

PRESIDENT'S ADDRESS.

A CONSIDERATION OF CERTAIN NEEDED INVESTIGATIONS IN PHARMACOLOGY.

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(Abstract.)

Under this title the term pharmacology is not used in its restricted sense, meaning pharmaco-dynamics only, but is employed to embrace the botany, chemistry and physiological action of drugs. The suggestions for needed investigations are the result of a critical study of the records of about four hundred drugs used in medicine at present.

In order to arrive at some general conclusions concerning existing knowledge of the commonly used organic drugs, those studied were reviewed, marked and classified in eight groups based on the extent to which they have been investigated, botanically, chemically and physiologically, as follows:

CLASSES BASED ON THE EXTENT OF CHEMICAL KNOWLEDGE.

1. Drugs whose chemical constituents and active principles are regarded as well known—276, or approximately 70 per cent.
2. Drugs whose chemical constituents and active principles are but partially determined—100, or approximately 25 per cent.
3. Drugs whose chemical constituents and active principles are undetermined—25, or approximately 6 per cent.

CLASSES BASED ON THE EXTENT OF KNOWLEDGE OF PHYSIOLOGICAL ACTION.

4. Drugs whose physiological action is well known, or which have been subjects of systematic investigations—175, or approximately 43 per cent.

5. Drugs whose physiological action is partially understood, chiefly through careful clinical reports—140, or approximately 35 per cent.
6. Drugs used empirically or employed for "reputed" action, no satisfactory records of scientific experiments or chemical investigations—82, or approximately 20 per cent.
7. Drugs employed primarily for purposes other than definite physiological effects, such as flavors, colors, etc. (some not used internally at present)—9, or approximately 2 per cent.

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8. Drugs of obscure or unknown origin—2, or approximately $\frac{1}{2}$ per cent.

These groups or classes are not marked by hard and fast boundary lines, and perhaps no two students would agree wholly to any single classification, as the personal equation enters largely into the work. A drug which one might regard as sufficiently known chemically and physiologically to be classed as "well known," another would rank as "partially determined," and similar differences of opinion will arise respecting other points involved, so that the classification given above is not offered as an exact record of the knowledge of the representative drugs, but rather as the author's estimation of that knowledge, and as said at the outset, it is given as a basis or reason for the proposal of certain lines of botanical, chemical and physiological investigation.

Lest there be misconception regarding the use of little-known drugs by physicians, it should be remembered that 70 per cent. of all drugs reviewed have been investigated chemically; that 43 per cent. have been subjected to systematic physiological experiments, and that the physiological action of 35 per cent. more is partially understood. Thus it seems that from 70 to 78 per cent. are employed on the basis of demonstrated value. Furthermore, it should be remembered that the 70 to 78 per cent. in number constitutes a very large percentage of the volume of drugs prescribed. While no statistics are available, in the opinion of the author it is over 90 per cent. of the total quantity used.

The Proceedings of the Indiana Academy of Science are primarily intended to disseminate information of special service in the development of the State and its resources. As space is limited, it is necessary to restrict further report of this address to the tables below showing the state of knowledge of drug plants of Indiana.

INDIANA PLANTS YIELDING DRUGS.

In order that the student may have a wider range in selecting a subject for study this list has been enlarged to include introduced and cultivated species, also a few plants foreign to our soil, but which may be cultivated in gardens for supplying laboratory material. The native species and the introduced and cultivated species are unmarked; those of the last class are indicated by an asterisk (*).

Chemical constituents, active principles and physiological action regarded as well known:

