TABLE X.—*Continued.*

(4 Months' Exposure.)

Chemical.	Glass preventing deterioration.
Hydriodic acid, diluted	All
Mercuric oxide, red	Red
Mercuric oxide, yellow	None
Mercurous iodide	None
Phenol	Red and green
Pyrogallol	Red, green and "Noviol"
Resorcinol	Red, green and "Noviol"
Santonin	Red and green
Solution of chlorinated soda	Red and green
Solution of hydrogen dioxide	Red, green and "Noviol"
Spirit of ethyl nitrite	Red, green and "Noviol"

BIBLIOGRAPHY.

Dr. Steinberg's dissertation gives a bibliography of 197 titles. Limitations of space prevent our publishing it in this article.

CONCLUSIONS.

(1) Spectral transmission curves of the eight samples of glass containers used as well as six samples of Corning glass filters are given.

(2) Reports are made on the deterioration of 35 chemicals and preparations stored in seven of the types of containers mentioned above under the following conditions: (*a*) exposed to direct daylight, (*b*) exposed to diffused light, (*c*) kept in a dark closet in "dark room." Since Amber C container closely resembled Amber B container, it was not used in all of our work.

(3) These exposure tests indicated that Amber A and B and Green B containers were the best protectives for light-sensitive chemicals. The other bottles used afforded poor protection against light rays.

(4) Of the 35 chemicals and preparations studied, all did not deteriorate because of the action of light. Other factors were: (*a*) Atmospheric oxidation: examples, apomorphine hydrochloride, sulphurated potassa and phenol. (*b*) Evaporation: examples, spirit of ethyl nitrite and diluted hydrocyanic acid. (*c*) Other atmospheric impurities: example, silver nitrate.

(5) Direct sunshine was very destructive to light-sensitive chemicals. In diffused light (resembling drug store conditions) the deterioration was much less (one-third to one-twelfth); in fact, with most chemicals, not much more than when the chemical was kept in a dark place.

(6) Reports on the protective action of certain stabilizing catalysts and of special types of colored glass are given.

COLLEGE OF PHARMACY,
COLUMBIA UNIVERSITY,
July 25, 1931.

EXPLORING ECONOMIC PLANTS.*

BY ERNST T. STUHR.[1]

Few fields create as much interest and offer as much fascination and satisfaction as does the exploration of the marvels and mysteries of economic plant life.

The dynasty of drug plants dates back to the days of the forefathers of prehistoric life. There is little doubt that the evolution of many plants into present-day forms has been greatly facilitated by the advent and progress of all worldly

* This paper is an elaboration of part of a comprehensive survey of the native plant resources of the Pacific coast. Scientific Section, A. PH. A., Miami meeting, 1931.

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things. Plants adapt themselves to surroundings. The competition for existence is often a severe ordeal for the survival of the fittest—from the simplest and smallest of plant life (bacterias, molds, yeasts) to the most highly developed and largest, as giant trees, et cetera. The present existing plants are the result of the slow, patient methods of Nature. Past achievements form the most dependable test of possibilities inherent in coöperation between the slow and patient methods of Nature and the phenomena of life.

The presentation of facts of interest with the production of medicines is timely, because of an increasing desire on the part of the public for a deeper insight into scientific and professional subjects, as well as an attempt to combat the many erroneous beliefs and fallacies which generally prevail regarding the various phases of the drug realm.

The compiling of this material was undertaken primarily to stimulate in the public, as well as in the druggist and medical practitioner an interest concerning the possibilities of the resourcefulness of the native plant life of the Pacific coast region from an economic viewpoint. Usually the time allotted to the subject of plant preservation and cultivation is somewhat limited. Realizing the great value of time and the primary desire of the public for concise information, the criterion has been to preserve the essential known facts regarding the respective plants in existence.

It will not be possible within the space allotted for this article to name the large number of medicinal plants occurring throughout this vast coast region. In order to make this list of drug plants more nearly complete, introduced and cultivated plants have been included along with the native wild growing plants. However, since this is a virgin field from the standpoint of scientific investigation of medicinal plant resources, it may be interesting to mention in the form of a résumé or synopsis, the results obtained from covering the plant kingdom.

It is to be noted from the following summary of this vast compilation that a surprisingly large number of economic plants thrive within the boundaries of the coastal states.

SUMMARIZATION OF SURVEY.

For the Coast Region.

Total number of plants considered, which possess or may be of medicinal value, 1153
Number of plant families considered, 155
Exotic (introduced) and cultivated plants, 505
Plants requiring study and investigation, 518
Official drug plants, 196

For the State of Oregon.

