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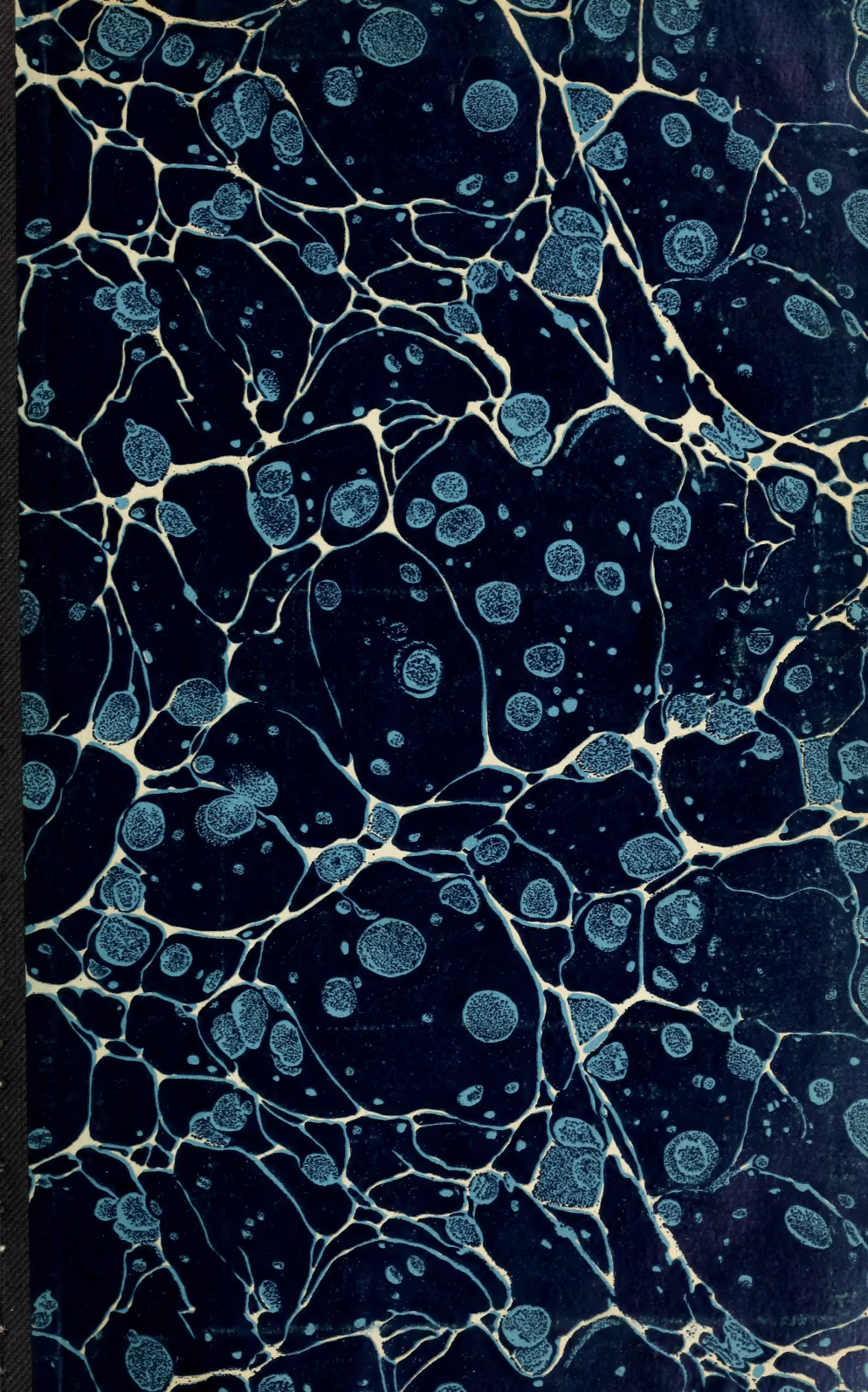

DIRECTIONS FOR COLLECTING FLOWERING PLANTS AND FERNS

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DIRECTIONS FOR COLLECTING FLOWERING PLANTS AND FERNS.

