# LSD

FIRST YOU MUST MAKE SOME ERGOT EXTRACT.

## The Culture and Extraction of Ergot Alkaloids

Make up a culture medium by combining the following ingredients in about 500 milliliters of distilled water in a 2 liter, small-neck flask:

Sucrose ..... 100 grams
Chick pea meal ..... 50 grams
Calcium nitrate ..... 1 gram
Monopotassium phosphate ..... 0.25 grams
Magnesium sulphate ..... 0.25 grams
Potassium chloride ..... 0.125 grams
Ferrous sulphate heptahydrate ..... 8.34 milligrams
Zinc sulphate heptahydrate ..... 3.44 milligrams
Add water to make up one liter, adjust pH 4 with ammonia solution and citric acid. Sterile by autoclaving.

Inoculate the sterilized medium with Claviceps purpurea under sterile conditions, stopper with sterilized cotton and incubate for two weeks periodically testing and maintaining pH 4. After two weeks a surface culture will be seen on the medium. Large-scale production of the fungus can now begin.

Obtain several ordinary 1 gallon jugs. Place a two-hole stopper in the necks of the jugs. Fit a short (6 inch) glass tube in one hole, leaving 2 inches above the stopper. Fit a short rubber tube to this. Fill a small (500 milliliter) Erlenmeyer flask with a dilute solution of sodium hypochlorite, and extend a glass tube from the rubber tube so the end is immersed in the hypochlorite. Fit a long, glass tube in the other stopper hole. It must reach near the bottom of the jug and have about two inches showing above the stopper. Attach a rubber tube to the glass tube as short or as long as desired, and fit a short glass tube to the end of the rubber tube. Fill a large, glass tube (1 inch x 6 inches) with sterile cotton and fit 1-hole stoppers in the ends. Fit the small, glass tube in end of the rubber tube into 1 stopper of the large tube. Fit another small glass tube in the other stopper. A rubber tube is connected to this and attached to a small air pump obtained from a tropical fish supply store. You now have a set-up for pumping air from the pump, through the cotton filter, down the long glass tube in the jug, through the solution to the air space in the top of the jug, through the short glass tube, down to the bottom of the Erlenmeyer flask and up through the sodium hypochlorite solution into the atmosphere. With this aeration equipment you can assure a supply of clean air to the Claviceps purpurea fungus while maintaining a sterile atmosphere inside the solution.

Dismantle the aerators. Place all the glass tubes, rubber tubes, stoppers and cotton in a paper bag, seal tight with wire staples and sterilize in an autoclave.

Fill the 1-gallon jugs 2/3 to ¾ full with the culture medium and autoclave.

While these things are being sterilized, homogenize in a blender the culture already obtained and use it to inoculate the media in the gallon jugs. The blender must be sterile. Everything must be sterile.

Assemble the aerators. Start the pumps. A slow bubbling in each jug will provide enough oxygen to the cultures. A single pump can, of course, be connected to several filters.

Let everything sit a room temperature (25 C) in a fairly dark place (never expose ergot alkaloids to bright light - they decompose) for a period of ten days.

After ten days adjust the culture to 1% ethanol using 95% ethanol under sterile conditions. Maintain growth for another two weeks.

After total of 24 days growth period the culture should be considered mature. Make the culture acidic with tartaric acid and homogenize in a blender for one hour.

Adjust to pH 9 with ammonium hydroxide and extract with benzene or chloroform/iso-butanol mixture.

Extract again with alcoholic tartaric acid and evaporate in a vacuum to dryness. The dry material in the salt (i.e., the tartaric acid salt, the tartrate) of the ergot alkaloids, and is stored in this form because the free basic material is too unstable and decomposes readily in the presence of light, heat, moisture and air.

To recover the free base for extraction of the amide of synthesis to LSD, make the tartrate basic with ammonia to pH 9, extract with chloroform and evaporate in vacuo.

