Pimenta.—The valid designation for this is *Pimenta Pimenta* (Linné) Karsten.

Sassafras Medullæ.—The valid name for this product is *Sassafras Sassafras* (Lin.) Karsten.

Succus Citri.—The words "Linné" and "variety" or "var." should be inserted between "*Medica*" and "*acida.*" Bonavia named and described a variety, not a subspecies. The word "medica" is a proper name derived from Media, and should be capitalized; also to distinguish it from "medica" referring to use as a medicine.

Terebinthina Laricis.—The proper designation of the species producing this drug is *Larix Larix* (Linné) Karsten.

Verbasci Folia.—Besides *Verbascum Thapsus* Linné, this drug is allowed to be derived from "other species of verbascum." Since the genus contains 200 or more species of wide variation in the physical, and probably in the therapeutic properties of the leaves, it would seem to be more appropriate to limit the drug to *Verbascum Thapsus.*

Xanthoxyli Fructus.—The generic name should be spelled with an initial Z instead of an X.

In order to restore the earliest family name used and to have them all end in "aceæ" the following changes should be made:

Fagaceæ	to	Castaneaceæ	Labiatæ	to	Labiataceæ
Moraceæ	to	Lupulaceæ	Rubiaceæ	to	Aparinaceæ
Polygonaceæ	to	Persicariaceæ	Cucurbitaceæ	to	Bryonaceæ
Euphorbiaceæ	to	Tithymalaceæ	Compositæ	to	Compositaceæ
Terebinthaceæ	to	Pistaciaceæ	Leguminosæ	to	Leguminaceæ, Krameriaceæ, Lomentaceæ
Rhamnaceæ	to	Zizyphaceæ			
Sterculiaceæ	to	Cacaoceæ			
Araliaceæ	to	Hederaceæ	Rosaceæ	to	Rosaceæ, Pomaceæ, Drupiferaceæ
Umbelliferæ	to	Umbellataceæ			
Oleaceæ	to	Jasminaceæ	Celastraceæ	to	Arillataceæ
Loganiaceæ	to	Strychnaceæ	Ericaceæ	to	Monotropaceæ

For assistance in bibliography my thanks are due to Dr. N. L. Britton, of the New York Botanical Garden; Dr. F. V. Coville, of Washington, D. C.; Dr. J. A. Nieuwland, of Notre Dame, Ind.; and to Miss Edith Wycoff, of Cincinnati, O.

ON THE USE OF TRYPSIN PREPARATIONS.

BY J. H. LONG.

Trypsin preparations have found some use in medicine for many years, and mostly in the way of internal administration. This use is greatly limited by the low digestive value of the products that have been available up to the present time, which, with a few exceptions, have been weak.

In the manufacture of digestive ferments the production of trypsin has not kept pace with that of pepsin, the practical isolation of which on the commercial scale has reached a remarkable degree of thoroughness. Indeed, it seems now to be the custom among the leading manufacturers of pepsin to make first a prod-

uct of far greater strength than that required by the Pharmacopoeia and dilute it down to a constant value, as needed, by the addition of some inert substance.

Nothing of the sort has happened with trypsin. A very limited number of manufacturers, here and abroad, have attempted to put on the market a reasonably strong product under the name of trypsin, but many so-called pancreatins have been made, the activity of which is amylolytic rather than proteolytic. The assay method of the Pharmacopoeia is directed practically to the determination of the starch-converting power of the pancreatin, while the milk peptonizing test is merely a limit test, and a very unsatisfactory one at that. A stimulating service might be rendered if the Pharmacopoeia were to call for a more stringent proteolytic test than the alteration of the casein in 400 Cc. of milk by 0.28 Gm. of pancreatin in half an hour. The test is based on the assumption that market milk contains 3.5 percent of casein, which, however, is not the case, as milk is now produced for fat value rather than for total solids or casein. With the average market milk compliance with the test would simply indicate that one part of pancreatin is able to convert about 40 times its weight of casein to the stage where it is not coagulated by acetic acid, and this is a low requirement because only superficial alteration of the casein is required to exhibit this change in behavior.

The practical value of the great mass of these pancreatins is questionable, because of their low degree of activity. Of the actual concentration of the pancreas enzymes in the intestine we know but little and it is possible that there are times when the ingestion of the ferment might be of great service. Of the limited use for pepsin there can be no doubt, since abundant observations of stomach contents in recent years have shown that the ferment is practically always present. The lack of acid is far more frequent. But failure in the proper functioning of the pancreas, as far as the secretion of ferments is concerned, is not rare and hence the therapeutic use of commercial ferments.

This brings up the question of the administration, which, from several points of view, is an important one. To be of use as aids in intestinal digestion pancreas ferments given by the mouth must pass through the stomach. It has been long held that trypsin and amylopsin suffer deterioration or even destruction in contact with the gastric secretion through the action of acid and pepsin. This view seems to be based largely on statements of Kuehne and other earlier workers and it is only in recent years that the question has been more closely studied. In our laboratory much attention has been given to the problem and the following facts have been brought out:

a. It is necessary to distinguish between the action of acid alone on trypsin and acid plus pepsin.

b. When digested at body temperature with low concentrations of hydrochloric acid trypsin is practically not much weakened, even when the duration of the incubation is extended through an hour, with the concentration of the "free" acid from 0.2 to 0.3 percent.

c. The case is very different, however, with pepsin present. Acid and pepsin working together on trypsin have a marked weakening action which may be easily shown by experiment.

d. But if the action of the pepsin and acid on trypsin is allowed to take place in the presence of a sufficient amount of protein the destructive effect is much less

marked and a large part of the trypsin may be left little diminished in strength, and capable of further action under proper conditions.

