Rusby (H. H.) (8)

Adonis. x xx

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ADONIS.

(*Adonis vernalis*, L.)

BY HENRY H. RUSBY, M. D.

The activity in the investigation of medicinal plants which has so strongly characterized the progress of medical science during the past ten or fifteen years, and which has so greatly enriched our knowledge of the medicinal floras of distant lands, has not entirely passed over the more common, and for centuries well-known, species of Europe and the United States. Indeed, some of our most valuable acquisitions, among which we number *Stigmata Maidis* and *Convallaria majalis*, have thus originated. Of this class, there is perhaps no more striking example than is afforded by the subject of this paper. A very common and exceedingly abundant plant in the open country of central and southern Europe, Adonis had been for generations used by the Russian peasantry in the treatment of cardiac diseases, without attention from the profession until about ten years ago, when Dr. Buhnow, of St. Petersburg, becoming impressed with its possibilities, subjected it to careful clinical trial, and, as a result, published an opinion of its great merit. Other investigations rapidly followed, and it soon became accepted by European physicians as a valuable addition to the cardiant group. In our own country it has not yet attracted general attention, although the clinical and physiological reports of Drs. Wilson, Hare, and others, have been sufficiently favorable, it would seem, to have called general attention to its important properties. Its growing reputation in Europe, however, insures its early acceptance by the American profession; and, indeed, its introduction into the next edition of the U. S. P. is being strongly urged. It is certain, therefore, at no distant day to become with us an important article of commerce, and we here present a careful description of the characters by which the genuine drug may be readily recognized, and with it a summary of the published information concerning its chemical and medicinal properties.

The genus Adonis possesses an appressed calyx of five sepals, which are sometimes united at the base; five to fifteen petals, with naked claws; a variable number of hypogynous stamens; a variable number of carpels, which become one-seeded and are partly accrescent, ovate-accuminate and possess a short style. The cauline leaves are pinnately parted. The genus is divided into several sections, our species belonging in the section *Consiligo*, which is characterized by having curved carpels and recurved styles, and a perennial root, while in all the other species the carpels and style are straight.

If, then, we find that a sample possesses a recurved style, we know that it must either be genuine *Adonis vernalis*, or it must belong to one of the other three species of the same section. From those, the genuine drug may be distinguished by having, in place of leaves, mere sheathing bracts upon the lower half of the stem, and by the possession of ten or twelve oblong and subdenticulate petals. As it occurs in commerce, the drug consists of rather stout stems from four to ten inches in length, to the lower portion of which is generally attached more or less of the stout, almost woody, crown from which they have sprung. The leaves upon the lower half of the stem are reduced to scale-like organs, while those upon the upper part are sessile, and clothe it densely with their narrowly linear or almost filiform bright-green, erect-appressed entire lobes. An additional mark which characterizes the species is the pubescence upon the outside of its sepals.

The activity of Adonis was at first supposed to be due to the possession of a large amount of aconitic acid —it was claimed as high as ten per cent. More recently, however, a non-crystalline body has been isolated by Dr. Cervello whi h, upon investigation, proves to produce practically the same physiological and clinical effects as the drug itself. This principle, which is a glucoside, and has been named adonidin, is contained in very small proportion, and is thus described: "It is non-nitrogenous, colorless, odorless, amorphous, and extremely bitter, soluble in alcohol, but only slightly soluble in ether and water. It is precipitated by tannic acid, the precipitate dissolving in much water. It is insoluble in cold dilute hydrochloric acid, but on being heated splits up into sugar, and a substance insoluble in ether." This glucoside is extracted with great great difficulty owing to the ease with which it decomposes. Prof. J. Mordagne, who has studied it, presents the following as the important points in its preparation: "(1) Preliminary and thorough treatment with subacetate of lead, which removes a great part of the coloring matter, as well as a pitchy product, probably resulting from the resinification of an essential oil observed in the leaves; (2) elimination of excessive lead by carbonate of soda; (3) precipitation of the tannate from an ammoniacal solution; (4) intimate mixture of the tannate with the oxide of zinc; and (5) the avoidance of too high a temperature in operating upon the alcoholic solution of adonidin, which would give rise to a deeper brown color." It exists in very minute quantity, probably not more than $\frac{1}{25}$ to $\frac{1}{50}$ of one per cent.

