

Juckerman (Jr.)

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on the gustatory organs  
of Sciurus Carolinensis

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Tuckerman (Fr)

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## ORIGINAL COMMUNICATIONS.

### ON THE GUSTATORY ORGANS OF *SCIURUS CAROLINENSIS*.

[PLATE VII.]

FREDERICK TUCKERMAN.

IN the tongue of most Rodentia the posterior portion rises somewhat abruptly above the level of the anterior. The tongue of *S. carolinensis* possesses this characteristic, although not especially well marked. The organ is 40mm. in length, 10mm. in breadth, and 8mm. in thickness, and is perfectly free for 17mm. from the frænum. The papillate surface is usually marked by a superficial longitudinal groove extending along the anterior half to the tip. In some specimens the groove passes directly through the apex, and from thence is continued to the frænum. The dorsum, anterior to the area of the circumvallate papillæ, is thickly beset with small, recurved papillæ of mechanical function. These papillæ vary in form, some being cone and others more or less cylinder-shaped. The latter measure 0.40mm. in height and 0.14mm. in breadth at their widest part, and, in the mid-dorsal region of the tongue, are about 0.35mm. apart. They are more or less flattened on top, with perpendicular sides, and each is seated upon one or more papillary upgrowths of the mucosa. The epithelium covering the papillæ is somewhat imbricated, and the spaces between them are filled to some height with epithelium likewise imbricated in arrangement. Not infrequently the papillæ have one or more cornified spines projecting from their upper surface, the points of which are directed inwards

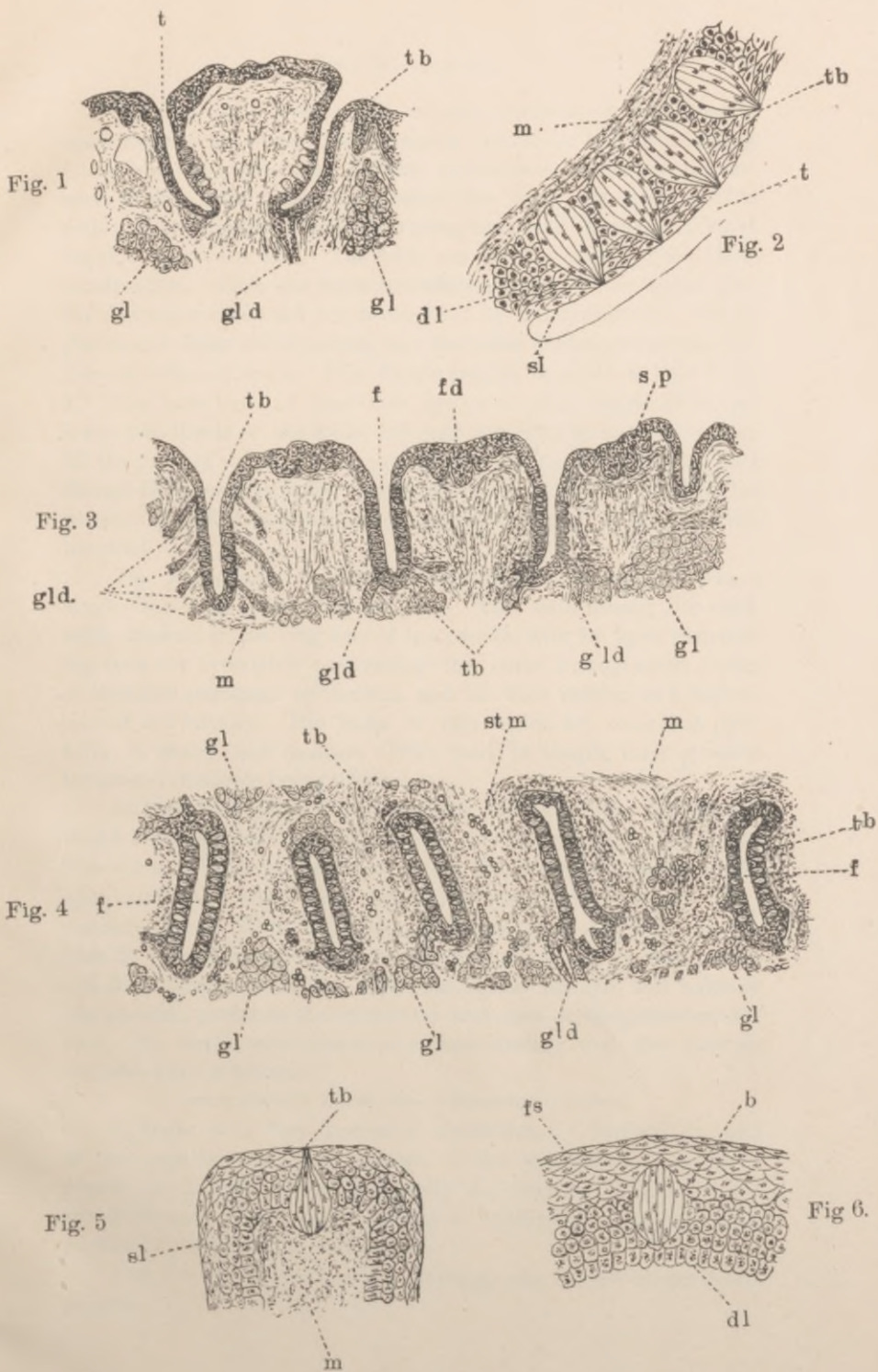
and backwards. The cone-shaped papillæ investing the upper surface and sides of the anterior half of the tongue do not differ in character very materially from ordinary conical papillæ. About the gustatory area and root are thick, fleshy, cone-shaped elevations, the apices of which are turned backwards. Fungiform papillæ of the normal type are distributed over the upper surface and sides of the organ, attaining their maximum size in the tract directly in front of the circumvallate papillæ.