If no source of pure Claviceps purpurea fungus can be found, it may be necessary to make a field trip to obtain the ergot growths from rye or other cereal grasses. Rye grass is by far the best choice. The ergot will appear as a blackish growth on the tops of the rye where the seeds are and are referred to as “heads of ergot.” From these heads of ergot sprout the Claviceps purpurea fungi. They have long steams with bulbous heads when seen under a strong glass or microscope. It is these that must be removed from the ergot, free from contamination, and used to inoculate the culture media. The need for absolute sterility cannot be overstressed. Consult any elementary text on bacteriology for the correct equipment and procedures. Avoid prolonged contact with ergot compounds, as they are poisonous and can be fatal.

LSD-25 Synthesis from "Psychedelic Guide to the Preparation of the Eucharist": Preparatory arrangements: Starting material may be any lysergic acid derivative, from ergot on rye grain or from culture, or morning glory seeds or from synthetic sources. Preparation #1 uses any amide, or lysergic acid as starting material. Preparations #2 and #3 must start with lysergic acid only, prepared from the amides as follows: 10 g of any lysergic acid amide from various natural sources dissolved in 200 ml of methanolic KOH solution and the methanol removed immediately in vacuo. The residue is treated with 200 ml of an 8% aqueous solution of KOH and the mixture heated on a steam bath for one hour. A stream of nitrogen gas is passed through the flask during heating and the evolved NH3 gas may be titrated is HCl to follow the reaction. The alkaline solution is made neutral to congo red with tartaric acid, filtered, cleaned by extraction with ether, the aqueous solution filtered and evaporated. Digest with MeOH to remove some of the coloured material from the crystals of lysergic acid. Arrange the lighting in the lab similarly to that of a dark room. Use photographic red and yellow safety lights, as lysergic acid derivatives are decomposed when light is present. Rubber gloves must be worn due to the highly poisonous nature of ergot alkaloids. A hair drier, or, better, a flash evaporator, is necessary to speed up steps where evaporation is necessary. Preparation #1 Step I. Use Yellow light Place one volume of powdered ergot alkaloid material in a tiny roundbottom flask and add two volumes of anhydrous hydrazine. An alternate procedure uses a sealed tube in which the reagents are heated at 112 C. The mixture is refluxed (or heated) for 30 minutes. Add 1.5 volumes of H2O and boil 15 minutes. On cooling in the refrigerator, isolysergic acid hydrazide is crystallised. Step II. Use Red light Chill all reagents and have ice handy. Dissolve 2.82 g hydrazine rapidly in 100 ml 0.1 N ice-cold HCl using an ice bath to keep the reaction vessel at 0 C. 100 ml ice-cold 0.1 N NaNO2 is added and after 2 to 3 minutes vigorous stirring, 130 ml more HCl is added dropwise with vigorous stirring again in an ice bath. After 5 minutes, neutralise the solution with NaHCO3 saturated sol. and extract with ether. Remove the aqueous solution and try to dissolve the gummy substance in ether. Adjust the ether solution by adding 3 g diethylamine per 300 ml ether extract. Allow to stand in the dark, gradually warming up to 20 C over a period of 24 hours. Evaporate in vacuum and treat as indicated in the purification section for conversion of iso-lysergic amides to lysergic acid amides. Preparation #2 Step I. Use Yellow light 5.36 g of d-lysergic acid are suspended in 125 ml of acetonitrile and the suspension cooled to about -20 C in a bath of acetone cooled with dry ice. To the suspension is added a cold (-20 C) solution of 8.82 g of trifluoroacetic anhydride in 75 ml of acetonitrile. The mixture is allowed to stand at -20 C for about 1.5 hours during which the suspended material dissolves, and the d-lysergic acid is converted to the mixed anhydride of lysergic and trifluoroacetic acids. The mixed anhydride can be separated in the form of an oil by evaporating the solvent in vacuo at a temperature below 0 C, but this is not necessary. Everything must be kept anhydrous. Step II. Use Yellow light The solution of mixed anhydrides in acetonitrile from Step I is added to 150 ml of a second solution of acetonitrile containing 7.6 g of diethylamine. The mixture is held in the dark at room temperature for about 2 hours. The acetonitrile is evaporated in vacuo, leaving a residue of LSD-25 plus other impurities. The residue is dissolved in 150 ml of chloroform and 20 ml of ice water. The chloroform layer is removed and the aqueous layer is extracted with several portions of chloroform. The chloroform portions are combined and in turn washed with four 50 ml portions of ice-cold water. The