THE FOLLOWING DIRECTIONS for the collection of flowering plants and ferns have been prepared in response to frequent requests for such information on the part of correspondents of the Bureau of Plant Industry and take the place of directions along the same line in Circular No. 126 of the Bureau of Plant Industry, issued in 1913, the supply of which is now exhausted.

EQUIPMENT.

Trowel or pick.—A trowel or pick is a necessity for securing the roots of many deep-rooted plants. Ordinary garden trowels are much too weak for general field work. The intrenching knife [1] formerly used in the United States Army, which is provided with a leather case and spring for attachment to the belt, will be found a useful instrument. Probably the best all-round tool, however, is the geological pick shown in figure 1, which has a head 9 to 10 inches long and a handle a foot long. The pointed end may be used for extracting plants from rock crevices, while the transverse blade is used for digging. The pick may be provided with a loop of rope to be passed over the wrist, and when not in use it may be thrust through the belt. If the pick is made to order by a blacksmith, care should be taken to secure a sufficiently firm shank.

Collecting box or portfolio.—A vasculum or collecting box of heavy tin (fig. 1) is often used for short collecting trips or when plants are desired for study in the fresh state. As supplied by dealers in botanical equipment these are painted black, but if repainted with white paint, to avoid absorption of the sun's rays, they will preserve specimens in much fresher condition. When collecting in mountainous countries a packsack does very well. The plants as gathered should be wetted and rolled up in wet newspapers before placing in the packsack and will be kept in as good condition as if placed in the collecting box.

For ordinary work a collecting portfolio of some sort should be used. Several more or less elaborate types have been devised, but have found comparatively little application. A simple and inex-

[1] This may be procured from dealers in second-hand Army equipment.

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pensive one, which will answer all practical purposes, consists of two pieces of heavy binder's board 12 by 17 inches. These are held together by a single strap or by two straps, which may be tied or buckled together and passed over the shoulder. The press described in the next paragraph may also be used for field work when not many plants are to be collected.

The press.—Experience has shown that the best type of press is that shown in figure 1, which measures 12 by 17 inches. This is made of ash slats, three-quarters of an inch wide and three-sixteenths of an inch thick, securely fastened at the ends and the points of intersection with short brass nails, known as escutcheon pins, which will not rust. The spaces between the slats allow the escape of moisture

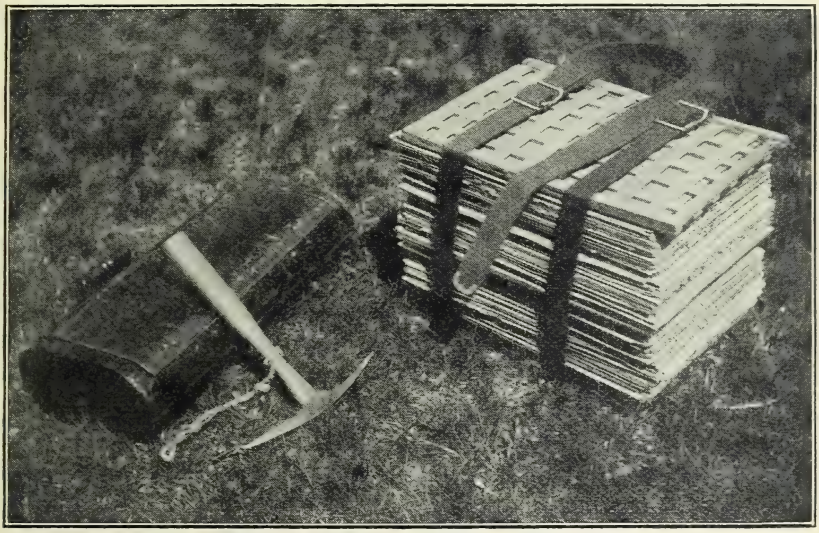

FIG. 1.—Collecting box, pick, and press.

and prevent the plants from blackening in drying. Two stout leather trunk straps may be used for strapping the press, additional holes being bored to permit adjustment to any desired capacity of the press. The type of trunk strap made of web or fiber, having a buckle with a flat corrugated tongue, is better than a leather strap, as it can be secured at any point in its length.