- Allium sativum* Linn. Garlic, bulb.
 **Althaea officinalis* Linn. Marshmallow, root.
Anthemis nobilis Linn. Roman chamomile, inflorescence.
Apocynum cannabinum Linn. Black Indian hemp, root.
Arctostaphylos Uva Ursi (Linn.) Sprengel. Uva Ursi, leaves.
Arisæma triphyllum (Linn.) Torr. Indian turnip, tuber.
Artemisia Absinthium Linn. Wormwood, leaves and inflorescence.
 **Atropa Belladonna* Linn. Belladonna, leaves and root.
Carum Carvi Linn. Caraway seed, fruit.
 **Carum Petroselinum* Benth. Parsley, root and fruit.
Cercis Canadensis Linn. Judas tree, bark.
Chenopodium anthelminticum Linn. American wormseed, seed.
Chimaphila umbellata (Linn.) Nutt. Pipsissewa, herb.
 **Claviceps purpurea* (Fries) Tulasne. Ergot, sclerotium.
Cochlearia Armoracia Linn. Horseradish, root.
Conium maculatum Linn. Conium, fruit.
Convallaria majalis Linn. Lilly of the Valley, rhizome and rootlets.
Coptis trifolia (Linn.) Salisb. Gold thread, herb.
Delphinium consolida Linn. Larkspur, seed.
 **Digitalis purpurea* Linn. Digitalis, leaves, flowers and seed.
 **Dryopteris Filix-mas* Schott and D. *Marginalis*, Gray. Male fern, rhizome.
Epigea repens Linn. Gravel plant, herb.
Euonymus atropurpureus Jacq. Wahoo, bark.
Gaultheria procumbens Linn. Wintergreen, leaves and inflorescence.
 **Gentiana lutea* Linn. Gentian, root.
Geranium maculatum Linn. Cranesbill, rhizome.
Humulus Lupulus Linn. Hops, inflorescence.

- **Hyoscyamus niger* Linn. Henbane, leaves and inflorescence.
Juniperus communis Linn. Juniper berries, fruit.
Lactuca Canadensis Linn. Wild lettuce, leaves and inflorescence.
Lobelia inflata Linn. Lobelia, herb and seed.
Menispermum Canadensis Linn. Yellow parilla, rhizome and roots.
Mentha piperita Linn. Peppermint, leaves and inflorescence.
Monarda fistulosa Linn. Wild bergamot, leaves and inflorescence.
Phytolacca decandra Linn. Poke root and berries.
Podophyllum peltatum Linn. Mandrake, rhizome and roots.
Prunus serotina Ehrh. Cherry, bark.
Quercus alba Linn. White oak, bark.
 **Ricinus communis* Linn. Castor bean, seed and leaves.
Rubus villosus Aiton R. *Canadensis*, Linn. and R. *trivialis*, Michx.
 Blackberry, root bark.
 **Salvia officinalis* Linn. Sage, herb.
Sanguinaria Canadensis Linn. Blood root, rhizome.
Sassafras variifolium (Salisbury) O. Kuntze. Sassafras bark, root,
 bark.
Satureja hortensis Linn. Summer savory, herb.
Taraxacum officinale Weber. Dandelion, root.
Thuja occidentalis Linn. Arbor vitae, leaves.
Thymus vulgaris Linn. Thyme.
Tsuga Canadensis (Linn.) Carr. Hemlock, bark.
Ustilago Maydis Leveille. Ustilago, entire fungous plant.
 **Valeriana officinalis* Linn. Valerian, rhizome and rootlets.
 **Veratrum album* Linn. White hellebore, rhizome and rootlets.
Veratrum viride Aiton. Veratrum, rhizome and rootlets.

Chemical constituents but partially determined; physiological action fairly well known:

- **Cactus grandiflorus* Linn. Cactus grandiflorus, branches.
Cannabis sativa Linn. var. *Americana*. American hemp, inflorescence.
Spigelia Marylandica Linn. Pink root, rhizome and rootlets.

Chemical constituents regarded as well known; physiological action not systematically investigated or well understood:

- Acorus Calamus* Linn. Calamus, rhizome.
Æsculus Hippocastanum Linn. Horse chestnut, bark and seed.

