PHILIPPINE GINGER.*

BY PATROCINIO VALENZUELA.

Zingiber officinale Roscoe = *Amomum Zingiber* Linn.
Zingiber zingiber Karst. = *Zingiber Blancoi* Hassk.

Philippine Synonyms:
- *Luya*—Tagalog.
- *Laya*—Bicol.
- *Baseng*—Ilocano.
- *Layal*—Zambales, Ilocano.

The ginger plant growing in the Philippines has been identified by Blanco (1) in his "Flora de Filipinas" as *Amomum zingiber* Linn. Hasskarl (2) in attempting to interpret Blanco's species from the description, proposed the name of *Zingiber Blancoi* Hassk. for ginger in the Philippines. Merrill (3), however, who has made an extensive study of the Philippine flora verified that Blanco correctly interpreted the Linnean species which is the same as *Zingiber officinale* Roscoe. According to Merrill, Blanco's description typifies *Zingiber Blancoi* Hassk. He (4) also believes that ginger in the Philippines has originated either from the Orient or Europe and was purposely introduced into the archipelago for its use as condiment. Thus he includes ginger among the different species which have been introduced by men either in prehistoric or within historic times.

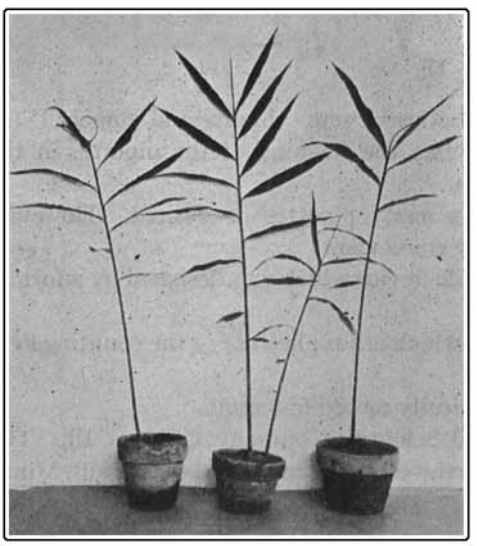

Fig. 1.—Plants raised in the green house of the Biology Bldg. from rhizomes of Lot III.

The plant abounds in all parts of the islands and is found cultivated by the natives in small patches for local demand. Its rhizome is very much used as a condiment in several native dishes, so much so that it is easily obtained in the city as well as the town markets. However, it is not cultivated on a large scale either for export purposes or for home consumption as a drug.

A decoction of ginger flavored with brown sugar is very commonly prepared as a drink. It is known by the name, *Tahû* as called by the Chinese. This is considered as an excellent aromatic, tonic, stomachic and stimulant and Pardo de Tavera (5) believes that it would probably be highly useful as well as economical as a part of the ration of European and native troops in the field. He also states that hot *Tahû* is an active diuretic and during the cholera epidemic in Manila some physicians used it with very satisfactory results.

Statistics regarding the importation of the drug ginger into the Philippines

* Part of a thesis submitted for the Degree of Doctor of Philosophy, Pharmacy as major, at the University of Wisconsin, June 1926.

are not available. According to the Director[1] of the Bureau of Commerce and Industry of the Philippine Islands, ginger is regularly imported from China (6).

Inasmuch as ginger is a drug of importance, not only in the Philippines but through the world, being official in all the editions of all national pharmacopœias, except the second edition of "Pharmacopœia Austriaca" the "Ph. Romana," the fourth edition of "Farmacopea Ufficiale del Regno d'Italia," and the "Ph. Serbica," this study is, therefore, undertaken to ascertain whether the cultivation and preparation of ginger in the Philippines would be advisable not only for its consumption as a condiment but as a drug as well.

