grows as a shrub, ranging in height from one to four meters. When young the whole plant is downy but when older, glabrous; probably this accounts for the older species name "pubera." The leaves are oblong, acute, more or less pointed at both ends, soft, very much veined and minutely pellucid punctate. The flowers occur in June and are greenish yellow, small in size and occur in terminal racemes. The male flower contains four to five short stamens, while the fertile flowers contain a pear-shaped ovary.

The fruit is yellowish in color, fleshy, drupe-like, pear-shaped, one-seeded and averages 2.5 cm. in length. The embryo is small and very oily.

Specimens used in our investigations were collected at Ohio Pyle, Pennsylvania, the only recorded stand north of the Mason-Dixon line.

Fluidextracts were made from both the whole fruit and the separated kernels without previous drying.

The investigations resulted as follows:

Fluidextract from the whole fruit.

Administration: Hypodermic, intraperitoneal. *Dose:* 0.003 cc. per Gm. weight of guinea pig. *Results:* General convulsions within three minutes, followed by general paralysis and usually complete recovery in 24 hours.

Administration—*Per os: Dose:* 0.003 cc. per Gm. weight of guinea pig. *Results:* Convulsions and death within an average of 18 minutes.

Fluidextract from the kernel.

Administration—*Per os: Dose:* 0.003 cc. per Gm. weight of guinea pig. *Results:* Convulsions and death within 60 minutes.

From this incomplete investigation it would seem that the fruits of *Pyrularia oleifera* are very poisonous. It is hoped that further investigation may be carried out. The toxic principles should be determined as well as the physiological action of the oil.

PIONEERING IN PLANT CHEMISTRY.*

BY ARNO VIEHOEVER.

Our present knowledge of plants and their uses has come to us down through the ages. Man, obviously by the trial and error method, early discovered the food, technical and medicinal value of plants and plant products. There is some evidence that only in modern times has man actually searched for the active and valuable ingredients.

Simple substances, as starch and cane sugar, were well known in antiquity. With the application of the general alchemistic methods employed in the middle ages: distillation, sublimation, melting, calcination, only the most resistant plant substances could be obtained, as benzoic acid, sublimed from gum benzoin. *Paracelsus*, the great independent fighter for medical science, endeavored to extract the active ingredients from medicinal plants, but the methods were still crude and the results rather unsatisfactory. Nevertheless, in 1675, *Lemery* gives us a grouping of chemical substances into mineral, animal, and vegetable products, and enumerates

* Section on Historical Pharmacy, A. PH. A., Toronto meeting, 1932. Illustrated by lantern slides.

among other plant products: sugar, turpentine, camphor, opium, gum benzoin and tobacco.

The great Swedish pharmacist, *Scheele*, probably deserves first mention as a pioneer, effecting or assisting in the isolation and purification of organic plant acids, as tartaric, citric, malic, oxalic and gallic acids, as well as the preparation of glycerin from olive oil (1784).

The work of the German apothecary, *Sertürner*, isolating morphine from opium (1805), that of the French professors of pharmacy, *Pelletier and Caventou*, isolating (1818 and 1820) other alkaloids as quinine from cinchona, created a real incentive for others to study the composition of plants. Thus we find in the 19th and 20th centuries a host of workers in the civilized countries of the globe engaged in the search for the active or valuable substances present in plants. Many workers should, no doubt, be classified as pioneers, had we the intimate knowledge of their life-work or the space to refer to it specifically.

Pharmaceutical workers, in the broadest sense, hold an honored place among the searchers in plant and drug chemistry. One of the outstanding men, a real pioneer, fruitful in his own work and in his inspiration to students and industries was the well-known German chemist, *Von Liebig*. His success during a lifetime, perfecting methods of organic analysis, and contributing greatly to the better understanding of the importance of chemistry in our life and in plant life (through soil fertility) furnish a lasting testimony. He may well be considered the founder of agricultural chemistry—soil and food chemistry.

In drug chemistry we meet frequently the name of *Dragendorff*, who, working in the Russian university (*of Dorpat*), elaborated an ingenious method for the successive isolation of plant constituents and assembled the data gathered by plant and drug chemists. The German educators, *Flueckiger* and *Arthur Meyer*, to whom I owe much gratitude for his teaching, the English, *Hanbury* and *Greenish*, the French, *Berthelot*, *Planchon* and *Perrot*, the American, *Maisch*, assembled valuable collections and data which brought them fame in the pharmacognostic field. *Trimble*, professor at Philadelphia College of Pharmacy, worked as a pioneer on the tannins, which group has in recent time engaged the attention of the most able chemists. *E. Schmidt*, of Marburg, Germany, my great teacher, author of the well-known "Handbook of Pharmaceutical Chemistry," spent a lifetime on the isolation of the alkaloids as the Solanaceæ, of Ephedra and many others.

Power with the splendid support of his friend *Wellcome*, a pioneer in medicine at-large, successfully completed a life-work of surveys, dealing with the intricate chemical composition of plants and drugs and fruit flavors.

Dean Kremers, the tireless worker, is surely in the front of pioneers of plant and drug chemistry, utilizing the State Experimental Plant Garden for fresh plant material to very good advantage. Outstanding, surely, is the work on the close chemical relation of pigments and flavoring substances demonstrated by him and his co-workers for the plant family, Labiatæ. Other American workers and especially the biochemists: *Gortner*, of Minneapolis, Minnesota; *McCollum*, of Hopkins; *Steenbock*, of Madison, Wisconsin; *Jones*, of Washington, should be in any list of prominent workers in the field of plant chemistry in the broadest sense.

