THE ISOLATION OF OXYDIMORPHINE FROM POPPY CAPSULES

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Oxydimorphine, with the empirical formula $C_{34}H_{36}O_6N_2 \cdot 3H_2O$, which is also called pseudomorphine, ψ-morphine, dehydromorphine, and oxymorphine has previously been isolated from opium and has been obtained by the mild oxidation of morphine [1].

When the fraction of phenolic alkaloids contained in the capsules of the oil poppy and the opium poppy was chromatographed on paper in the toluene–isobutanol (3:7)–buffer solution with pH 3.5 system, we found an alkaloid, which we called Kh-4, which did not move from the starting line [2]. This alkaloid gave the characteristic color reactions for a phenol group.

To determine the possibility of the formation of the alkaloid Kh-4 from morphine during analysis, we treated pure morphine in the same way as in its determination in the plant raw material and performed a quantitative chromatospectrophotometric determination of morphine in poppy capsules with additions of pure morphine. In both cases, practically the same amount of morphine as was taken was found [3]. This showed that the alkaloid Kh-4 is present in the raw material and is not formed during the analytical process.

The results of a chromatographic separation of the various intermediates in the industrial production of morphine from poppy capsules has shown that Kh-4 is present in all the intermediates, but the largest amount is found in the "crude" morphine – an intermediate consisting of morphine contaminated with narcotine, the alkaloid Kh-4, and traces of codeine and thebaine.

In an investigation of the distribution on paper of the known opium alkaloids in the same solvent system, it was established [4] that the oxydimorphine remained at the starting line. In view of this, we suggested that Kh-4 could be oxydimorphine.

To identify the alkaloid Kh-4, it was isolated from crude morphine in the following way. The crude morphine was dissolved in tartaric acid with an excess of which at pH 1-2 it formed a water-insoluble bitartrate. After the morphine bitartrate had been separated off and the mother solution had been made alkaline with ammonia to pH 9, a precipitate deposited which, according to chromatography, was a mixture of narcotine and Kh-4. To separate the narcotine, this precipitate was treated with a 3% solution of acetic acid with heating. The narcotine did not dissolve. The base Kh-4 was precipitated from the acetic-acid solution at pH 9. Chromatograms showed that the precipitate contained only the alkaloid Kh-4. For purification, the base was dissolved in alkali and was precipitated with carbon dioxide as in the purification of oxydimorphine [5]. The resulting amorphous powder was recrystallized from a 2% solution of ammonia in 50% ethanol. When this solution was boiled, after the elimination of the excess of ammonia a crystalline precipitate of the alkaloid Kh-4 separated out. The hydrochlorides and sulfates of this alkaloid and of the oxydimorphine synthesized from morphine were obtained by the method used to obtain the analogous salts of oxydimorphine [5].

The properties of the alkaloid Kh-4 were compared with those of oxydimorphine, which we isolated from morphine by a known method [6].

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The UV spectra of solutions of the sulfates in water and of the bases in 0.02 N hydrochloric acid of the substances being compared were identical and corresponded to those given in the literature [7]. The IR spectra of the sulfates of oxydimorphine and of the alkaloid Kh-4 taken in KBr on a UR-10 instrument coincided completely, and the spectra of the bases in paraffin oil coincided with the analogous spectrum of pseudomorphine [8].

The color reactions with the Mark, Mandelina, Vasitskii, Erdtman, and Kiefer reagents [9], and also with sulfuric and nitric acids for the salts and bases of oxydimorphine and the alkaloid Kh-4 also proved to be identical.

Thus, an alkaloid of phenolic nature known as Kh-4 has been isolated from poppy capsules. It has been established that this alkaloid is identical with the oxydimorphine previously isolated only from opium.

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