Although a voluminous bibliography has been compiled in the review of the literature of ginger at large, yet very little, it was found, has been done on the phytochemical study of the rhizome of the plant grown in the Philippines. So far, Bacon's work (7) on the Philippine terpenes and essential oils is the only study which is recorded in the literature that includes the essential oil obtained from Philippine ginger. He reported that a yield of 0.072 per cent of light yellow oil having an odor of ginger and also a strong odor very much like that of orange peel oil was distilled by him. Lately a report of the Bureau of Science (8) of the Government of the Philippine Islands, gave the following results for the analysis of Philippine ginger:

	I ("Larger variety")	II ("Finer variety")
Ash	7.9 per cent	5.4 per cent
Alcohol extract	7.02 per cent	8.50 per cent
Ether extract	5.98 per cent	5.99 per cent

Adriano and Tavanlar (9) in their recent study of the calcium oxide content of some Philippine foods, reported 70.18 per cent moisture, 1.22 per cent ash, 1.27 per cent CaO in ash corresponding to 0.05 per cent in the dried material and to 0.026 per cent in the material containing 70 per cent of moisture.

Wells (10) has pointed out the commercial possibility of ginger cultivation in the Islands.

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(1) "Flora de Filipinas. Segun el Sistema sexual de Linneo." Por el P. Fr. Manuel Blanco, Agustino Calzado, 1837. (E. D. Merrill, *Species Blancoanae* p. 7 (1918).)

(2) M. Blanco, "Flora de Filipinas," übersetzt und kritisch beleutet von J. K. Hasskarl. (E. D. Merrill, *Species Blancoanae* p. 22 (1918).)

(3) *Ibidem*, p. 110.

(4) E. D. Merrill, "Notes on the Flora of Manila with special reference to the introduced element," *Philippine J. Sci.*, 7C, 192 (1912).

(5) T. H. Pardo de Tavera, "The Medicinal Plants of the Philippines" (1892), Trans. by J. B. Thomas p. 228 (1901).

(6) Correspondence from Director Reyes of the Bureau of Commerce and Industry, Manila, October 12, 1925.

(7) R. F. Bacon, "Philippine Terpenes and Essential Oils," *Philippine J. Sci.*, 5A, 259 (1910).

(8) *Loc. cit.*

(9) F. T. Adriano and E. J. Tavanlar, *Philippine Agr.*, 14, 347 (1925).

(10) A. H. Wells, Unpublished article read at the Chemistry Section of the Second Philippine Pharmaceutical Convention, Manila, 1923.

HISTOLOGICAL STUDY.

The cross sections of the freshly dug rhizomes of Philippine ginger cultivated

[1] Thanks are due to Director Reyes who has kindly given this and other information.

in the biological green-house were examined. A study of the sections did not reveal any difference in the anatomical structures as compared with the descriptions and illustrations in literature. (1)

The possible localization of the pungent principles, at least of zingerone in the various sections, was tried by means of Millon's reaction. The sections were colored as observed in the microscopical test with Millon's reagent, but closer microscopical examination of the colored portions under high power revealed that the portions intensely colored are the cell walls of the vessels. In view of the doubt-

Philippine ginger—Zingiber officinale Roscoe.

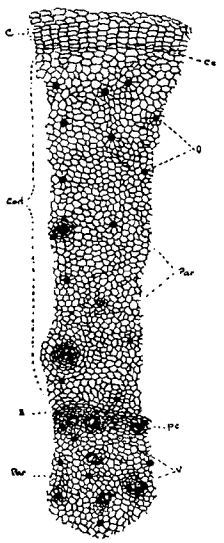


Fig. 2.

Fig. 2.—Cross section of fresh rhizome. *C*—cork; *Cc*—cork cambium; *O*—oil cells; *Cort*—cortex; *E*—endodermis; *V*—vessels; *Par*—parenchyma; *Pc*—pericycle.

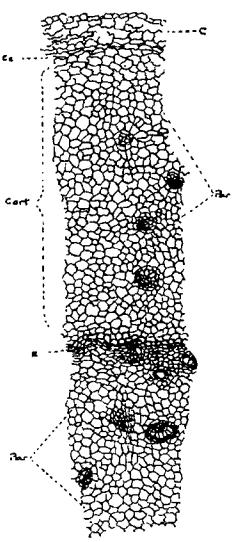


Fig. 3.