Tschirch, the author of the well-known handbook of pharmacognosy, and *Dietrich* are authorities on the resins, a group still so little known. *John Uri Lloyd*

is the resourceful experimenter and manufacturer of unusual preparations, the inventor of an ingenious extraction apparatus; all command high respect for their achievements in plant chemistry.

Pioneer work is to be credited to the pharmacist, *Peckolt*, who went to Brazil and described many new drug products, to *Greshoff*, who made extensive surveys on plants, containing saponins and hydrocyanic acid, to *Molish*, the versatile professor of Plant Physiology in Vienna, to *Tunmann and Rosenthaler*, who collected data and devised new methods for the micro-chemical study of plants and drugs, to *Pregl*, who perfected the method of mino-analysis so useful in the study of plant compounds in living plants.

Our list would be all too fragmentary if we were to leave out the splendid work of such European pharmaceutical manufacturers as Merck & Company, on plant constituents; Schimmel, on essential oils; Hoffmann-La Roche, on preparations, the well-known American firms, etc.; of *Bourquelot* on the enzymes, active in the hydrolysis and synthesis of plant compounds; of *Abderhalden*, on enzymes, proteins; of *Wallach*, the deceased Goettingen professor, on ethereal oils; of his successor, *Windaus*, on cholesterol, gallic acids, and digitalis; of the illustrious *Willstaætter* who solved the mystery of chlorophyll composition, a study which had engaged plant physiologists for a hundred years, of *Emil Fischer* who synthesized sugars and simple proteins; of *Wieland* who worked with marked success on vitamins and provitamins as the ergosterol; of *Warburg* for whom the Rockefeller Foundations created a new institute for the continuation of his remarkable studies on the metabolism of the plant and animal cell; he having explained the mechanism of chlorophyll action, storing light energy, and of iron serving as a catalyst in cell action—of *Bergius*, one of the most daring plant chemists.

Bergius, all but trumps nature in making new compounds in the hydrogenation of carbon, in the manufacture of food from wood, a veritable giant of applied science. Most of these workers were honored by the Nobel Prize.

Of foremost institutions, where pioneers in plant-chemistry labor, we mention the United States Department of Agriculture, the Plant Research Institute in Yonkers, New York, the Pharmacognostic Institute in Vienna, under the able leadership of *Wasicky*, of the Pharmacotherapeutic Institute in Leyden, Holland, directed by *Van Itallie*. The study of bio-chemistry is coming to the foreground and the work on insecticidal plants as pyrethrum by *Staudinger* of Zürich, as derris by *La Forge* of Washington, D. C., should be generally known as samples of new accomplishements.

It is a fact, generally little appreciated, that there is the greatest opportunity for pioneer work in Plant Chemistry. The chemistry of the living drug plant is still a mystery in most cases.

It is an open question how thoroughly much of the work now on record has been done—with dried specimens, with small lots, with crude methods then available. "The science of drugs is hardly known," said Sir Henry S. Wellcome recently, "only the surface has been scratched." The chemical knowledge of such well-known drugs as Aloes, Cascara, Rhubarb, Podophyllum and Digitalis, to mention but a few examples, and their standardization is still unsatisfactory.

We attempt to contribute our humble bit, as time permits, to the work of the pioneers through the study of the living plants, wherever possible; the improve-

ment of selective extractions, checking the activity of the fractions with physiological test methods (preferably on transparent animals); the use of microchemical methods, and through the search for pure principles, and their study, physical, chemical and physiological.

Pharmacy is challenged, as a calling, to help the medical profession in providing the perfect medicine. Pharmacy can meet this challenge through pioneering in the Biochemistry of plants and animals yielding—per chance—the healing sap or substance for the helpless sick.

PUBLICITY FOR PHARMACEUTICAL EDUCATION.*

BY C. W. BALLARD.

It is difficult to definitely place the responsibility for the decline in prestige of retail pharmacy in the public mind. The replacement of individually owned establishments by those of large organizations concerned primarily with the business aspects, the diminishing number of prescriptions and the excessive number of pharmacies in the larger centers are all undoubtedly factors in creating the situation. But be the causes what they may, the fact remains that pharmacy is further away from a professional status than it was a generation ago. It must also be conceded that other professions and notably dentistry have materially increased in the public estimation. This decline in prestige cannot be charged to a diminishing of the educational standards, for in this respect pharmacy has kept fair pace with other professions. But the public as a whole knows nothing regarding the educational preparation for the practice of pharmacy. Education, both general and professional, is taken for granted in medicine, dentistry and law, perhaps in part because of the professional attitude assumed toward the public by those in these professions. Pharmacy is most often typified in the public mind by the luncheonette type of store where the professional aspects are almost wholly submerged. The task of rehabilitating pharmacy in popular estimation involves education of the public and it cannot hope to succeed without close coöperation on the part of the retail pharmacist. In its relationship to the public this educational project or campaign presents three phases—the individual pharmacist, the press and the pharmacy schools. Concerted action on the part of all three is necessary for a satisfactory culmination and the efforts must be maintained for a considerable length of time.

THE PHARMACIST AND THE PUBLIC.

The individual pharmacist is the most immediate point of contact between the public and pharmacy and he, undoubtedly, can do the most effective work in this educational project. Unfortunately, he is often apathetic in his attitude and is apt to regard professional pharmacy as limited to the compounding of prescriptions. Because of the diminishing number of prescriptions he feels that his claims to professionalism are correspondingly diminished. He readily sees the fallacy of rating the professionalism of a physician by the number of patients he visits, the dentist by the number of teeth he extracts and the lawyer by the number

* Section on Education and Legislation, A. PH. A., Toronto meeting, 1932.