chloroform solution is then dried over anhydrous Na2SO4 and evaporated in vacuo. Preparation #3 This procedure gives good yield and is very fast with little iso-lysergic acid being formed (its effect are mildly unpleasant). However, the stoichometry must be exact or yields will drop. Step I. Use White light Sulfur trioxide is produced in anhydrous state by carefully decomposing anhydrous ferric sulfate at approximately 480 C. Store under anhydrous conditions. Step II. Use White light A carefully dried 22 litre RB flask fitted with an ice bath, condenser, dropping funnel and mechanical stirrer is charged with 10 to 11 litres of dimethylformamide (freshly distilled under reduced pressure). The condenser and dropping funnel are both protected against atmospheric moisture. 2 lb of sulfur trioxide (Sulfan B) are introduced dropwise, very cautiously stirring, during 4 to 5 hours. The temperature is kept at 0-5 C throughout the addition. After the addition is complete, the mixture is stirred for 1-2 hours until some separated, crystalline sulfur trioxide-dimethylformamide complex has dissolved. The reagent is transferred to an air- tight automatic pipette for convenient dispensing, and kept in the cold. Although the reagent, which is colourless, may change from yellow to red, its efficiency remains unimpaired for three to four months in cold storage. An aliquot is dissolved in water and titrated with standard NaOH to a phenolphthalein end point. Step III. Use Red light A solution of 7.15 g of d-lysergic acid mono hydrate (25 mmol) and 1.06 g of lithium hydroxide hydrate (25 mmol) in 200 ml of MeOH is prepared. The solvent is distilled on the steam bath under reduced pressure. the residue of glass-like lithium lysergate is dissolved in 400 ml of anhydrous dimethyl formamide. From this solution about 200 ml of the dimethyl formamide is distilled off at 15 ml pressure through a 12 inch helices packed column. the resulting anhydrous solution of lithium lysergate left behind is cooled to 0 C and, with stirring, treated rapidly with 500 ml of SO3-DMF solution (1.00 molar). The mixture is stirred in the cold for 10 minutes and then 9.14 g (125.0 mmol) of diethylamine is added. The stirring and cooling are continued for 10 minutes longer, when 400 ml of water is added to decompose the reaction complex. After mixing thoroughly, 200 ml of saturated aqueous saline solution is added. The amide product is isolated by repeated extraction with 500 ml portions of ethylene dichloride. the combined extract is dried and then concentrated to a syrup under reduced pressure. Do not heat up the syrup during concentration. the LSD may crystallise out, but the crystals and the mother liquor may be chromatographed according to the instructions on purification. Purification of LSD-25 The material obtained by any of these three preparations may contain both lysergic acid and iso-lysergic acid amides. Preparation #1 contains mostly iso-lysergic diethylamide and must be converted prior to separation. For this material, go to Step II first. Step I. Use darkroom and follow with a long wave UV The material is dissolved in a 3:1 mixture of benzene and chloroform. Pack the chromatography column with a slurry of basic alumina in benzene so that a 1 inch column is six inches long. Drain the solvent to the top of the alumina column and carefully add an aliquot of the LSD-solvent solution containing 50 ml of solvent and 1 g LSD. Run this through the column, following the fastest moving fluorescent band. After it has been collected, strip the remaining material from the column by washing with MeOH. Use the UV light sparingly to prevent excessive damage to the compounds. Evaporate the second fraction in vacuo and set aside for Step II. The fraction containing the pure LSD is concentrated in vacuo and the syrup will crystallise slowly. This material may be converted to the tartrate by tartaric acid and the LSD tartrate conveniently crystallised. MP 190-196 C. Step II. Use Red light Dissolve the residue derived from the methanol stripping of the column in a minimum amount of alcohol. Add twice that volume of 4 N alcoholic KOH solution and allow the mixture to stand at room temperature for several hours. Neutralise with dilute HCl, make slightly basic with NH4OH and extract with chloroform or ethylene dichloride as in preparations #1 or #2. Evaporate in vacuo and chromatograph as in the previous step. Note: Lysergic acid compounds are unstable to heat, light and oxygen. In any form it helps to add ascorbic acid as an anti- oxidant, keeping the container tightly closed, light-tight with aluminum foil, and in a refrigerator.

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