Fig. 3.—Cross section of young rhizome. *C*—cork; *Cc*—cork cambium; *Cort*—cortex; *Par*—parenchyma; *E*—endodermis.

Philippine ginger—Zingiber officinale Roscoe.

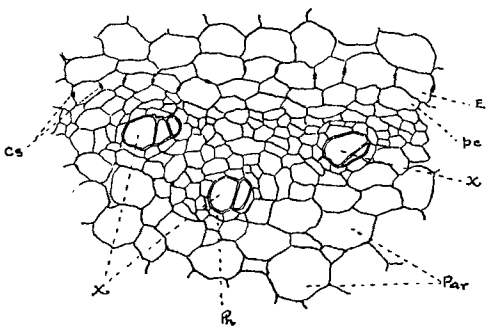


Fig. 4.—Endodermal region from a cross section of young rhizome. *E*—endodermis; *Cs*—casparian strips; *Pc*—pericycle; *X*—xylem; *Ph*—phloem; *Par*—parenchyma.

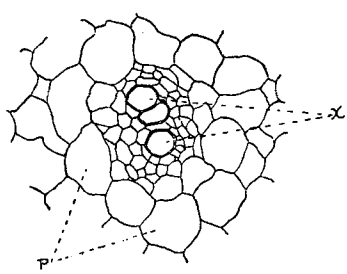


Fig. 5.—Fibrovascular bundle from a cross-section of young rhizome. *X*—xylem; *P*—parenchyma.

ful occurrence of the principles in these portions of the tissues, further study was not made.

Microscopical study of the anatomical structure of the rhizomes was made from several cross and longitudinal sections of both old and young rhizomes. These sections were permanently mounted by means of the paraffin method according to the schedule of Prof. Kraus. (2) Portions of the freshly dug rhizomes from the green-house were placed in solutions enumerated below for the specified time.

70 per cent alcohol	12 hours	1/3 alcohol 2/3 chloroform	12 hours
85 per cent alcohol	12 hours	Chloroform	12 hours
95 per cent alcohol	12 hours	Chloroform and parowax	Cold
Absolute alcohol	12 hours	On oven	6 to 12 hours
2/3 alcohol 1/3 chloroform	12 hours	In oven	12 hours

Parawax renewed several times until free from chloroform.

After the rhizomes had undergone the above treatment, they were imbedded in paraffin and blocked. Several sections (longitudinal and cross) were made and fastened on slides by means of Mayer's Fixative.

STAINING OF THE SECTIONS.

The removal of the paraffin was accomplished by immersing the slides several times in xylene for a few minutes after which the sections were dried by repeated immersion in absolute alcohol.

From this dehydrating agent, the slides were transferred to safranin and left in this staining solution over night. After the safranin treatment they were washed with water, immersed quickly and for a very short time in acid solution, then in alcohol and xylene. They were then stained with gentian violet, in the solution of which, the slides were left from 3 to 4 hours and permanently mounted with Canada balsam. Different shades of the stain were obtained by changing the length of time in the staining and washing processes.

The various sections drawn from the selected slides are shown in Figs. 2 to 8.

HISTOLOGY.

The various tissues of the whole rhizome consist mainly of (1) epidermis, (2) cork, (3) cortex, (4) endodermis, (5) fibrovascular bundles, (6) oil secretion cells and (7) parenchyma.

1. *Epidermis.*—This is shown in the young rhizomes. It was absent in the sections from the old rhizomes, presumably destroyed by secondary growth. It consists of a layer of flattened thick-walled cells somewhat smaller than the cork cells. Under the epidermis are a few layers of parenchyma cells.

2. *Cork.*—It consists of slightly flattened, thin-walled cells extending radially towards the epidermal region. Figs. 2 and 3 show the cork including cork cambium.

