BACTERIAL CONTENTS OF THE ANAL AND CASTOR GLANDS OF BEAVER

(Castor canadensis)

GERALD E. SVENDSEN and JOSEPH D. JOLLICK

Department of Zoology and Microbiology
Ohio University, Athens, Ohio 45701

(Received July 18, 1977; revised December 31, 1977)

Abstract—Bacterial contents of both the anal gland and castor gland of the beaver (Castor canadensis) were determined. Using our culture methods, no bacteria were isolated from the castor glands, but the anal gland contained high numbers of the aerobe Escherichia coli and the anaerobe Bacteroides fragilis. The latter may be represented by several variants but facilities were not available for advanced anaerobic analysis. The relative numbers of each bacterial group and the group present were constant regardless of sex, age class, or colony of beaver. The bacterial fermentation hypothesis is rejected for castor gland section but remains possible for anal gland secretions based on variations seen in B. fragilis. The role of the products of both the castor gland and anal gland are discussed in relationship to scent communication in beaver.

Key Words—Castor canadensis, anal gland, castor gland, fermentation, scent communication.

INTRODUCTION

Canadian beaver (Castor canadensis) live in colonies composed of an extended family unit. Each colony occupies a discrete area not used by other colonies (Taylor, 1970; Svendsen, 1979). Scent mounds, a “mudpie” of mud and debris to which the beaver adds odoriferous body products, are conspicuous within the area used by a beaver colony. Beaver possess two pairs of large saclike glands which produce odoriferous products implicated in scent communication (Svendsen, 1978).
A bacterial fermentation process producing volatile constituents used in chemical signaling has been proposed for several species of mammals (Albone and Perry, 1975; Michael et al., 1976; Gorman et al., 1974). The most detailed evidence to support the fermentation hypothesis and its role in conspecific recognition based on differences in fatty acid profiles are presented for *Vulpes vulpes* (Albone et al., 1974), *Macaca mulatta* (Michael et al., 1972), and *Herpestes auroputatus* (Gorman, 1976). In this paper we report the bacterial contents of the anal and castor glands of beaver and the relationship of these findings to chemical communication and the fermentation hypothesis.

**METHOD AND MATERIALS**

Samples of the contents of both the anal gland and castor gland were collected aseptically using a 1.0-ml sterile disposable syringe with a 1/4-in. 20-gauge needle. All samples were obtained from live beaver either anesthetized in the laboratory or restrained in a handling bag in the field. To obtain contents of the anal gland, the wall of the cloaca was swabbed with antiseptic, the anal gland pushed outward against the wall of the cloaca, and the needle inserted through the tissue into the lumen of the gland. A 1.0-ml sample was collected. Contents of the castor glands (=castoreum) were collected from anesthetized beaver. An incision was made through the skin to expose the gland, the gland surface swabbed with antiseptic, and castoreum drawn into a sterile syringe.

Viable counts of aerobic/facultative and anaerobic bacteria were determined by diluting the sample through $10^{-5}$ dilutions in prereduced thioglycolate broth, then 0.1-ml samples of the dilutions were plated on duplicate plates of sheep blood agar, chocolate agar, and eosine–methylene blue (EMB) medium. One set of plates was immediately placed in Gas Pac anaerobic jars and incubated for 48 hr at 37°C. The other set was incubated at the same temperature in air.

The isolation and enumeration of anaerobes from tissues and secretions presents special problems, foremost of which is the need to exclude oxygen from the collected material. In the case of the anal gland secretions, the problem is minimized during collection because the secretion is a highly viscous, fatty material which would retard $O_2$ diffusion. The syringe used for collection was evacuated by forceful and full depression of the plunger and then immediately inserted into the lumen. A 0.5-ml sample of the secretion was emulsified in the thioglycolate diluent and placed on the solid media and placed under anaerobic conditions as rapidly as possible. Exposure to oxygen was kept to a minimum; none the less, since roller tube counts were