

Sites of Production of Fructose and Citric Acid in the Accessory Reproductive Glands of Three Species of Male Chiropterans

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ABSTRACT

The prostate of the three species investigated secrete both fructose and citric acid, the latter in greater amounts than the former. The seminal vesicles of *Cynopterus sphinx* and *Tapbozous longimanus* produce both fructose and citric acid; however, citric acid is more abundantly secreted than fructose. The ampullary glands of *Scotophilus beathi* secrete only fructose, while those of *T. longimanus* produce both fructose and citric acid.

INTRODUCTION

Even though the morphology of the accessory reproductive glands of a number of male chiropterans has been described (Matthews, 1941; Vamburkar, 1958; Prasad, 1966), biochemical observations are available only for a few species (e.g., *Pteropus giganteus giganteus*, Rajalakshmi and Prasad, 1970; *Nyctalus noctula*, Racey, 1974). Hence it was thought opportune to report on the sites of production of fructose and citric acid in the accessory sex glands of three species of Indian bats, viz., *Cynopterus sphinx* Vahl (short-nosed fruit bat), *Scotophilus beathi* Horsfield (greater yellow bat) and *Tapbozous longimanus* Hardwicke (Indian sheath-tailed bat) belonging, respectively, to the families Pteropidae, Vespertilionidae and Emballonuridae.

MATERIALS AND METHODS

All animals were adults in the breeding condition as indicated by the enlarged testes, presence of spermatozoa in the seminiferous tubules and enlarged accessory sex glands. They were collected from the Banaras Hindu University campus and adjacent places. The animals were sacrificed within 24 hours of their arrival in the laboratory. Fructose was estimated by the method of Roe (1934) as modified by Lindner and Mann (1960) and citric acid by the method of Ettinger et al. (1952).

RESULTS AND DISCUSSION

The accessory reproductive glands of *Cynopterus sphinx* (Fig. 1A) consist of the

unpaired prostate, and paired seminal vesicles and Cowper's glands. The prostate is minute and lies ventral to the urethra; the seminal vesicles are large with tubular proximal and rounded distal portions. The Cowper's glands are bean-shaped and lie cephalic to the bulboschiocavernosus muscles. In *Scotophilus beathi* (Fig. 1B) a single prostate and paired ampullary and Cowper's glands comprise the accessory sex glands; seminal vesicles are absent in this species. The prostate partly encircles the neck of the urinary bladder dorsolaterally; the pear-shaped ampullary glands are terminal enlargements of the ductus deferens. The oval Cowper's glands open into the urethra cephalic to the bulb. In *Tapbozous longimanus* (Fig. 1C) the accessory glands include the unpaired prostate, and paired seminal vesicles, ampullary and Cowper's glands. The prostate encircles the urethra and the ampullary glands lie between the seminal vesicles.

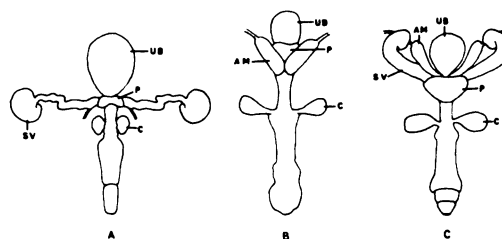


FIG. 1. Ventral views of the reproductive tracts of A, *Cynopterus sphinx* (X0.65); B, *Scotophilus beathi* (X1.6); C, *Tapbozous longimanus* (X1.6). Abbreviations: AM, ampullary gland; C, Cowper's gland; P, prostate; SV, seminal vesicle; UB, urinary bladder.

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TABLE 1. Fructose and citric acid in the accessory sex glands of 3 species of chiropterans.

Species	Gland	Fructose		Citric acid	
		Content µg/organ	Concentration mg/100 g	Content µg/organ	Concentration mg/100 g
<i>Cynopterus sphinx</i>	Prostate (18) ^a		42.6 (32.6 and 52.6)		131.2 (104.2 and 158.2)
	Seminal vesicles (9)	95.2 ± 4.8 (27.9 – 165.2) ^b	173.5 ± 7.4 (61.8 – 270.2)	134.1 ± 6.8 (50.4 – 204.9)	251.1 ± 31.9 (69.8 – 436.8)
<i>Scotophilus beabti</i>	Prostate (7)	23.3 ± 0.9 (14.6 – 31.1)	44.5 ± 3.2 (23.3 – 78.2)	200.3 ± 22.3 (124.6 – 272.7)	350.3 ± 16.4 (264.8 – 551.5)
	Ampullary glands (7)	77.1 ± 5.1 (18.4 – 110.7)	359.6 ± 26.0 (104.8 – 562.2)	...	7.4 ^c (9.2 and 5.6)
<i>Tapbozous longimanus</i>	Prostate (12)		37.6 (38.6 and 36.6)		47.6 (49.1 and 46.1)
	Seminal vesicles (12)		17.5		60.4
	Ampullary glands (12)		43.8 (12.6 and 75.0)		47.8 (32.0 and 63.6)

Values are Mean ± S.E.M.

^aNumber of animals used.

^bRange of the components.

^cMean of two determinations of pooled glands.

The accessory reproductive glands of *Tapbozous* and the prostate of *Cynopterus* are minute and hence only the content of pooled glands was determined; however, the data presented for the glands of *Scotophilus* and the seminal vesicles of *Cynopterus* are based on individual samples.

analysis of the accessory glands are presented in Table 1.

The prostate in the three species investigated secrete both fructose and citric acid and thus resembles that of *Pteropus* (Rajalakshmi and Prasad, 1970). Like the prostate of *Pteropus*, the prostate of the bats in the present study secretes more citric acid than fructose. The seminal vesicles of *Cynopterus* and *Taphozous* produce both fructose and citric acid and differ from those of *Pteropus* which secrete only fructose. The ampullary glands of *Scotophilus* produce fructose in abundance but citric acid only in negligible amounts and thus differ from the ampullary glands of *Pteropus* and *Taphozous* which secrete both the substances.

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