3. *Cortex.*—This consists of a layer of cells chiefly of parenchyma. Numerous oil secretion cells and fibrovascular bundles are distributed throughout the cortex. It is narrow as compared with the steele. According to Tschirch and Oesterle (3), the narrowness of the cortex and the relative number of fibrovascular bundles are rather characteristic of ginger. Figures 2 and 3 show the cortex (cort.) with the oil cells (*o*) fibrovascular bundles and parenchyma (*p*). The parenchyma cells are similar to those in the steele, those occurring in the middle portions of the cortex being relatively larger than those nearer the endodermis and cork. They are much larger than those of the other tissues.

4. *Endodermis.*—The rather thin-walled cells are elongated, somewhat elliptical and very much smaller than the neighboring parenchyma of the cortex. The end walls of the endodermis show very clearly in cross-section small glistening pinkish dots known as the Casparian dots, or Casparian strips (4). See Figs. 4, 6 and 7. The endodermal cells do not contain starch grains. The pericycle (*Pc*) is found below the endodermis. It consists of cells resembling those of the endodermis except that there are no Casparian strips and its cells appear to be living.

5. *Fibrovascular Bundles.*—Although scattered throughout the cortex and the steele, they are especially numerous under the endodermis. The vessels are broad,

with reticulated thickenings occurring mostly 2 or 3 in each bundle. They are accompanied by long and broad fibers. Companion cells are also found with the vessels.

Philippine ginger—Zingiber officinale Roscoe

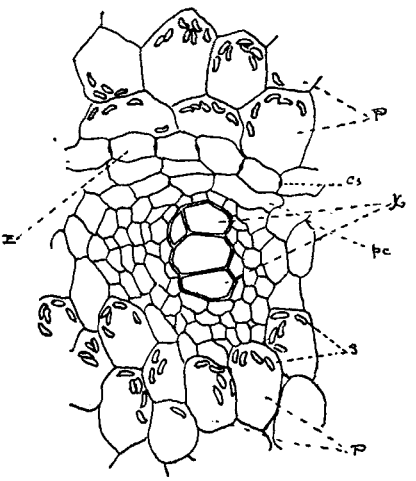


Fig. 6.—Endodermal region from a cross section of old rhizome. *E*—endodermis; *X*—xylem; *P*—parenchyma; *S*—starch granules; *Cs*—casparian strips; *Pc*—pericycle.

Philippine ginger—Zingiber officinale Roscoe.

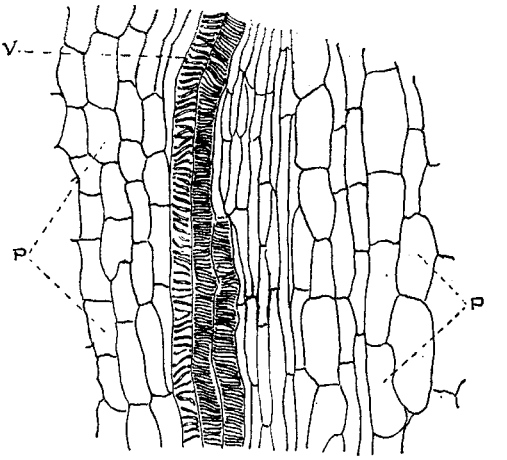


Fig. 8.—From a longitudinal section of old rhizome *V*—vessels; *P*—parenchyma.

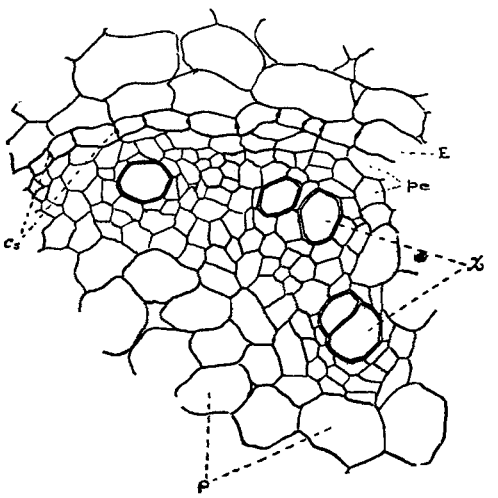
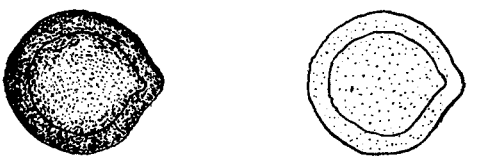


Fig. 7.—Endodermal region from a cross-section of young rhizome. *E*—endodermis; *X*—xylem; *P*—parenchyma; *Cs*—casparian strips; *Pc*—pericycle.



