

SUGGESTIONS FOR A COURSE IN MICRO-ANALYSIS AND BACTERIOLOGY FOR COLLEGES OF PHARMACY.

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At the Detroit meeting of the American Conference of Pharmaceutical Faculties the writer made the following suggestion in the presidential address to the Conference, "That immediate steps be taken to arrange a course in pharmaceutical bacteriology (including sterilization, disinfection and zymology) and sanitation." In harmony with the thought expressed, the following detailed outline of courses is hereby submitted. This outline is based upon the work as carried out at the California College of Pharmacy where these branches of study have been taught for a period of five years to the students taking the regular third-year course. To complete such courses in one year, certain preparation is necessary, as the regular work in the microscopical examination of vegetable drugs and other vegetable substances, and a general course in bacteriology as is given in the regular two-year course in many of the leading colleges of pharmacy. The courses are to be suitably adapted to the correlated courses in chemistry, so arranging the apportionment of the time that twelve hours per week will fall to the work in microscopy and bacteriology and twelve hours to chemistry. The proposed courses, suitably modified and adapted, should also be added to the curriculum of Public Health courses in Medical Colleges and in Universities.

The outline is submitted in the hope that it will receive the attention of all instructors in Colleges of Pharmacy, and Colleges of Medicine and in Universities, who are interested in public health work. Comments and criticisms are solicited.

Part I—Microscopical.—The microscopical examination of fiber foods and drugs.

A laboratory course of four hours each week extending throughout the college year, supplemented by lectures, reviews and special reading and seminar work. The details of the course vary somewhat from year to year. The micro-analytical methods employed in the examination of foods and drugs are similar to those of the U. S. Food and Drugs laboratories, with desirable additions and changes.

I. Examination of Fiber.

1. Vegetable Fiber.
 - a. Cotton.
 - b. Paste Board. Wrapping Paper. Tissue Paper.
 - c. Newspaper, filter paper, etc.
 - d. Book-paper, Banknote, etc.
 - e. Writing Paper.
 - f. Cordage, thread, etc.
 - g. Cotton cloth. Mercerized Cotton Cloth.
 - h. Hemp Fiber and Cloth.
 - i. Linen Cloth. Linen tester.

2. Animal Fiber.
 - a. Human hair.
 - b. Hair of other animals. Wool. Bristle.
 - c. Woolen cloth.
 - d. Camel's hair. Alpaca. Mohair.
 - e. Silk fiber. Silk cloth.
 3. Mixed Fiber. Animal and Vegetable.
 - a. Government Note. Bank Note.
 - b. Felt Paper.
 - c. Shoddy.
 - d. Mixed cloth (wool and cotton).
 4. Inorganic Fiber.
 - a. Glass fiber. Glass wool.
 - b. Asbestos.
- II. Commercial Starches.
1. Corn starch, rice starch, wheat starch.
 2. Potato starch, sweet potato starch, banana starch.
 3. Arrowroot starches, etc.
- III. Dextrins. A comparative study is to be made in order to determine the source of the starch used, the degree and character of dextrinization, etc.
- IV. Starch Fillers. A study of starch fillers used in sausage meats.
- V. Ice Cream Fillers. Starch, Tragacanth, etc.
- VI. Flours and Meals.
1. Cereal Flours. A critical comparative study of wheat, rye, rice and barley grains and the flours made therefrom. Hand gluten test. Bamihl gluten test and Winton modification of the Bamihl test. Processed flour. Bleached flour and chemical test for bleached flour. Polished rice.
 2. Oat Meal and Corn Meal. A comparative study. Note the distinct polarizing bands of corn starch.
 3. Buckwheat flour. Italian Buckeye meal.
 4. Pancake flours. Mixed flours. Making estimates of the percentages of the different flours in the compound or mixture.
 5. Banana Flour. Squash meal, etc.
- VII. Comparative Study of Brans—wheat, rye, rice, barley, corn. Middlings.
- VIII. Cotton Seed Cake. Linseed Cake. A comparative study.
- IX. Prepared Starches, Flours and Meals.
1. Spaghetti, macaroni, noodles.
 2. Sago, etc.
- X. Bread and Pastry. Examined as to the identity of materials used, as to kind of flour used, etc.
1. Breads, biscuits, rolls, etc. Examination as to starch identification, use of mixed flours, absence or presence of yeast cells, etc.
 2. Cookies, cakes, "Arrowroot biscuit," etc.
- XI. Breakfast Foods. These are to be examined as to material used, ascertaining manner of manufacture and absence or presence of substances declared on the label.
1. Flaked corn and wheat.
 2. Rolled oats and wheat. Mixtures. Manner of manufacture. Chinese puffed rice.
 3. Puffed rice and wheat.
 4. "Cream of wheat," "Carnation mush," etc.
 5. Shredded wheat, "Grape nuts," etc.

XII. Baby and Invalid Foods. These are examined as to presence of flours, unaltered starch, as to identity of starch, use of cane or milk sugar, presence of dried milk, casein, etc.

