patients showed an increase in plasma pethidine accompanied by a fall in gastric concentration of the drug. This suggests that the gastric juice acts as a depot for the drug, the pethidine being initially trapped in the juice, and then after it passes into the small intestine with the gastric contents, reaction with the alkaline intestinal contents promotes its reabsorption into the plasma.

It is noteworthy that foetal intoxication with such local anaesthetics as lignocaine and mepivacaine has been associated with the presence of high concentrations of these anaesthetics in gastric contents of the foetuses (Sunshine & Fike, 1964; Sinclair, Fox & others, 1965; Datta, Houle & Fox, 1975).

Thanks are due to Mr. James Ewing and Miss Alice MacDonald for their excellent technical assistance. This work was supported in part by USPHS Grants CA-14729 and CA-13038.

March 4, 1975

REFERENCES

BRODIE, B. B. & HOGBEN, C. A. M. (1957). *J. Pharm. Pharmac.*, **9**, 345–380.

BURNS, J. J., BERGER, B. L., LIEF, P. A., WALLACE, A., PAPPER, E. M. & BRODIE, B. B. (1955). *J. Pharmac. exp. Ther.*, **114**, 289–298.

DATTA, S., HOULE, G. L. & FOX, G. S. (1975). *Canad. Anaesth. Soc. J.*, **22**, 79–83.

GOEHL, T. J. & DAVISON, C. J. (1973). *J. pharm. Sci.*, **62**, 907–909.

PLOTNIKOFF, N. P., ELLIOTT, H. W. & WAY, E. L. (1952). *J. Pharmac. exp. Ther.*, **104**, 377–386.

PLOTNIKOFF, N. P., WAY, E. L. & ELLIOTT, H. W. (1956). *Ibid.*, **117**, 414–419.

SHORE, P. A., BRODIE, B. B. & HOGBEN, C. A. (1957). *Ibid.*, **119**, 361–369.

SINCLAIR, J. C., FOX, H. A., LENTZ, J. F., FULD, G. L. & MURPHY, J. (1965). *New Engl. J. Med.*, **273**, 1173–1177.

SUNSHINE, I. & FIKE, W. W. (1964). *Ibid.*, **271**, 487–490.

# Comparative potencies of European and Indian squill

F. S. HAKIM, N. G. BOWERY, F. J. EVANS, *Departments of Pharmacognosy and Pharmacology, The School of Pharmacy, 29/39 Brunswick Square, London WC1N 1AX, U.K.*

Squill B.P.C. 1973 is defined as the bulb of *Urginea maritima* L. Baker (Fam. Liliaceae), the European or white squill. In the November issue of the *Pharmaceutical Journal* (1974) it was proposed that Squill B.P.C. could be substituted by its common adulterant Indian squill (*Urginea indica* Kunth.). The limited phytochemical work available (Seshadri & Subramanian, 1950; Rangaswami & Subramanian, 1954, 1955; Krishna Rao & Rangaswami, 1967) concerning Indian squill, suggests that the bufadienolide glycosides are different in their detailed structure from those of European squill. The problem is further aggravated by reports (Seshadri & Subramanian, 1950; Chopra, Chopra & others, 1958) that commercial samples of Indian squill are mixtures of *Urginea indica* Kunth. and *Scilla indica* Roxb. and most phytochemical investigations are based upon a mixture of the two species. Squill glycosides are said to possess a reflex expectorant action in low doses (B.P.C. 1973) and they are constituents of some cough mixtures. Since patients on cardiac glycosides could also be exposed to Indian squill in such preparations, we have considered it advisable to compare the cardiotoxic potencies of European and Indian squill.

Table 1. *Potency of Indian and European squill tinctures determined on groups of guinea-pigs.*

| Guinea-pig wt (g)* | | | | Quantity infused (ml) | | | | ml $kg^{-1}$ body weight | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| European batch | | Indian batch | | European batch | | Indian batch | | European batch | | Indian batch | |
| 1 | 2 | 1 | 2 | 1 | 2 | 1 | 2 | 1 | 2 | 1 | 2 |
| 472 (38·5)† | 388 (47) | 477 (35) | 352 (50) | 5·14 (0·67) | 4·29 (0·47) | 5·40 (0·59) | 4·69 (0·68) | 10·70 (0·69) | 11·17 (0·40) | 11·26 (0·92) | 13·34 (0·72) |

* The animals were heavier than B.P. requirements but the scatter between groups is approximately the same and the infusion is expressed in terms of body weight.
† Standard deviations n = 6.

The method used was essentially that of the British Pharmacopoeia for prepared digitalis but the animals were heavier. Albino guinea-pigs were anaesthetized by intraperitoneal injections of urethane 1·7 g $kg^{-1}$. The trachea and the right jugular vein were cannulated and needle electrodes inserted subdermally for measurement of the electrocardiogram. Prepared tinctures of squill were infused intravenously at a rate of 1·5 mg in 0·15 ml $min^{-1}$. Digoxin (Lanoxin Burroughs Wellcome) was used as a standard and infused at 5 to 10 $\mu$g in 0·15 ml $min^{-1}$. All tinctures were diluted in 0·9% saline and contained 6% ethanol. The time taken for cessation of heart beat was determined from the ecg recording. Tinctures were prepared according to the method of the B.P.C. and samples of plant material were supplied by William Ransom & Son Ltd. and by Brome & Schimmer.

From Table 1 it can be seen that there is no significant difference between the potency of the two species when expressed as ml of tincture infused per kg body weight of guinea-pigs. However, the solid content of Indian squill was on average 3·3% and of European squill 6·53%, suggesting that B.P.C. tinctures of Indian squill would exhibit half the potency of European tinctures. We were also able to compare soft solid extracts provided by William Ransom & Son Ltd. The Indian extract had a potency of 0·27 g $kg^{-1}$ $\pm$ 0·0124 and the European of 0·272 g $kg^{-1}$ $\pm$0·04, $t$ being 0·053, indicating that there is no significant difference. The production of non-official tinctures from such soft extracts would provide a more uniform potency for squill preparations. Lanoxin assayed by the same process had a potency of 1 mg $kg^{-1}$ and was over 100 times as potent a squill tinctures. There would appear to be little possibility of cardiac glycoside over-dosage from the normal use of Indian squill.

September 15, 1975

## REFERENCES

*British Pharmacopoeia* (1973). Appendix XIVD A111, London: Her Majesty's Stationery Office.

*British Pharmaceutical Codex* (1973), pp. 468, 820 & 823, London: The Pharmaceutical Press.

CHOPRA, R. N., CHOPRA, I. C., HANDA, K. L. & KAPUR, L. D. (1958). *Urginea indica* Kunth. (Liliaceae), Chopra's Indigenous Drugs of India, 2nd edn., pp. 251–253, Calcutta–12: U. N. Dhur & Sons (Private) Ltd.

KRISHNA RAO, R. V. & RANGASWAMI, S. (1967). *Tetrahedron Lett., No.* **46**, 4563–4565.

*Pharm. J.* (1974), **213**, 531.

RANGASWAMI, S. & SUBRAMANIAN, S. S. (1954). *J. scient. ind. Res., 13B*, 150.

RANGASWAMI, S. & SUBRAMANIAN, S. S. (1955). *Ibid., 14B*, 131.

SESHADRI, T. R. & SUBRAMANIAN, S. S. (1950). *Ibid., 9B*, 114–118.