A *B*

Fig. 9.—*A*.—A cross-section of rhizome treated with guaiac and H_2O_2, natural size. *B*.—Section untreated, natural size.

A *B*

Fig. 10.—*A*.—A cross-section of a root treated with guaiac only, natural size. *B*.—Section untreated, natural size.

6. *Oil Secretion Cells*.—These cells are slightly smaller than the average parenchyma cells. They contain a yellowish green oil. Their occurrence in the section is indicated in Fig. 2, drawn from a cross-section of fresh rhizome.

7. *Parenchyma.*—This forms the largest part of both cortex and steele. The cells are thin-walled and much larger than the other cells. In the cortex, as already mentioned above, the middle parenchyma consists of relatively larger cells. In the old or mature rhizomes (see Fig. 6) the parenchyma cells contain numerous starch grains. The starch grains are hardly differentiated from those occurring in other varieties of ginger. They are simple, flattened, somewhat elongated and ovate with tapering point at one end. The hilum is hardly distinguishable.

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(1) A. Tschirch and O. Oesterle, "Anatomischer Atlas" (1893) Tafel 26; L. Koch, "Pharmakognosticher Atlas," Bd. I (1911) Tafel 24; L. Reuter, "Traité de Matière Médicale," p. 147 (1923); A. L. Winton, J. Moeller and K. B. Winton, "The Microscopy of Vegetable Foods," 2nd ed., pp. 600–601 (1916).

(2) The writer gratefully acknowledges the kind suggestions of Prof. E. J. Kraus of the Botany Department, under whose directions this part of the work was undertaken.

(3) A. Tschirch, and O. Oesterle, "Anatomischer Atlas," Tafel 26 (1900).

(4) A. J. Eames and L. H. MacDaniels, "An Introduction to Plant Anatomy," pp. 101–102 (1925).

PHYTOCHEMICAL STUDY.

Material. I.—The preliminary work was conducted with material obtained in a fresh state by parcel post from Manila through the kindness of the Director of the School of Pharmacy of the University of Philippines. Whereas some of the rhizomes had become soft due to partial rotting, a number of them were quite firm and showed no indications whatever of decay. Inasmuch as the shipment required about a month, the antiseptic qualities of some of the constituents must be truly remarkable.

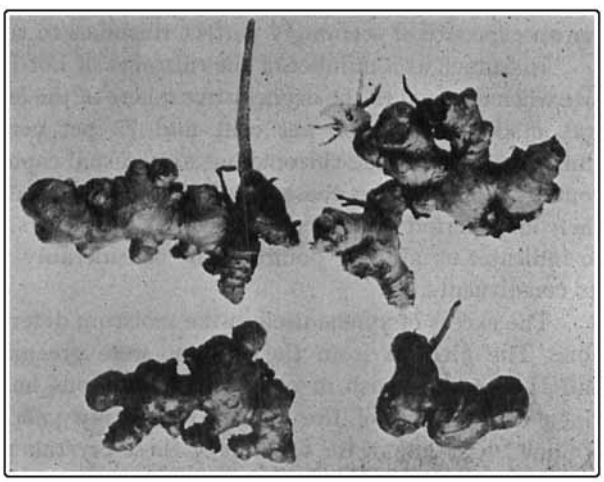

Fig. 11.—Rhizomes from plants (Fig. 1) one month after the overgrown portions had died off. (Lot III.)