- Agropyrum repens* (Linn.) Beauv. Couch grass, rhizome.
Aralia racemosa Linn. Spikenard, root.
Arctium Lappa Linn. and some other species of *Arctium*, Burdock, root and seed.
Asarum Canadense Linn. Canada snake root, rhizome.
Asclepias incarnata Linn. White Indian hemp, root.
Beberis vulgaris Linn. Barberry, bark.
Castanea dentata (Marsh) Sudworth. Chestnut, leaves.
Caulophyllum thalictroides (Linn.) Michx. Blue cohosh, rhizome and rootlets.
Ceanothus Americanus Linn. Jersey tea, leaves.
Chelidonium majus Linn. Garden celandine.
Cornus circinata L. Heritier. Green osier, bark.
Cornus florida Linn. Dogwood, bark.
Cypripedium pubescens Swartz and *C. parviflorum* Salisbury, Ladies' Slipper, rhizome and rootlets.
Epilobium angustifolium Linn. Willow herb, herb.
Eupatorium perfoliatum Linn. Boneset, leaves and inflorescence.
Eupatorium purpureum Linn. Queen of the meadow, rhizome and rootlets.
Galium Aparine Linn. Cleavers, herb.
Helianthus annuus Linn. Sunflower seed.
Hepatica triloba Chaix. Liverwort, herb.
Inula Helenium Linn. Elecampane, rhizome and rootlets.
Heuchera Americana Linn. Alum root, rhizome.
 **Kalmia angustifolia* Linn. Sheep laurel, leaves.
Liriodendron Tulipifera Linn. Tulip tree, younger bark.
Marrubium vulgare Linn. Horehound, herb.
Matricaria Chamomilla Linn. German chamomile, flowers.
Melissa officinalis Linn. Lemon balm, herb.
Penthorum sedoides Linn. Virginia stonecrop, leaves and inflorescence.
Phoradendron flavescens (Pursh.) Nutt. Mistletoe, leaves and branches.
Phytolacca decandra Linn. Poke berries.
Polygonatum biflorum (Walt.) Ell. Solomon's seal, rhizome.
Polygonum hydropiper Linn. *P. hydropiperoides* Mich. and *P. punctatum* Ell. Water pepper, herb.
Populus Balsamifera candicans (Ait.) Gray. Balm Gilead, buds.
Ptelea trifoliata Linn. Wafer ash, root bark.

- Rhus glabra* Linn. Sumach berries.
Rhus radicans Linn. Poison oak, leaves.
Rumex crispus Linn and some other species of *Rumex*. Yellow dock, root.
Salix alba Linn. White willow, bark.
Salix nigra Marsh. Black willow, buds and bark.
Sambucus Canadensis Linn. Elder flowers.
Saponaria officinalis Linn. Soapwort, herb.
Scrophularia nodosa var. *Marylandica* A. Gray. Figwort, herb.
Solanum Dulcamara Linn. Bittersweet, twigs.
Symplium officinale Linn. Comfrey, root.
Trifolium pratense Linn. Clover (red), tops.
Viola Tricolor Linn. Pansy, herb.
Xanthoxylum Americanum Miller. Prickly ash, bark.
Zea Mays Linn. Cornsilk.

Chemical constituents but partially determined; physiological action not systematically investigated or well understood:

- Allanthus glandulosa* Desf. Ailanthus, bark.
Aletris farinosa Linn. Unicorn root, rhizome.
Borago officinalis Linn. Borage, herb.
 **Cactus Grandiflorus* Linn. Cactus grandiflorus, succulent branches.
Castalia odorata (Dryander) Woods and Wood. White pond lily, rhizome.
Cimicifuga racemosa (Linn.) Nutt. Black cohosh, rhizome and rootlets.
Citrullus vulgaris Schrader. Water melon seed.
Dioscorea villosa Linn. Wild yam, rhizome.
Erigeron Canadensis Linn. Flebane, leaves and inflorescence.
Fraxinus Americana Linn. American White ash, bark.
Hamamelis Virginiana Linn. Witch hazel, leaves and bark.
Iris versicolor Linn. Blue flag, rhizome.
Juglans cinerea Linn. Butternut-root, bark.
Juglans nigra Linn. Black walnut, leaves.
Larix laricina (DuRoi) Koch. Tamarac, bark deprived of corky layer.
Leonurus Cardiaca Linn. Motherwort, herb.
Liquidambar Styraciflua Linn. Sweet gum, inner bark.

- Lycopersicum esculentum* Miller. Tomato, herb.
Lycopus Virginicus Linn. Bugleweed, herb.
Nepeta Cataria Linn. Catnep, herb.
Oenothera biennis Linn. Evening primrose, herb.
 **Enanthe Phellandrium* Lam. Water fennel, seed and fruit.
 **Paeonia officinalis* Linn. Peony, rhizome.
Panax quinquefolium Linn. Ginseng, root.
Populus tremuloides Michx. and *P. alba*, Linn. White poplar, bark.
Prunus Persicaria (Linn.) Seibold and Zuccarina. Peach leaves.
 **Ricinus communis* Linn. Castor leaves.
Salix nigra, Marsh. Black willow, buds.
Solanum Carolinense Linn. Horse-nettle, berries and root.
Solidago Canadensis Linn. *Solidago Canadensis*, leaves and inflorescence.
Urtica dioica Linn. Nettle root.
Verbascum Thapsus Linn. Mullein leaves.
Viburnum Prunifolium Linn. Black haw, bark.

