shifting to 402 in KOH). Contrary to the earlier report, caffeic acid was also present on the Forestal chromatogram and *p*-coumaric, sinapic and ferulic acids on a toluene-acetic acid chromatogram.

The taxonomic significance of these results lies in the very rare occurrence of ellagitannin in the order Ranales. The only other recorded occurrence of ellagic acid in the order is in *Cercidiphyllum japonicum* Sieb. & Zucc., one of the two only species included in the family Cercidiphyllaceae. Of this family Swamy and Bailey,² quoted by Lawrence,³ have written that it is to be regarded as included within the Ranales only if the order be recognized as a useful repository for primitive dicotyledonous plants. On grounds which have been briefly stated elsewhere (Bate-Smith⁴) and will shortly be published in greater detail, it has to be considered whether the family Nymphaeaceae, by virtue of the presence in it of ellagitannins, is not also out of place in this order.

¹ E. C. BATE-SMITH, *J. Linn. Soc. (Bot.)* **58**, 95 (1963).

² G. L. SWAMY and I. W. BAILEY, *J. Arnold Arboretum* **30**, 187 (1949).

³ G. H. M. LAWRENCE, *Taxonomy of Vascular Plants*. Macmillan, New York (1951).

⁴ E. C. BATE-SMITH, *Bull. Soc. Botan. France*, Memoire on Chimiotaxinomie, 16 (1965).