II.—A second lot was obtained from the University of the Philippines through the Bureau of Supplies of the Government of the Philippine Islands. In two large cases this material was shipped from Manila December 11, 1924, and received at Seattle, January 14, 1925. Owing to government red tape, the cases were not delivered at Madison until April 2, 1925. As can be imagined, some of this material had softened and showed other signs of decay. The bulk of this material, however, was subjected to extraction with alcohol.

III.—Because of the delay in the shipment of the second lot, a third but much smaller lot was purchased in the Divisoria Market in Manila by Mrs. E. C. Valen-

zuela and brought by her with the least possible delay to Madison. It arrived in perfect condition.

Moisture Determination.—The xylene method was employed,[1] 10 grams of thinly sliced rhizome and 100 to 150 cc. of xylene being used for each determination.

I.—86.50 per cent and 85.00 per cent, respectively, of moisture were found. The filtrate of the residual xylene was yellow.

II.—Owing to the unsatisfactory condition in which this material arrived a number of determinations were made, yielding, as might be expected, more or less divergent results, *viz.* 80.0, 87.0, 79.0, 84.5, 87.0, 86.0, 82.0, 87.0, 85.0, 82.0 per cent or an average of 83.95 per cent.

III.—Three determinations yielded 75 per cent, 78 per cent, and 73 per cent respectively, or an average of 75 per cent.

After two days, during which the unpacked rhizomes were exposed to room temperature, three additional determinations were made yielding 70 per cent, 70 per cent and 69.5 per cent respectively, an average of practically 70 per cent. This is also in agreement with the results of the three analyses of Adriano and Tavanlar (*loc. cit.*).

A comparison of the averages of the three Lots, *viz.*, 85.8 per cent for the first, 83.9 per cent for the second, and 75.0 per cent for the third, would seem to indicate that the partial decay of some of the rhizomes in closed packages during shipment was the cause of the high moisture content of Lots I and II. Hence, 75 per cent may be assumed, for the present at least, as coming nearer the normal moisture content of the rhizomes as dug. A loss of about 5 per cent of moisture is recorded for an exposure of seemingly perfect rhizomes to room temperature for 2 days.

Inasmuch as a number of the rhizomes of Lot III produced buds of appreciable size when exposed to the drying atmosphere of the laboratory, a third determination was made. Sixty-nine per cent and 72 per cent respectively were obtained, thus showing that the rhizome has an unusual capacity for holding on to its water content. That under these conditions the rhizomes did not rot completely during their long period of shipment in closed containers is remarkable and would seem to indicate, as already pointed out, considerably preservative power of some of its constituents.

The excess of xylene used in the moisture determinations was filtered off while hot. The filtrates from the last lot were greenish, whereas those from Lots I and II were yellowish in color. The solutions had the pungent taste of ginger. Upon evaporation of the hydrocarbon, tiny yellowish needle-like crystals were obtained. Although the amount of these crystals was too small for further work, yet their study would perhaps be worth while.

Ash Determination.—The following results were obtained:

Lot I.	I.	II.
Total ash	11.97 per cent	11.88 per cent
Insoluble ash	5.42 per cent	5.48 per cent
	6.55 per cent	6.40 per cent
Lot II.	I.	II.
Total ash	5.67 per cent	5.87 per cent
Insoluble ash	1.68 per cent	1.93 per cent
	3.99 per cent	3.94 per cent

[1] *Circ.* 134, U. S. Dept. Agri. (1908).

In Lot I the ash had a greenish color. In the case of the Lot III, the ash had also a greenish color, although not to the extent of imparting this tint to the solutions of soluble ash as had been observed in the ash determination of Lot I.

The high percentage of all three kinds of ash in the Lot I is noteworthy. The yield, however, of the ash in the Lot III was not as high. It is within the pharmacopœial requirements as well as within the average yield of ash of good samples of ginger obtained in the market. The unusually high percentage of ash in the Lot I cannot be explained.