The physiological investigations of Dr. H. A. Hare, of the University of Pennsylvania, demonstrate that adonidin possesses the following properties: Its action upon cold and warm-blooded animals seems to be the same. Its characteristic action is to stimulate the muscles of the heart and arteries, by which blood-pressure is in-

creased. At the same time it stimulates the inhibitory centres, thus slowing the action of the heart, and so imparts a slower and a stronger pulse. But these results can be greatly altered, or even reversed, according to the manner in which the drug is administered. That is to say, if the dose be large enough to produce these effects in an excessive degree, so as to result in over-stimulation, the reaction of feebleness follows, and the above named symptoms are of very brief duration, a rapid and feeble pulse shortly succeeding. In the same way, if the dose be strongly poisonous, all indications of a temporarily strengthened circulation may be wanting, paralysis presenting from the very first. If, on the other hand, the dose administered be small and repeated at judicious intervals, no symptoms of feebleness may result, but we obtain a prolonged stimulation, and sustain the circulatory function for a great length of time and without the succession of unfavorable symptoms.

Dr. Hare's investigations followed a large number of clinical observations, and confirmed the conclusions which had thus been reached in every particular. He found that the prominent characteristic of the action of adonidin was the increase of blood-pressure; and this was precisely the symptom which had been observed clinically in numerous instances, and on which the great value of the drug was found to depend in the treatment of dropsical affections resulting from enfeebled heart action.

Perhaps the most interesting feature connected with the action of Adonis is its close similarity to that of digitalis—most unexpected in view of its close relationship both chemically and botanically to aconite, the physiological antidote to digitalis. While the action of Adonis is in general very similar to that of digitalis, yet it is accounted superior to that drug by many authorities, because it possesses greater diuretic power, has no cumulative effect, and can be tolerated longer.

Heart tonics, more than any other group of medicines, have recently received the attention of investigators, and numerous elaborate comparative studies have been reported and earnestly discussed in various countries. Opinion of course differs widely as to choice and application among them, but all authorities agree in according to adonidin a very high rank as a heart-stimulant. Its properties are thus summed up by Durand:

"In doses of ⅓ gr. adonidin:

1. Increases arterial tension.
2. Regulates the heart-beat.
3. Dininishes the frequency of the pulse.
4. Increases the force of the cardiac contractions.
5. Acts with rapidity, its effects being only present during its administration.
6. Increases diuresis.
7. Is well tolerated.

8. The indications for its use are the same as digitalis."

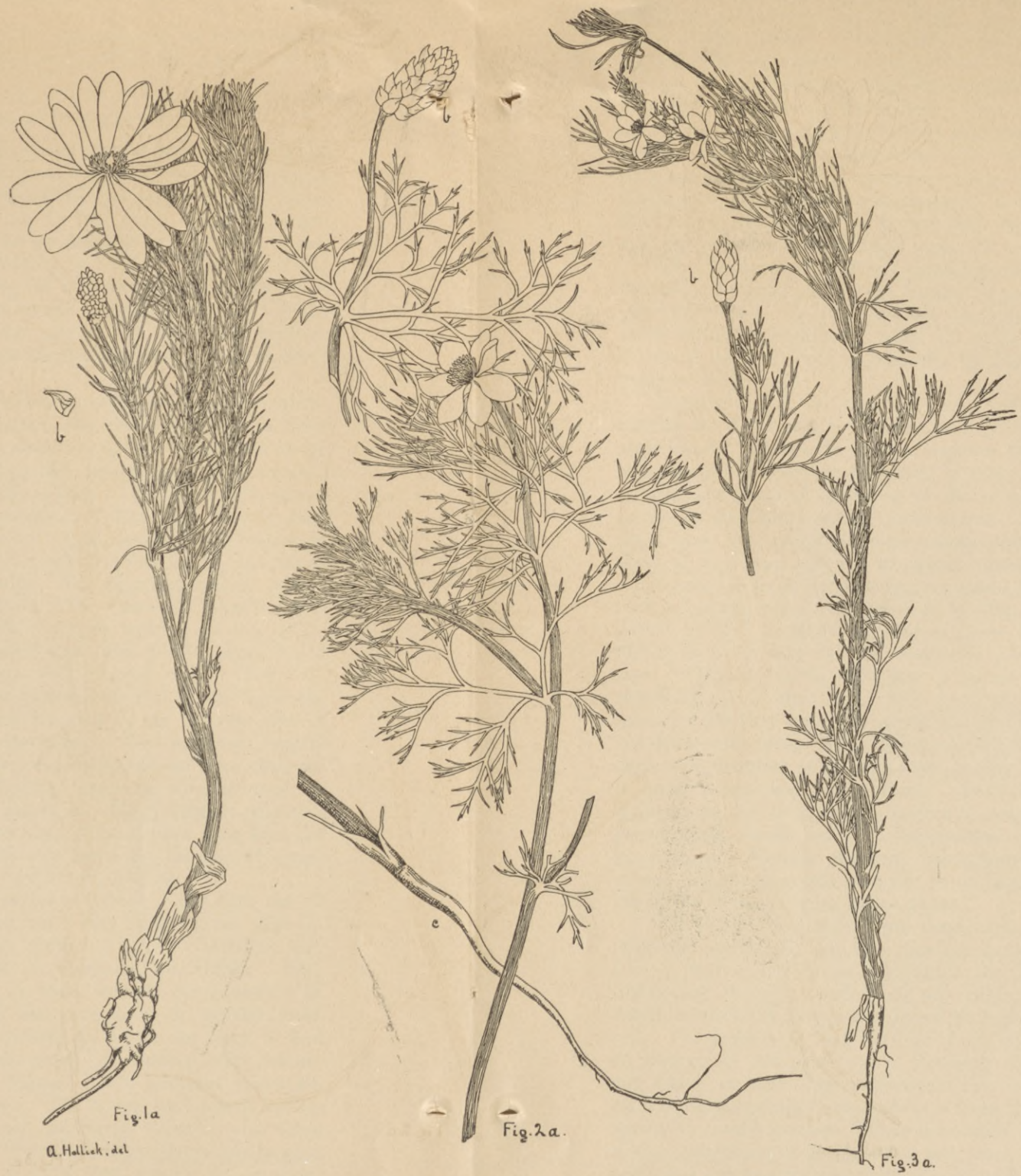
He commends its use, especially in mitral insufficiency and interstitial myocarditis, and in palpitation of the heart.