The explanation of these differences is simple enough. Protein is not the inert neutral substance the earlier physiologists assumed it to be, but, because of its peculiar structure, may be very active in binding either acid or alkali. A gramme of egg albumen or meat protein will hold 60 milligrammes or more of hydrochloric acid in amino acid salt combination. When protein is mixed with not more than 3.5 percent of its weight of acid in aqueous solution, pepsin present will have almost no effect in the way of digestion; with 6 percent the digestion is slow, while with 10 percent the digestion is rapid, provided the dilution is such as to not lower the hydrogenion concentration too much. A certain value of the hydrogen concentration is necessary for the activation of pepsin and if this does not obtain, protein will not be digested nor trypsin destroyed by the combination of acid and pepsin.

From this it would appear that trypsin administered by the mouth might readily persist in the stomach and pass through into the duodenum. Under certain limited conditions this is true, but a proper balance between acid and food protein would have to hold. In the absence of the right amount of protein the acid and pepsin would destroy much of the trypsin and the same thing would hold for the amylopsin.

With these facts in mind it must certainly appear irrational to administer the shot-gun combination found in a number of mixed ferment preparations which seem to be put together without much regard to the work supposed to be accomplished by them. I cannot agree with Mr. Beringer in his defense of the formulas of the National Formulary III.[1] In the Compound Elixir of Pepsin we have along with 10 Gm. of pepsin, 1 Gm. of pancreatin, 1 Gm. of diastase (whatever that may be practically), and 1 Cc. of hydrochloric acid with approximately 360 mg. of the real acid. As the protein of the pepsin is often pretty fully saturated with acid this combination is such that the activity of the trypsin and amylopsin would be greatly impaired by the mixing operation. But worse than this is the small proportion of the pancreatin present. In the finished product there is a milligramme to the cubic centimeter, while the dose is 8 Cc. This mixture may have some value as a pepsin product or as a vehicle, but the "compound" part of it is utterly absurd. Mr. Beringer complains that it was dropped from the National Formulary. It should never have been in there to begin with, because it is irrational. The Compound Powder of Pepsin is nearly as bad. While the dose of pancreatin provided for is greater, it is still too low to have therapeutic value, and the acid, not finding enough protein to bind it properly, would unquestionably weaken the ferments other than the pepsin on standing.

Mr. Beringer finds fault with the American Medical Association because it condemns such mixtures, which he seems to think should be retained since they were extensively prescribed. This is not a sound argument. In the last two thousand years many things have been extensively prescribed which had no value whatever, and alas! this ignorant prescribing is still going on.

These mixtures, and similar ones, have been condemned because the amounts of trypsin or other pancreas ferment they contain are far too small to have any appreciable therapeutic value, even supposing the trypsin and amylopsin in them

[1] JOURNAL A. PH. A., April 1917.

to remain active, which under the ordinary conditions of prescribing is extremely doubtful.

Trypsin is indeed more stable in presence of acids than was formerly supposed, as several series of investigations from this laboratory have shown. But the practical conditions under which it can pass the stomach have to be carefully observed, and when administered at all this should be with the fewest possible complicating conditions. A few milligrammes of trypsin can have at best but a vanishing effect. Large doses given at the right time may reasonably be expected to have therapeutic value, and prescribing should naturally have this end in view. As made at the present time, the pancreatins and their various combinations have no proper place in rational medicine, as proteolytic agents. There is here great room for improvement.

ASSAY OF GLYCERIN.

A BELATED CORRECTION.

BY A. B. LYONS.

Three years ago F. T. Bradt read a paper before the American Pharmaceutical Association, published in their JOURNAL, January 1915, proposing a simplified form of the Hehner assay for glycerol. Hehner had employed as an oxidizing agent a volumetric solution of potassium dichromate made of such strength that one mil corresponded to exactly 0.01 Gm. of glycerol. It contained therefore in each liter "about" 74.86 Gm. [theoretically 74.567 Gm. (O = 16)] and 150 mils of strong sulfuric acid. The strength of the solution was adjusted by titration against a volumetric solution of ferrous ammonium sulfate.

The assay was made by placing in a clean beaker an accurately weighed portion of the sample (about 0.4 Gm.), adding 50 mils of the volumetric dichromate solution together with about 15 mils of strong sulfuric acid, covering the beaker with a watch glass and heating two hours on a boiling water-bath. The excess of dichromate was then determined in the cooled solution by titration with a volumetric solution of ferrous ammonium sulphate, after which calculating of the amount of glycerol was a simple matter.

Mr. Bradt's suggestion was to use for the oxidizing agent the official potassium dichromate V. S., of which one mil will correspond with 0.00065757 Gm. of glycerol. The excess of dichromate was determined by adding to the solution potassium iodide and titrating the iodine set free with sodium thiosulphate V. S. The directions for the assay are in detail: weigh out accurately five grammes of the sample of glycerin, dilute with distilled water to exactly one liter, and take for titration exactly five mils of the solution (equivalent to 25 milligrammes of the sample). Add 50 mils of tenth-normal potassium dichromate V. S. and 25 mils of strong sulphuric acid and heat in a suitable flask twenty minutes in a steam bath. Cool, add 1 Gm. potassium iodide (free from iodate); after standing ten minutes dilute with 100 mils of water and titrate the liberated iodine with tenth-normal sodium thiosulphate V. S.

Subtract the number of mils of the thiosulphate solution required from 50, multiply the remainder by 2.6303 for percentage of glycerol in the sample. (This