Chemical constituents regarded well known; physiological action uninvestigated:

- Achillea Millefolium* Linn. Yarrow, leaves and inflorescence.
Agropyrum graveolens Linn. Celery seed.
Aselepias Syriaca Linn. Silkweed, root.
Asparagus officinalis Linn. Asparagus, root.
 **Carthamnus tinctorius* Willd. American saffron, flowers.
Chrysanthemum Parthenium (Linn.) Pers. Feverfew, herb.
Dicentra Canadensis D. C. Turkey corn, tubers.
Equisetum hyemale Linn. *Equisetum hyemale*, herb.
Hydrangea arborescens Linn. *Hydrangea*, roots.
Hypericum perforatum Linn. Johnswort, herb.
Mitchella repens Linn. Squaw vine, herb.
Sabatia angularis (Linn.) Pursh. Centaury, herb.
Solidago odora Aiton. Golden rod, leaves and inflorescence.

Chemical constituents but partially determined; physiological action uninvestigated:

- Adiantum pedatum* Linn. Maiden hair fern, frond.
Agrimonia Eupatoria Walt. Agrimony, herb.

Ampelopsis quinquefolia Michx. American ivy, bark and small twigs.
Aralia nudicaulis Linn. American sarsaparilla, root.
Avena sativa Linn. *Avena sativa*, heads.
Calendula officinalis Linn. *Calendula* flowers and *calendula* herb.
Capsella Bursa-Pastoris Moench. Shepherd's purse, herb.
Celastrus scandens Linn. False bittersweet, bark.
Chelone glabra Linn. Balmoney, herb.
Collinsonia Canadensis Linn. Stoneroot, rhizome.
Epiphegus Virginiana (Linn.) Bart. Beech drops, herb.
Gnaphalium obtusifolium Linn. Life everlasting, herb.
Juglans nigra Linn. Black walnut hulls, epicarp.
Lacinaria spicata (Linn.) Kuntze. Button snake root, tuber.
Nepeta Glechoma Benth. Ground ivy, herb.
Ostrya Virginiana (Mill) Willd. Ironwood, heart wood.
Pimpinella Saxifraga Linn. Saxifrage, root.
Plantago major Linn. Plantain leaves.
Polygonum Uvedalia Linn. Bearsfoot, root.
Scutellaria lateriflora Linn. Sculleap, herb.
Spiraea tomentosa Linn. Hard hack, leaves, etc.
Symplocarpus foetidus Nutt. Skunk cabbage, root stock.
Trillium erectum Linn. Bethroot, rhizome.
Viola pedata Linn. Violet herb, leaves, etc.

Chemical constituents undetermined; physiological action not systematically investigated or well understood:

Trifolium repens Linn. White clover, inflorescence.
Xanthoxylum Americanum Miller. Prickly ash, berries.

Chemical constituents undetermined; physiological action uninvestigated:

Æsculus glabra Willd. Buckeye, bark.
Aralia hispida Vent. Dwarf alder, root.
Betonica officinalis Linn. Wood betony, herb.
Cratægus Oxycantha Linn. Hawthorn, "berries."
Gentiana ochroleuca Frœl. Sampson snakeroot, root.
Gentiana quinquefolia Linn. Five-flowered gentian, herb.
Impatiens aurera Muhl. and *I. biflora*, Welt., herb.

- Ligustrum vulgare* Linn. Privet, leaves.
Nymphaea advena Soland. Yellow pond lily, root.
Polemonium reptans Linn. Abscess root, root.
Polytrichum juniperinum Hedwig. Haircap moss, entire plant.
Rubus strigosus Michx. Raspberry, leaves.
Senecio aureus Linn. Life root, entire plant.
Sorghum saccharatum (Linn.) Persoon. Broom corn, seed.
Stylosanthes biflora (Linn.) B. S. P. *Stylosanthes*, herb.
Verbena hastata Linn. Vervain, herb.