MONTHLY REVIEW.

American readers may congratulate themselves that Prof. David Hooper has joined the corps of contributors to American pharmaceutical literature. He contributes what we believe to be his first paper in any American journal, to the *Pharmaceutical Record*, Oct. 7th, p. 296, on Cinchona Cultivation in India. Although official records of the doings of the Government plantations of India are from time to time published, they are usually but little seen by our people, and the article here reviewed thus conveys just the information which we could have desired.

The three Government estates on the Nilgiri Mountains are at Ootaeamund, Naduvatam, and Pykara, cover 1779 acres, contain about 1¾ million trees, a gain of 200 per cent. during the past decade, and yield annually about 100,000 pounds of bark. The first of these estates is situated at an elevation of from 6500 to 8000 feet. The second is 22 miles distant, and is at an elevation of from 5000 to 6000 feet, which is very nearly the same as that of the third estate. The principal species planted upon these three estates is the *Cinchona officinalis*, yielding brown bark, and its hybrids, which have rapidly replaced the *Succirubra* since that has so largely fallen in public estimation. Prof. Hooper says: "The Calisaya bark is the best quinine yielder of all the Cinchonas, but unfortunately will not grow in the elevated sites of the Government plantations." This statement exactly corroborates our own experience, as we have observed that in Northern Bolivia, where the climate does not greatly differ from that of the Nilgiri, Calisaya flourishes below 5000 feet, and when planted above 5500 feet, the trees are quite likely to be destroyed, the line of excessive altitude being very sharply defined.

The different modes of collecting the bark are all sufficiently described, and a very handsome full page engraving is presented, showing a thrifty plantation, with the natives engaged in "mossing" the trunks. Prof. Hooper states that in some sections the climate is so moist that the bark has to be dried by artificial heat. Private estates are referred to, but we are sorry to find that estimates of their extent are omitted, with the exception of that at Wainad, where 5,000,000 plants are supposed to be grown. The Bengal government has extensive plantations at a much lower elevation than those above defined. Of these the Sikkam plantations have an elevation of 1,400 to 5,000 feet, occupy 20,000 acres, contain nearly 5,000,000 trees, with a possible yield of



Explanation of Cut.—Illustrations reduced one-third, from dried specimens in herbarium of Columbia College. Fig. 1, *Adonis vernalis:* L.; *a*, flowering and fruiting plant; *b*, enlarged achenium, showing recurved style. Fig. 2, *A. autumnalis*, L.; *a*, flowering plant; *b*, fruit, showing straight style; *c*, annual root. Fig. 3, *A. æstivalis* L.; *a*, flowering plant; *b*, fruit, showing straight style.