Oxidase Test.—Qualitative tests for oxidase with the aid of tincture of guaiac were tried on freshly cut rhizomes of Lot III. Practically no change in color was observed. However, a positive test was obtained later with material that had been kept under green-house conditions. Apparently the oxidase had been destroyed during transportation.

Microscopical and Macroscopical Color Tests.—In studying the properties of zingerone, Nomura[1] found that it gives a red coloration with Millon's reagent, dissolves to a green-colored solution with alcoholic ferric chloride, and reduces ammoniacal silver nitrate solutions on warming. Apparently this behavior is due to the phenolic character of zingerone. Based upon these color reactions of zingerone, the possibility of testing sections of ginger rhizomes with these reagents was tried. Thus, sections of the rhizomes of Lot III were tested with Millon's reagent and alcoholic ferric chloride. The sections immediately acquired a pinkish coloration throughout. A more intense coloration was found around the endodermal region, especially the cells around the vessels near the endodermis. Very slight greenish coloration was observed in case of ferric chloride. The tests were carried further macroscopically by placing the dried rhizome in fine powder in a porcelain test tablet and testing with the same reagents used above. The pink coloration caused by Millon's reagent was again observed. In case of ferric chloride, the change was not so decisive.

Moisture and Ash Contents of Fresh Rhizomes.—Since a variation of results has been observed in the moisture content of the rhizomes shipped from Manila, analyses were made of the recently dug rhizome from the ginger plant grown in the green-house.

Material.—The rhizome used was the one yielded by the plant after the overground stems had withered and which remained in the pot one month after the withering of the stems. This rhizome was thoroughly washed and then allowed to dry spontaneously at room temperature.

Moisture Determination.—The xylene method was employed. Ten grams of thinly sliced rhizome and 150 cc. of xylene were used for each determination. Seventy-nine and one-half per cent and 80.00 per cent, respectively, were obtained in two determinations.

The excess of xylene was filtered while hot. The filtrate was greenish, pungent and after evaporation of the hydrocarbon yielded 0.198 per cent and 0.200 per cent of yellowish residue with tiny needle-like crystals.

The average moisture content of 79.75 per cent obtained from the fresh rhizome may be considered as its normal water content. Thus, referring back to the per-

[1] *J. Chem. Soc. Trans.*, 111, 771 (1917).

centages of moisture, yielded by the first and second lots shipped from Manila *viz.* 85.8 per cent and 83.9 per cent, the present results from the fresh rhizome corroborate the assumption that the excess of water might have been due to partial decay.

Ash Determination.—The ash content of the rhizome obtained from the same plant referred to above is as follows:

	I.	II.
Total ash	6.29 per cent	6.10 per cent
Insoluble ash	2.30 per cent	2.40 per cent
	3.99 per cent	3.70 per cent

Oxidase Test.—The test for oxidase[1] was made on the fresh rhizome and root immediately after these had been dug and thoroughly washed. The surface of the fresh sections was covered with a recently made and weak solution of guaiac resin in absolute alcohol. After a short while the rhizomes became decidedly blue, the color being more intense in the cortical region. The coloration started first near the periderm and then continued to spread throughout the section. The addition of a drop of hydrogen peroxide caused the color to become more intense.

Similar tests were made on sections of the root. Positive results were also obtained, the blue color being very intense at the pith which, when cut, exudes milky juice.

Pungency.—The rhizomes used in this experiment were those of the third lot which had been allowed to stand in the laboratory for thirty-five days. Four different samples were prepared from these rhizomes. 1. Peridermal portion. This constitutes the peelings (periderm) of the rhizomes which was carefully removed. 2. Cortical portion. This consists of that portion of the cortex which was carefully scraped from the parenchymal part. 3. Parenchymal portion. This is the remaining part of the rhizomes left after the removal of the periderm and the cortex. 4. Entire rhizome. All materials were dried at room temperature (the entire rhizome being previously sliced) for six days and reduced to a No. 20 powder.

Solutions having different dilutions were made from each of these four samples and the pungency was physiologically tested according to the modified Scoville method.[2] The observations were made by ten persons to eliminate personal equations as far as possible.