1. Dried milk and casein. Pure and mixed.
2. Starchy baby foods.
3. Horlick's malted milk.
4. Borden's condensed milk. Evaporated milk.
5. Eskay's food.
6. Peptogenic milk powder, etc.

XIII. Spices and Condiments. These are examined as to identity and quality (organoleptic testing) and as to absence or presence of adulterants. Samples are secured in the open market, from grocers and from pharmacists.

1. Capsicums—Hungarian, American, Mexican, etc.
2. Pepper—Black and white. Processed white pepper (bleached).
3. Allspice and allspice stems.
4. Cloves and clove stems. Exhausted cloves.
5. Nutmeg. Mace. Cinnamon.
6. Mustard. Prepared mustards.
7. Herb Condiments—Marjoram, sage, etc.
8. Umbelliferous spices. Curry powders.

XIV. Dairying Products.

1. Milk. A critical comparative study of normal cow's milk, pasteurized milk, boiled milk, evaporated milk and condensed milk, including bacterial content, presence of pus and blood corpuscles, sediment, etc.
2. Sour milk, klabbered milk, buttermilk.
3. Cream. Whole milk. Half milk. Skimmed milk.
4. Butter and butter substitutes.
5. Cheese and cheese parasites.

XV. Home Drinks.

1. Coffee. The normal and roasted bean. Ground coffee. Coffee substitutes. Dekofa. Cereal coffee. A careful study of round coffees and their more common admixtures and adulterants. A study of coffee substitutes as to composition.
2. Teas. Qualities and grades. Government standards and tests. Tea culture in the United States.
 - a. Coloring substances. Reed test. West test.
 - b. Adulterants. Exhausted tea. Japanese false tea. Foreign leaf, etc.
 - c. Tea substitutes.
3. Cocas and Chocolates.
 - a. Cocoas and Chocolates. Methods of manufacture.
 - b. Cocoa shells.
 - c. "Soluble cocoas."
 - d. Cocoa butter.
 - e. Adulterants.

XVI. Food Products, Vegetable and Animal. Samples are secured from private homes, grocers and canneries. They are examined as to identity, quality and purity and the findings recorded on special report cards. In the examination of these products the polarizer, the micrometer scale, the Thoma-zeiss hemacytometer (Turck ruling) and other necessary apparatus, are used. The Lagerheim sublimation tests for benzoic acid and salicylic acid and the curcuma thread test for boric acid and the starch paper test for sulphurous acid, are used.

1. Canned meats. Canned fish. Anchovy pastes, etc. Examine for mold and bacterial contamination and the presence of preservatives.
2. Sausage meats. Examine for starches and starch fillers, preservatives and coloring substances.

3. Jams and jellies. Examine as to identity, use of green fruit, fruit refuse, preservatives, yeast, bacteria and mold.
4. Catsups and tomato pastes. Examine for preservatives, mold, bacteria and yeast cells, tomato refuse, etc.
5. Preserved and Pickled Fruits. Examine for bacterial and yeast contamination ("Swells" and "Leaks"), for sulphurous acid (bleached fruits), and preservatives.

XVII. Candies. Qualities and grades. These are to be examined for various fillers (starch, flour), nature of coating, coloring substances, impurities, etc.

1. Stick candies. Nut candies.
2. Coated candies. Chocolate candies.
3. Gum drops, cough drops, caramels.
4. Licorice sticks, etc.

XVIII. Vegetable Drugs, Crude and Powdered. Compound Powders, Pills, Tablets, Extracts. Samples are donated by retail and wholesale druggists or purchased in the open market. These are examined as to quality and purity, ash content (including acid insoluble ash), fineness of powder, organoleptic characters, etc., and the findings entered upon special report sheets.

1. Powdered Vegetable Drugs.
2. Compound Powders. Dusting Powders. Face Powders.
3. Cattle powders.
4. Poultry powders.
5. Extracts, solid and fluid.
6. Medicinal Teas.
7. Pills.
8. Tablets.
9. Crude drugs. Pressed herbs.
10. Patent and proprietary preparations of an organic nature.
11. Calomel, Charcoal, Mercury, Sulphur.
12. Pastes, Plasters, Ointments.
13. Snuffs, Tobaccos.
14. Unknowns.

The sequence of the several operations of the complete analysis of a sample of powdered vegetable drug may be given as follows:

1. Noting the condition of the seals of the sample or package. Breaking the seals.
2. Thoroughly mixing the sample. Selecting an average sample.
3. Organoleptic testing (consistency or feel, color, odor, taste).
4. Determining the fineness by means of a suitable nest of sieves.
5. Preliminary examination of the average sample and of the samples upon the different sieves, using pocket lens, tweezers, etc. Organoleptic testing of individual fragments, etc.
6. Special examination (macroscopical and microscopical) of the several portions on the different sieves if thought desirable or necessary.
7. Again mixing the several portions on the several sieves and reducing to uniform fineness, if thought desirable or necessary.
8. Complete and thorough microscopical examination.
9. Ash determination if thought desirable.
10. Acid insoluble ash determination if thought desirable.
11. Special tests if thought desirable.
12. Recording the results of the analysis.

(To be continued.)