300,000 pounds of bark per annum. In 1882 these trees consisted almost wholly of Succirubra, the remainder being chiefly Calisaya. The manufacture of quinine upon the ground, however, has called for a richer class of bark, so that Calisaya and the more valuable hybrids now equal in number the Succirubras. It is stated that the Ledger varieties of Calisaya thrive best between 3,500 and 2,000 feet, while the other forms of the species prefer a low elevation. "Ledgers like a sunny aspect and the Succirubra a northerly or shady one." It is believed that the low price of bark in Europe will result in the near future in the manufacture of most of it in India.

The *Balsamodendron Berryi* forms the subject of an interesting contribution by Prof. Hooper to the *Pharm. Jour. and Trans.* As we could not do justice to this article without reproducing it entire, for which we have not space, we must content ourselves by referring the reader to the original.

A paper read at the Allegheny County Medical Society by Dr. A. Koenig, is published on page 326 of the same journal, in which the speaker deplores the unreliable strength or "possible inertness" of many vegetable preparations prepared according to the processes prescribed by the United States Pharmacopæia. We have dwelt upon this subject in these columns almost to the point of weariness, and yet we cannot forbear making reference to all fresh literature bearing upon a subject of such surpassing importance, particularly when it is supported by such carefully compiled evidence as is furnished us by Dr. Koenig. In conclusion Dr. Koenig says: "The question that confronts us is, are our prescriptions compounded with cheap preparations? The mere fact that they are in the market indicates that there is a demand for them. There is but one solution to this deplorable condition of the drug trade, namely, to place it under Governmental supervision. Every bottle of medicine in the retail drug store used in compounding prescriptions, should bear the Government's stamp of genuineness. Without stringent precautions of this nature, the physician will continue to do battle against the scythe of Death with a leaden sword."

The physiological action and therapeutic value of *Apocynum cannabinum*, have been carefully studied by Dr. Geo. R. Murray, late House Physician to the University College and Hospital, London, and the results are published in full in the *Therapeutic Gazette* for September, p. 585. The paper is too long to admit of our giving even an abstract in this place, but it pleasantly confirms a view which we have long entertained, that this native plant possesses valuable properties of a high order as a remedy in cardiac diseases. While the country has gone wild on the subject of strophanthus and other far-away and costly apocynaceous products, they might have done equally well by developing the properties of the species here referred to.

Dr. F. C. Heath contributes an article on Heart Tonics to the September number of the *American Lancet*, p. 322. His classification is into stimulants, tonics, and sedatives. Among the tonics are mentioned: digitalis, adonidine, convallaria, caffeine, strophanthus, and the cactaceæ. No enumeration is made of the other classes, but the drugs named, with many others, are carefully compared as to their clinical effects.

It is comparatively but a few years since the natural order Leguminosæ was generally spoken of in our text-books as being innocuous or chiefly so; but no other family has of late years developed such an unenviable reputation in this direction. One by one its members —by no means always belonging to the same sub-order or tribe—have been reported as possessing more or less poisonous properties. In quite a number of them an active constituent has been isolated, and a valuable remedy has resulted. Now we find that *Coronilla scorpioides*, a native of Southern Europe, has properties allied to those of Scoparius, rendering it worthy of confidence as a heart tonic.

A general impression seems to be gaining ground to the effect that pulsatilla in the treatment of epididymitis is a delusion. A conclusion on this point should not be reached hastily, as the adverse reports upon it may be in part at least due to unpraiseworthy preparations, it being a drug which suffers very greatly by keeping. It is very possible that its beneficial properties are not to be obtained except by using a preparation of the fresh drug.

According to a writer in the *Lancet*, the pods of senna, which are ordinarily found with the leaflets, possess important advantages over the latter on account of their less disagreeable taste.

Miss Emily Gregory reviews a series of papers by Arthur Meyer, in the *Bot. Zeit.*, on the origin of the partition walls which occur in the intercellular spaces or vittæ of the fruit of the Umbelliferæ. These vittæ are of great interest to pharmacists, as they contain the aromatic oils which lend to these fruits their chief value, and have always formed important characters in their determination.

