

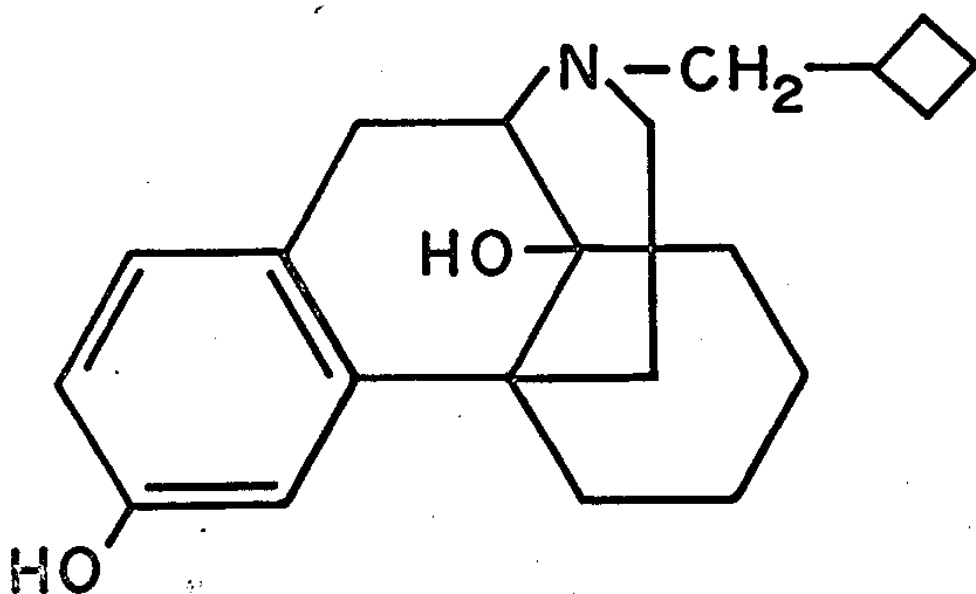


Figure 7. Structure diagrams of butorphanol (1-BC-2627, 1-N-cyclobutylmethyl-3, 14  $\alpha$ -dihydroxymorphinan).

#### Miosis and Subjective Effects

Initially, single doses of butorphanol, morphine and placebo were compared to determine the ability of butorphanol to produce morphine-like subjective effects and miosis. Ten subjects received at weekly intervals, placebo (normal saline), morphine sulfate, 7.5, 15 and 30 mg; and butorphanol tartrate, 2, 4, and 8 mg. Drug effects were measured by change in pupil size, measured photographically; Subjects' and Observers' Single Dose Opiate Questionnaires<sup>9,10</sup> and items on the Morphine-Benzedrine Group (MBG) Scale, a general measure of drug induced euphoria; the LSD Scale, a measure of early psychotomimetic and dysphoric effects; and the Pentobarbital-Chlorpromazine-Alcohol Group (PCAG), a measure of apathetic sedation.<sup>11</sup> Control pupil observations were taken each day at 0800 and 0830. Drugs were administered subcutaneously under double-blind conditions at 0800. At 0830, 0900, 1000, 1100, 1200, 1300, 1400 and 2000 pupils were again photographed and questionnaires were