Total number of existing plants considered, which possess or may be of medicinal value, 533
Introduced and cultivated plants, 178
Plants requiring study, 246
Official drug plants, 109

This is a field, which to the author's knowledge, had not hitherto been investigated, wherefore the above results are of marked interest to not only the Pacific coast states, but to pharmacognosists throughout the country. This investigation was conducted in coöperation with the Bureau of Plant Industry, Washington, D. C., and the Oregon State Experiment Station, Corvallis, Oregon.

Cascara, Digitalis, and Hops in Oregon.

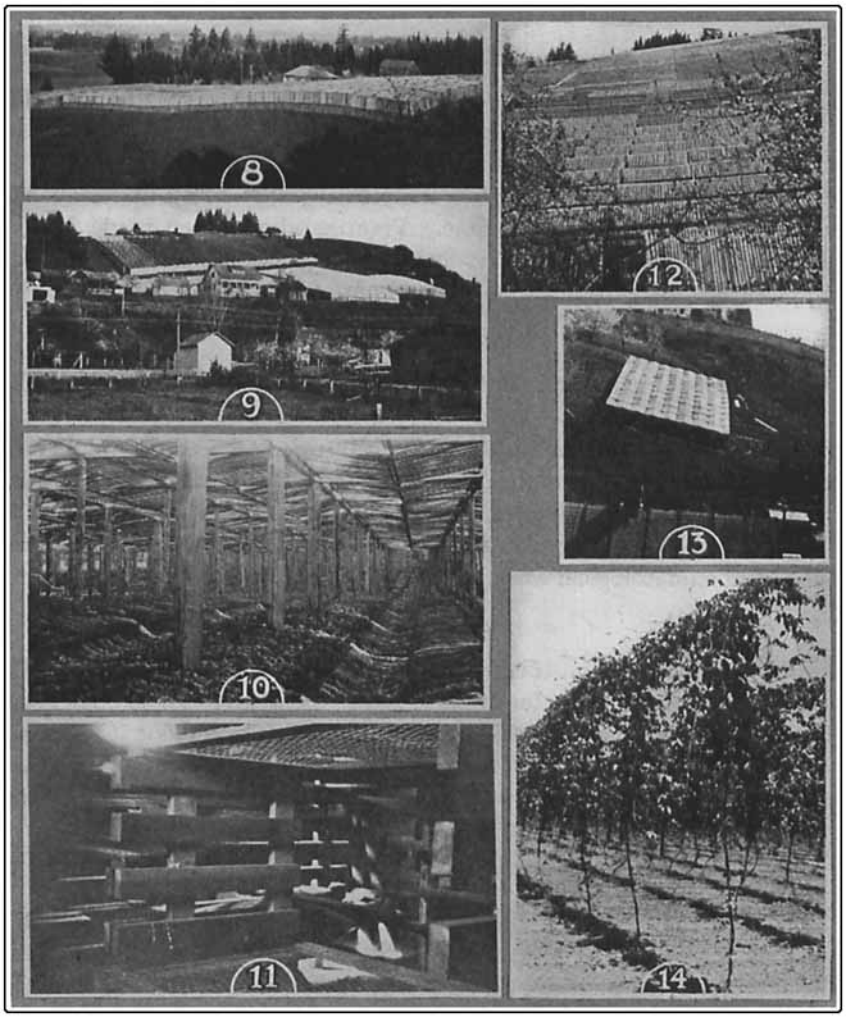

Fig. 1.—Eight-acre plot, one-year old seedlings. In background four-year old grove of Cascara. Fig. 2.—Native Oregon Digitalis—Wastelands and roadsides of Lincoln County, Western Oregon. Fig. 3.—Native Oregon Digitalis growing wild in Western Oregon. Fig. 4.—Digitalis growing along fence rows; coast region, Lincoln County, Oregon. Fig. 5.—Close-up section of three-year old Cascara planting. Fig. 6.—Cascara plantings, three-year old trees. Fig. 7.—Digitalis in wooded and open areas; coast region of Western Oregon. Fig. 8.—Ginseng sheds (P. M. Stamp). Fig. 9.—Hillside project (Posson & Midford). Fig. 10.—Interior of lath house. View of fresh plantings (P. M. Stamp). Fig. 11.—Ginseng drying room (Osborne). Fig. 12 and Fig. 13.—Lath house covering hillside (John Osborn). Fig. 14.—Hop yard view near Salem, July 1930.

The varied flora of the region is very impressive, which can only be expected considering the number of native medicinal plants growing wild. In consideration of the foregoing points it is hoped that the presenting of this article might bring some small amount of benefit to those interested in the native plant life of the Pacific coast.

EXCERPTS OF POSSIBLE COMMERCIAL DEVELOPMENTS.

SOME COMMERCIAL ASPECTS OF CASCARA PLANTINGS.

The romance of cascara, *Rhamus purshiana*, D. C., is indeed very fascinating, and interest has been manifested in this native tree of the Pacific coast area through the investigations of Starker[1] and his associates.