The results reveal that the cortex is the most pungent whereas the parenchyma is the least pungent.

Thus the physiological tests corroborate the microchemical tests. If in this connection it be remembered that oil cells are also found in the cortical layer, the effects of the practice of pealing the rhizome will be readily understood.

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[1] W. C. Stevens, "Plant Anatomy," 4th ed., p. 360 (1924).

[2] A one per cent alcoholic solution is prepared by boiling 1 gram of drug with alcohol for half an hour. The cooled filtrate is diluted to 100 cc. To measured amounts of this solution 2 drops of 5 per cent sodium hydroxide solution are added and diluted with water to 100 cc. Of this aqueous solution 1 cc. is held in the mouth for 15 seconds. An unmistakable warmth denotes the limit of dilution. Double this strength causes a distinct burning of the mouth lasting for several seconds.

The results obtained follow.

	Subjects.	Limit of pungency of different samples. Peridermal.	Cortical.	Parenchymal.	Whole.
1.	P. V.	1:3000	1:3000	1:3000	1:3000
2.	A. U.	1:5000	1:5000	1:3000	1:3000
3.	W. J. M.	1:3000	1:2500	1:2500	1:2500
4.	S. S. C.	1:3000	1:3000	1:3000	1:3000
5.	E. C. V.	1:3000	1:3000	1:2500	1:3000
6.	T. F.	1:3000	1:5000	1:3000	1:2500
7.	A. B. G.	1:3000	1:5000	1:2500	1:2500
8.	S. M.	1:3000	1:5000	1:3000	1:2500
9.	L. R. K.	1:3000	1:5000	1:3000	1:3000
10.	P. A. H.	1:3000	1:3000	1:3000	1:2500

The above results may be summarized as follows:

No. of persons.	Limit of pungency.	Material tested.
9	1:3000	Periderm
1	1:5000	
5	1:5000	Cortex
4	1:3000	
1	1:2500	
7	1:3000	Parenchyma
3	1:2500	
5	1:3000	Entire rhizome
5	1:2500	

(To Be Continued)

PRESCRIPTION LIBRARIES FOR COLLEGES.

Herbert R. Speckart, of St. Louis, has made a suggestion relative to the preservation of prescription files and utilizing them in pharmacy schools. The idea is that stores discontinuing business donate their prescription files to colleges, after removing the names thereon of patients and physicians. This involves considerable labor, but without doing so there would be complaint because of possible misuse. In most instances prescription files are transferred to other stores; however old files are to be had, which reminds us that during the 50th anniversary of the AMERICAN PHARMACEUTICAL ASSOCIATION, several members were fortunate in obtaining many old prescriptions that had been compounded by the "Father of American Pharmacy," William Procter, Jr.

Many pharmacy schools are in close touch with hospital pharmacies, or have charge of these departments, but doubtless the prescription files referred to would have some additional value for prescription reading and practice.

ASEPTOSOL, A NEW ANTISEPTIC PHENOL.

The ethereal oil derived from the leaves of *Chavica Betle*, a plant indigenous to the East Indies, has been found to contain a phenol as its active antiseptic constituent. This phenol has been given the name "aseptosol." This substance is not to be confounded with the already known "chavicol," which is a mixture of bodies derived from the leaves of *Chavica Betle*, and containing aseptosol as one of its constituents. This chavicol is a powerful antiseptic, five times as powerful as phenol as a bactericide. The aseptosol itself is much more active and much more stable than is the chavicol mixture. It has been obtained as a chemically pure product of melting point 15.8° C. and solidifying point 15.2°; b. p. 230–231°; sp gr. 1.0203 at 15° C. The product is almost pure white, and has an odor somewhat faintly reminiscent of phenol. It gives alkali salts which crystallize well, and does not resinify as does its allied product, eugenol.—J. McLang, *Chem. Trade J.*, p. 560 (May 7, 1926), through *Chem. & Drug.*