Trichlor-isopropyl alcohol was used as a 2½% solution. Doses of 0.045 gram per 100 grams of body weight caused death within 3 hours in all cases. This compound is absorbed very rapidly and causes complete loss of motor control in 5 minutes.

Doses of 0.035 gram per 100 grams of body weight caused the same loss of motor control as the lethal dose, but in the majority of cases the animals recovered and showed normal activity in 5 to 6 hours.

Isopropyl alcohol was injected in volumes per body weight corresponding to those used with trichlor-isopropyl alcohol. The dilutions were varied from 2½% to 50%. In none of these cases was a lethal dose obtained. This shows clearly that trichlor-isopropyl alcohol is much more toxic than isopropyl alcohol.

SUMMARY.

Trichlor-isopropyl alcohol has both a greater disinfectant action and toxicity than isopropyl alcohol.

CULTIVATION OF THE OPIUM POPPY IN NORTH CAROLINA.*

BY E. V. HOWELL.

In 1905, I began the cultivation of poppies. In 1909 at the Los Angeles meeting of the AMERICAN PHARMACEUTICAL ASSOCIATION I presented an historical sketch of opium production, with items of interest from my experiments. From translation of the work of Dioscorides about A.D. 77 and other authors, I found that the μηκώνιον of Theophrastus was evidently an extract of the whole plant, while Dioscorides distinguishes μηκώνειον, described as an extract of the entire herb, from οπος, the more active juice of the capsules. I found also that the ancients knew in a crude way almost as much as we now know of the plant. They stated that the young plants were harmless and could be eaten as a salad, the seeds were used in making bread (as to-day); could be fed to poultry, furnished oil, etc.

Dioscorides stated that the capsules had to be scarified to produce opium; methods were used to prevent the instruments from cutting too deep thus allowing internal bleeding. Discussion as to whether transverse or longitudinal cutting was the better was noticed. The plants were to be cut "advancing backwards lest the juice get on your raiment." The uses of the juice, the leaves and capsules, in various forms were enumerated.

Since 1909, I have grown annually poppies from the same strain of seed. I started with both white and black seeded varieties of the *Papaver somniferum*. The black variety evidently is the hardier as it has crowded out the white. In North Carolina, the poppy once started will seed itself, the problem becoming one of thinning or transplanting. Poppies should be sown in the fall, and may be sown by simply scattering on the top of snow, in the winter. They will mature the following spring. In transplanting, it is necessary that it should be done in cold weather, early in the spring. The poppy will survive a very considerable amount of cold, or even freezing.

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* Scientific Section, A. PH. A., Buffalo meeting, 1924.

To successfully plant and harvest an acre of poppies would be no more tedious, for instance, than to complete an acre of tobacco. Tobacco is planted in early spring in seed beds, covered with cloth. Each plant is transferred to fields and set out in rows. The leaves are gathered by hand, assorted, tied in bundles, hung on sticks, placed in barns and cured by heat. Further assortment by hand is resorted to before marketing, which is usually done in large warehouses where bidders inspect the various piles, some weighing less than 100 pounds, others more. Further stemming, cleaning, curing and flavoring methods are used. In earlier experiments I obtained opium by incision of the capsules, which, after 10 days of air-drying, gave opium of a 6 to 7 per cent morphine content. The capsules are numerous but not so large as from the oriental poppies. No attempt was made to increase the size by restriction of the number of capsules per plant, in fact an increase of capsules for seed production was looked upon as desirable.

Every possible effort to express, crush, or extract the juice after crushing and thus obtain opium, avoiding the tedious and expensive labor item of bleeding the capsules, was tried without success. The addition of ferments and the use of oxidizing agents were fruitless. Nature's mystic method, retaliation for man's wounding the plant, was the only way I found of producing opium—scarifying with knives padded to incise very slightly, a white milk juice exudes, which remaining on the capsule hardens and turns brown; this can be scraped off after twenty-four hours. In this time twelve to eighteen alkaloids and an acid or two are developed by the plant.

