Short-chain carboxylic acids from the anal glands of the binturong, *Arctictis binturong* (Viverridae, Mammalia)

Paul J. Weldon, Michael F. Gorra, William F. Wood

1. Subjects and source

The binturong (*Arctictis binturong*) is a large, arboreal viverrid (subfamily Paradoxurinae) with a coat of long coarse hair and a prehensile tail that inhabits the dense forests of Southeast Asia, Palawan, Sumatra, Java, and Borneo. This species, as with most Carnivora, possesses paired glands that open on both sides of the anus (Story, 1945). These anal glands are used by both sexes to scent-mark (Kleiman, 1974).

2. Previous work

There are no previous reports on the composition of the anal gland secretions of *A. binturong*. An analysis of the glandular secretions of another paradoxurine, the masked palm civet (*Paguma larvata*), indicated cycloheptadecanone (dihydrocivetone) and several straight-chain ketones (Wheeler et al., 1998).
3. Present study

We obtained the glandular secretions from five males (14–19 kg) and one female (15 kg) of *A. binturong*, all captive-born and ranging from 2.8 to 10.2 years old. Subjects were fed a mixture of oranges, grapefruit, apples, pears, pineapples, bananas, kiwi fruit, melons, strawberries, tomatoes, and rodents. The mouth of a glass vial was held over a gland duct opening while the body of the gland was manually palpated to express the dark brown exudate. Several ml of CH$_2$Cl$_2$ were added to the vials before they were placed on dry ice. Vials were stored at $-20^\circ$C.

Secretions were analyzed on a 5890 Hewlett-Packard gas chromatograph fitted with a 5970 mass selective detector using a 12-m cross-linked methyl silicone HP-1 capillary column. The oven temperature was kept at $40^\circ$C for the first 4 min and then increased at a rate of $30^\circ$C/min to $250^\circ$C, where it was maintained for 4 min. Fragments below 39 amu were not recorded.

Three carboxylic acids were observed as the main or sole components of all extracts ([m/z values (rel. intensity)]: 2-methylpropanoic acid [m/z = 88 (M$^+$, 11), 73 (29), 55 (9), 45 (28), 44 (27), 43 (100), 42 (17), 41 (56), 40 (26), and 39 (24)]; 2-methylbutanoic [m/z = 75 (5), 74 (100), 73 (17), 69 (6), 57 (46), 56 (14), 55 (14), 45 (28), 41 (58), and 39 (23)]; and 3-methylbutanoic acid [m/z = 87 (16), 69 (5), 61 (9), 60 (100), 45 (32), 43 (44), 42 (17), 41 (42), 39 (30), and 38 (8)]. Identiﬁcations of these compounds were conﬁrmed by comparisons of their GC retention times and mass fragmentation patterns with those of authentic compounds.

4. Comparative aspects

Carboxylic acids are common in mammalian skin gland secretions, but the compounds reported generally are of higher molecular weight than those that we observe in *A. binturong*. C$_2$–C$_5$ Carboxylic acids, including 3-methylbutanoic acid, have been reported in the anal gland secretions of the mongoose, *Herpestes auropunctatus*, another viverrid (Gorman et al., 1974). These compounds are hypothesized to arise from bacteria residing in the glands.

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References