Several experimental plots of cascara plantings are being undertaken in the Willamette valley at the present time. Plantings have been made from seeds, as well as from seedlings with the result of thriving trees as shown by the accompanying pictures. The commercial prospects are promising to date.

GINSENG CULTURE.

Much has been written about this ancient Chinese herb and former U. S. P. drug (*Panax* 1870).

The Oriental lore and the apparent healthy price secured for the dry root as acclaimed by Fritts[2] have created extensive interest of prospective commercial growers throughout western Oregon and Washington. Investigations point toward a possible increase of Ginseng plantings in the Pacific Northwest, which is reputed to possess ideal climatological aspects for this "orient-famed" drug.

GOLDENSEAL.

Hydrastis canadensis, L., the golden root-bearing plant, an exotic plant to the Northwest, has commanded interest throughout the ages.

Numerous prospective plantings are reported throughout the immediate Northwest country, centering in the Skagit Valley of Washington. Goldenseal culture is without a doubt pronounced successful as evinced by the extensive investigations of Langenhan[3] and associates.

DIGITALIS.

The possible remuneration which might be benefited from a native plant, which grows so abundantly as *foxglove* in western Oregon, is worthy of mention.

The accompanying pictures, taken by the author in the coast region of Oregon, are convincing evidences of a possible future project and worthy industry for development in the great Pacific Northwest.

THE WILLAMETTE VALLEY HOP INDUSTRY.

The Cultivation of *Humulus Lupulus*, L.

The cultivation of hops, *Humulus Lupulus*, L., has developed into an extensive industry in the Willamette valley and immediate regions. Large acreages are devoted to hop growing. The farming communities in the Salem territory are possessed with large hop yards, as indicated by the accompanying views, and numerous dryers.

According to reports released by the Oregon State Experimental Station a number of young hop plants have been received from England, for use in hop-

[1] *Amer. Jour. of Pharm.*, 103 (1931), 73.
[2] *N. A. R. D. Jour.*, Oct. 23 (1930), 213.
[3] Jour. A. Ph. A., Vol. XIX, No. 4 (1930), 349.

breeding work. The plants are of a new variety resistant to the downy mildew disease, which is threatening the hop-growing industry of the Willamette valley.

EXCEPTIONAL OPPORTUNITIES AND POSSIBILITIES FOR DEVELOPMENT OF FUTURE CRUDE DRUG SUPPLY.

The importance of this work has been greatly emphasized in recent years by our dependence upon European countries for crude drugs and by the rapid disappearance of our native medicinal plants. At present, it is impossible to give adequate information for the successful cultivation of even some of our native medicinal plants, which grow wild about us. Hence, the experimental cultivation of plants is imperative for the future supplies of the essential crude drugs.

Many universities and institutions have begun to cultivate medicinal plants with reference to the economic aspect. The possibility of cultivating some of the existing wild medicinal plants on a commercial basis should be of vital interest and importance to all who have the drug industry and its future development at heart.

The development of the natural plant resources of the Pacific Northwest will lead toward a great future industry for which nature has prepared the foundations, with exceptional and superior natural advantages, as soil and climate.

The author is confident that the Northwest section of the country could eventually become the leading producer of crude drugs.

INFLUENCE OF PERIOD OF VEGETATION AND DEVELOPMENT OF PLANT ON THE ALKALOIDAL CONTENT OF HYOSCYAMUS NIGER L.*

BY ZDENEK F. KLAN.[1]

A study is here presented of the alkaloidal content of the different parts of this important drug plant during the various stages of its growth and development. Extensive tables are given showing the quantitative alkaloidal content with a qualitative differentiation as to whether it is chiefly atropine, hyoscyamine, scopolamine, tropine or scopoline.

Among many valuable conclusions it was found that (1) with the growth of the germinating plant the quantity of alkaloids in its organs decreases and that (2) in the order of their alkaloidal content the parts of the plant are as follows: root (both of annual and biennial plants), flowering tops, fruits, leaves and stems.

INTRODUCTION.

Literature records many studies dealing with the observations on alkaloids in pharmacologically important *Solanaceæ*, of which the chief subject of research has been *Atropa Belladonna* and in the second place *Datura Stramonium*. The authors have given very little attention to the not less important species *Hyoscyamus niger*. The majority of published investigations refer mostly to the quantitative determinations of alkaloids of commercial drugs official in pharmacopœias in order to ascertain their value, the greater number deal with histochemical observations of the localization of alkaloids in tissue, with the influence of selection on the alkaloidal content with quantitative determination of alkaloids in in-

* Scientific Section, A. PH. A., Miami meeting, 1931.

[1] Former holder of fellowship of the Rockefeller Foundation in food and drug control, Praha, Czechoslovakia.