

tribution table shows the following classes (yields of oocysts) expressed in terms of $\times 10^4$ and frequencies (rats) respectively: 2,000, 12; 4,000, 16; 6,000, 9; 8,000, 4; 10,000, 4; 12,000, 2; 14,000, none; 16,000, 1. A separate analysis of the yields for the males gives the following statistical constants: Number, 30; mean, $64,297,675 \pm 4,403,100$; standard deviation, 35,757,500; coefficient of variation, 55.61%. The same for the females: Number, 18; mean, $37,328,300 \pm 2,840,000$; standard deviation, 17,864,000; coefficient of variation, 47.86%. The difference of the means for the 2 sexes is 26,969,400; the probable error of the difference, 5,239,000. The ratio of the difference of the means to the probable error of the difference is 5.143, a value which indicates an extremely high degree of significance. It is necessary to be extremely reserved in accepting this sex difference, however, for in most cases the males and females were from different litters and, hence, probably of widely differing heredity. We are now continuing the experiment without splitting up the litters of rats.

Conclusion. White rats show exceedingly great variability in potentiality for the production of oocysts during an infection with *Eimeria miyairii*. If a similar situation exists among other species of either mammals or birds, the implications are far-reaching and important, for they may serve to explain many of the cases where one worker claims to have controlled or cured coccidiosis with a particular food or remedy, while another secures contrary results with the same methods.

6140

Action of Bufagins Isolated from Different Species of Toads.

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In the investigation of *Ch'an Su*, a commercial preparation of the venom of a Chinese toad, and the poisonous secretions of 10 additional species of toads collected from different parts of the world, the authors found variations in the potency, physical constants, and chemical composition of some of the principles that were isolated from them. The secretion of each species of the toads contains at least from 3 to 5 distinct principles that belong to 5 classes of com-

pounds: *cholesterol*, *epinephrine*, *bufagin*, *bufotoxin*, and *bufotenine*.

Cholesterol occurs in all of the secretions. Spectrographic examinations of several different samples showed the presence of ergosterol in various amounts. It has already been proved that after irradiation the sterol from *Ch'an Su* has an antirachitic action in rats.¹

Epinephrine occurs in *B. marinus*,² *Ch'an Su*,³ and appears to be present in *B. arcuarum*, *B. regularis*, *B. formosus*, and *B. bufo gargarizans*. The amount varies from 2 to 5% of the dried secretion.

Bufagin is a word used generically, since it was observed that most of the bufagins, although similar in their action and elementary composition, are quantitatively different from each other as shown by their minimal emetic dose in cats and pigeons, respectively, and also by the average fatal dose in cats (Table I). Besides, their

TABLE I.

Bufagin from	m. p.	Elementary Analysis		Minimal Emetic Dose in Pigeons	Minimal Emetic Dose in Cats	Average Fatal Dose in Cats
		C	H			
	°C.	%	%	mg. per kg.	mg. per kg.	mg. per kg.
<i>Ch'an Su</i>	222-223	70.02	7.67	0.300	0.125	0.23 (27)*
<i>Bufo marinus</i>	212-213	71.87	8.07	0.375	0.300	0.58 (20)*
<i>B. arcuarum</i>	220	69.68	7.96	0.150	0.060	0.09 (11)*
<i>B. viridis viridis</i>	255-255.5	70.65	8.33	0.150	0.060	0.11 (10)*
<i>B. valliceps</i>	205-206	70.41	8.46	0.200	0.080	0.21 (10)*
<i>B. formosus</i>	253-254	70.87	8.37	0.150	0.070	0.10 (10)*

* Figures in parentheses indicate the number of cats used for the determination of the dose.

melting points are not the same throughout. The bufagins possess the essential features of the members of the digitalis group. The action of the bufagins is not persistent, for the cat can eliminate completely a minimal emetic dose within one to few hours. The cat unit of each principle is less than 1 mg. All of the bufagins raise blood pressure and stimulate the isolated intestines and uterus. Locally, they produce numbness of the tongue. The bufagin from *B. marinus* was first isolated by Abel,² and that from *B. formosus* by Kotake,⁴ and Wieland and Vocke,⁵ respectively.

¹ Chen, K. K., Jensen, H., and Chen, A. L., *J. Pharm. Exp. Ther.*, 1931, **43**, 13.

² Abel, J. J., and Macht, D. I., *J. Pharm. Exp. Ther.*, 1911-12, **3**, 319.

³ Jensen, H., and Chen, K. K., *J. Biol. Chem.*, 1929, **82**, 397.

⁴ Kotake, M., *Liebig's Ann.*, 1928, **465**, 11; *Sc. Pap. Inst. Phys. Chem. Res.*, 1928, **9**, 233.

⁵ Wieland, H., and Vocke, F., *Liebig's Ann.*, 1930, **481**, 215.