The circumvallate papillæ are three in number and are situated well back on the dorsum. They are arranged in an isosceles triangle, the apex of the triangle being backwards. At each side of the tongue, near the base, is a papilla foliata. The inner border of these papillæ is marked by a fringe of large, fleshy papillæ, the apices of which are directed upwards, inwards and backwards. This fringe is continued for some distance on to the glosso-palatine arch.

#### GUSTATORY STRUCTURES.

*The Circumvallate Papillæ.*—These papillæ show no indications of lobation. Their upper surface, which is somewhat uneven, overtops the surrounding lingual area. The epithelium covering their free surface measures about 0.07mm. in thickness, being a trifle thicker than that protecting the sides. The lateral walls of the papillæ curve downwards and inwards, giving them a rather constricted base. The trench encircling each papilla is deep, narrow, and quite uniform in breadth. Serous glands are fairly abundant in the underlying stroma, and also occur within the papillary body itself. Their ducts open into the trench at its deeper part. Nerves of considerable size enter the papillæ at their base, and their branches (which are for the most part non-medullated) radiate to the summit and lateral regions of the papillæ, in the mucosa of which they cease to be longer distinguishable.

The taste-bulbs of the circumvallate papillæ are only fairly numerous. They are disposed at the sides in a zone of four to six tiers, the uppermost tier being about opposite the middle of the trench. I failed to detect taste-bulbs in the epithelium of the free upper surface of the papillæ, and they were likewise wanting in that investing the outer wall of the trench. From horizontal sections, made at different levels, I estimated the number of bulbs in a tier at fifty. If we allow for five tiers, we shall have two hundred and fifty bulbs for each of the three papillæ. The bulbs present the usual amount of variation in size and shape. (Fig. 2 shows their external structure magnified 240 diameters.) The mean length of the bulbs is 0.057mm., and their mean breadth 0.032mm.





*The Papillæ Foliatæ.*—The exposed surfaces of these papillæ are somewhat flattened. Each papilla consists of five bulb-bearing folds, possessing the same general appearance, but varying somewhat in size. The furrows separating the folds are quite narrow, with a nearly uniform breadth throughout, and have an average depth of about 0.5 mm. The folds are for the most part simple in construction. Each one bears secondary papillæ at its upper part, the depressions between which are filled by the epithelium. Serous glands and ducts are abundant, and the latter discharge into the furrows at different levels. (The foliate papilla is shown in figs. 3 and 4.) The taste bulbs of this area are, as a rule, restricted to the lower two-thirds of the folds, although occasionally they completely fill the sides of a fold. They are usually arranged in eight tiers, though there may be more. Judging from horizontal sections, the number of bulbs in each lateral gustatory organ is about eleven hundred.

*The Fungiform Papillæ.*—These papillæ commonly bear a single taste-bulb at their upper part. The bulb usually lies vertically, directly in the long axis of the papilla, with its apex penetrating (but not invariably perforating) the outer homogeneous layers of stratified pavement epithelium, and its base resting in a depression of the mucosa. The bulbs of this region are somewhat pyriform in shape, and measure 0.051 mm. in length, their greatest transverse diameter being 0.025 mm.

At the lower part of the posterior surface of the epiglottis I found a few isolated bulbs embedded in the stratified epithelium. The apices of these bulbs fail to pierce the superficial strata of the epithelium, and their bases but rarely touch the mucosa. They measure from 0.039 to 0.048 mm. in length and are 0.030 mm. in breadth. Small mucous glands are very abundant in this region, and their ducts, which are numerous, quite straight and more or less parallel, perforate the epithelium and open on the posterior surface. No ducts were observed communicating with the anterior surface of the epiglottis.

EXPLANATION OF PLATE—REFERENCE LETTERS.

*b.*, bulb; *d. l.*, deep lamina of epithelium; *f.*, furrow; *fd.*, fold of the papilla; *f. s.*, free surface of the epithelium; *gl.*, serous gland; *gl. d.*, duct of serous gland; *m.*, mucosa; *st. m.*, striated muscle-fibres; *s. l.*, superficial lamina of epithelium; *s. p.*, secondary papillæ; *t.*, trench; *t. b.*, taste-bulb.

Fig. 1 x 40. Vertical section through one of the circumvallate papillæ.

Fig. 2 x 240. Vertical section through one side of the base of the same circumvallate papilla, showing the bottom of the trench and the four lowest tiers of taste-bulbs. *t. b.*, Taste-bulb, the reference mark indicating the apical end.

Fig. 3 x 40. Transverse vertical section through one of the papillæ foliatæ.

Fig. 4 x 40. Horizontal section through the upper part of one of the papillæ foliatæ. *st. m.*, Striated muscle-fibres which have been divided transversely to their long axis.

Fig. 5 x 240. Vertical section through a fungiform papilla of the mid-dorsal region of the tongue, showing a single taste-bulb at its upper part. The two upper thirds of the bulb are embedded in the epithelium and the lower third rests in a depression of the mucosa.

Fig. 6 x 240. Transverse vertical section through the lower part of the posterior surface of the epiglottis. *b.*, Bulb-like structure, entirely epithelial in position.

AMHERST, MASS.