Mr. Meyer finds that these walls entirely line the cavities, and consist mainly of suberin, a substance through which the oils cannot readily escape as they do, on drying, through ordinary tissues. She says: "It is also well known that the oil of these plants has an injurious effect on many insects, birds, etc., when eaten by them. Therefore, these suberous walls must be regarded as a special arrangement for the preservation of the species."

The 8th instalment of Dr. Britton's Enumeration of the plants collected by the editor of this column in South America in 1885 and 1886, appears in the October

number of the *Bulletin of the Torrey Botanical Club*. It consists of the Leguminosæ, from Lupinus through Galactia, and records 55 species, 5 of which are new to science, namely, two in Desmodium and one each in Astragalus, Coursetia and Dalea, the latter a very handsome blue flowered species.

In the same number, Mr. A. F. Foerste presents a plate of *Nasturtium lacustre*, and comments upon the peculiarity of this aquatic plant in directing the small rootlets which develop upon the upper surface of its leaf, in an upward instead of a downward direction.

A very interesting paper on the mandioca is contributed to the same journal by the Rev. Thomas Morong, now botanizing in Paraguay. This product, which is variously known as mandioca, manioca, cassava, yuca, and to botanists as *Manihot utilissima* (the wild), and *Manihot Aipi* (the sweet), is justly characterized by the writer as one of the most valuable of that region, and one of the most important food plants in the world. The roots of both the wild and the sweet varieties are eaten, although the former must first go through a process of fermentation, and have its poisonous juices carefully removed or destroyed. Because of the danger attending its use, it is not so generally consumed as is the sweet variety, although it is equally esteemed when properly prepared. It is used as an ingredient of soups, is boiled, roasted, and employed in the form of bread. Mr. Morong says, " The roots are grated or ground into a powder, and after the juice is expressed, dried in the sun or placed over a fire, and thus made into flour which forms an excellent bread when baked. The Paraguayan method is to knead the bread with new cheese or ground rice, melted fat, salt, water, and a little coriander seed, prepare it in long, cylindrical rolls or rings, and bake in a rounded oven, or brick ovens resembling huge ant-hills, which may be seen in the rear of many of the houses. The bread thus prepared is commonly called 'Chipa.' The Chipa bread, if I may be allowed to express an opinion, is, at least, when fresh, a delicious article of food. The native women make and sell great quantities of it in the Asuncion market. The town of Luque, on the Asuncion and Villa Rica Railroad, is noted for the fine bread which is made of this flour, and the passengers eagerly purchase it from the women who offer it for sale. I have also seen pastry and sponge cake make of the flour as light and as palatable as anything prepared from wheat flour, and I do not know why it may not serve all the purposes for which the latter is used. If the ground powder is heated upon iron plates and partially cooked, it clusters into hard and irregular lumps, and forms the well known tapioca of commerce; or prepared somewhat differently it becomes the article known in England as the 'Brazilian Arrowroot.'" Mr. Morong speaks very highly of the readiness with which

the mandioca may be cultivated, and its very prolific nature. He believes that it would become a most valuable addition to the cultivated plants of our Southern States, and urges its introduction by the United States Agricultural Department.

The report of the botanist of the United States Department of Agriculture, Dr. Geo. Vasey, for the year 1888, contains besides a brief report on Grasses and Weeds by the botanist, a valuable paper by the agent of the Department, Prof. F. W. Anderson, on The Pastoral Resources of Montana. In this report the forage grasses of the section are carefully reported upon. The report is enriched by 13 excellent plates.

While referring to this report we take the opportunity to congratulate the Department of Agriculture on the increased resources that have been placed at its disposal, and upon the excellent use that is being made of them. The readers of the BULLETIN will perhaps remember that some two years since, the insufficient appropriations for this Department were strongly denounced in the daily press. This action seems to have been instrumental in bringing about an important reform in this direction, so that the Department is now more abundantly supplied with funds than has been the case in the past. Among the new work which is being organized, are some investigations in medical botany, with an account of which we shall hope to favor our readers at future time.

We are in receipt of a pamphlet entitled "Genera Desired for the Herbarium of Parke, Davis & Co.," intended for use in exchanges. Remembering that the herbarium of Parke, Davis & Co. already contains more than 19,000 species, representing an unusually large number of genera, one is impressed with the extent of the world's flora by finding that this list indicates that nearly 6,000 genera are still lacking. More than 10,000 duplicates are offered in exchange for these desiderata. Single species representing the different genera are desired, by purchase where that is preferred.