In the study of the uses and abuses of plants, we see this useful plant—furnishing the best of drying oils, one that has preserved for us, in the realm of art, the wonderful work of the master painters—stung, by the inhumanity of man, to the production of morphine. The subsequent introduction of the evils of our opium situation is strictly the work of man. That opium can be produced in North Carolina is certain; that also the seed will mature after incising the capsules has been demonstrated. Just what is the effect on the oil content of the seed, after bleeding, I haven't had time to ascertain. Continuous planting has developed a hardy strain, with an increase of the number of capsules, the highest this year being forty from one plant. The following items from poppies grown are interesting.

Plants.	Capsules.	Seed.
1	13	579 grains
2	16	418 grains
1	40	561 grains
2	26	287 grains
1	9	155 grains

This average collection of seven plants, with 104 capsules, yielded 2000 grains of seed—an average of about 15 capsules per plant, and about 20 grains of seed per capsule.

If plants were set out two feet apart the 10,890 plants per acre would yield, calculating 2000 grains of seed from seven plants, 443 pounds of seed. It is possible in gardens to grow plants one foot apart. This would give 48,560 plants which would yield 1700 pounds of seed per acre. The parts of the poppy that are quoted at wholesale in large quantities are as follows: Seed, Dutch, 10 cents per pound,

German, 9 cents; poppy flowers, red, 25 to 33 cents per pound; poppy oil, 2.20 to 3.20 per gallon (*Oil, Paint and Drug Reporter*, January, 1924). At these prices then, seed valued at $45.00 to $175.00 per acre could be produced; the value of the remainder of the plant for paper making is yet problematical. It is worth while to investigate some crop that would be profitable, that could be introduced where the more valuable crop is menaced, as for instance cotton in the boll weevil districts, where poppy cultivation would aid in elimination of this pest.

It is interesting to note that poppy heads and flowers are used medicinally in many countries, although these are not popular in America. For instance, in Great Britain they use the decoction of poppy capsules, the extract of the capsules, the liquid extract of the capsules and the syrup of the capsules. We know that frequently opium gives better results than any one or two of its alkaloids.

The British have this idea in their papaveretum, which is the hydrochlorides of the whole of the alkaloidal constituents of opium. This is recommended as preferable to morphine for hypodermic injection, having a better sedative and soporific action, with milder after effects. With the omission of narcotine from the hydrochlorides of the total alkaloids, pleistopon is used in England and, similarly, with morphine eliminated a preparation called opon is prepared, and the glycerophosphates of all of the alkaloids is called glycopon. There is some alkaloidal activity in the capsules but after experiments I don't believe they would run as high as one-half of one per cent of morphine so that preparations of the capsules are limited to fomentations, for use in dental abscesses, for a vehicle for urethral injections and as a mild sedative in cough remedies.

The conclusions drawn from the experiments are briefly that the opium poppy is hardy and easily grown in North Carolina; that it will produce opium in this climate. Again, that it is worth while to consider it as a crop, for the seed alone, which could be made to yield from $45 to $175 per acre in competition with the wholesale price, in large quantities, of imported seed quoted at 10 cents per pound, not to speak of the encouragement of a tariff, if it were grown. That the use of the capsules with their small per cent of morphine, after the stimulation of heroin, would furnish material for cough remedies and mild sedative preparations, not subject to the restrictions of our narcotic laws.

ABSTRACT OF DISCUSSION.

Arno Viehoever: I am not really familiar at present with conditions, especially with the work that has been done on the poppy, but my recollection, hazy as it is, seems to be that the work that has been done has definitely indicated the presence of alkaloids, such as morphine, in the poppy. I certainly would like to have some further information.

E. A. Ruddiman: Between 1890 and 1900 at Nashville, Tenn., I was given the dry juice of the plant for examination. I assayed the dried extract by the then U. S. P. method and obtained in the neighborhood of 7 per cent morphine, apparently. Later, I found that what I had precipitated as morphine was calcium carbonate. I could not get a satisfactory test for morphine. In later experiments with plants from imported seeds, on scarifying the capsules and drying the juice, I failed to detect, satisfactorily, any amount of morphine.

Arno Viehoever: I want to call attention to the fact that one might gather an erroneous conclusion in believing that if the seed did not contain any alkaloid the plant would not. The hollyhock of South Carolina has been held to contain caffeine. The seed does not contain, even by using very fine measurements, any trace of it, and yet the leaf of the plant contains up to 2 per cent. All such facts should be taken into consideration.