Driers.—The best driers are those made of very heavy gray blotting paper, cut to $11\frac{1}{2}$ by $16\frac{1}{2}$ inches. Felt carpet paper of the same size may be used, but it is less bibulous and proves less satisfactory in drying plants quickly. When plants are collected in quantity, pieces of corrugated strawboard of the same size as the driers will be found of great advantage, as by their use the press is so thoroughly ventilated that only a single change of driers is required. They should

be sufficiently strong to withstand the pressure applied to the press and should be smooth faced on one side.

The Bureau of Plant Industry has used with good success a drier made by gluing two ordinary driers to the faces of a sheet of unfaced corrugated strawboard. This does away with the necessity for the use of both driers and strawboards, but is subject to the objection that when plants with stout stems or rootstocks are pressed the channels between the corrugations are likely to become jammed, thus lessening the effectiveness of this drier as a ventilator.

Collecting sheets.—Specimens are placed in the press in folders of unglazed paper, in which they remain through the process of pressing and thereafter until mounted. The folders used by the Department of Agriculture and by other institutions are blank sheets of ordinary newspaper stock 16½ by 23 inches, folded to 11½ by 16½ inches, but old newspapers cut to this size are quite as good.

INSTRUCTIONS FOR COLLECTING.

Herbaceous plants 3 feet high or less should be collected entire, being bent in a V-shape or N-shape when necessary to accommodate them to the collecting sheets (fig. 2). The root should be secured entire, or, if very large, a portion sufficient to show its character should be taken. Of shrubs or trees a branch about a foot long should be collected, with specimens of the bark and of the sucker or shoot leaves when these differ from those of the main branches. Water plants and those of very fleshy texture require special treatment, which is described in succeeding paragraphs.

The specimens as collected should be placed in the collecting sheets in the portfolio, the leaves being smoothed out and the other parts disposed to best advantage. Roots should be washed thoroughly in order to remove the mud. Many delicate flowers, such as those of the dayflower and the evening primrose, have a tendency to collapse even if perfectly fresh when placed in the press, but it is possible to secure perfect specimens of these and similar flowers by applying bits of paper, moistened with water, to the fresh flower and spreading the petals out to their fullest extent when the plants are placed in the portfolio. When herbaceous plants are too large to collect entire, they may be cut into sections of a size to fit the collecting sheets. In the case of tall plants not only the upper part should be collected but also a portion of the base, in order to show the basal leaves, which are often very different from those of the upper part of the stem.

Several groups of plants require special attention. Sedges and rushes are of little use unless collected in mature fruit. In all other groups it should be the aim of the collector to secure specimens show-

ing flower and fruit, as well as roots, when possible. Mature fruit is especially important for identification in the families of Umbelliferae and Compositae. Some trees, such as willows and oaks, flower before the leaves are expanded. In such cases flowering specimens should be collected, and the shrub or tree from which they are taken should be marked, so that the fruit and mature leaves may be secured later from the same individual.

Aquatic plants.—Many of the fine-leaved water plants, such as pondweed (Potamogeton), bladderworts, and milfoil, collapse entirely if dried by the usual methods. Such plants should be rolled

FIG. 2.—A specimen in a collecting sheet, showing the method of folding to fit the sheet and the use of a slit strip of paper to hold a bent stem in position.

up in very wet paper in the field and brought home in that condition. They should then be placed in water and floated out on sheets of white paper, which must be carefully drawn out of the water so that the finer divisions of the leaves will not cohere. These white sheets should then be placed in collecting papers and given the same treatment as other specimens.

Fleshy plants.—Many fleshy plants, such as purslane and orpines or live-forevers, are very hard to dry properly, their moisture content allowing them to live for a long time in the press. They require to be placed for a short time in boiling water, after which treatment

much better specimens may be obtained. Care must be taken not to immerse the flowers. Ironing such plants while in the folder with a very hot flatiron has been recommended by some. Cacti with flattened joints may be split, scraped out, and dried in the usual manner. Those with round stems should be cut into transverse sections and dried.

Seeds and small fruits.—Seeds and small fruits may be put in envelopes and placed in the collecting sheets with the specimens from which they were taken. Fleshy fruits, thick roots, and fleshy flowers of considerable size should be preserved in alcohol or formaldehyde[1] and provided with labels, written in pencil on some nonbibulous paper, which will serve to connect them with the corresponding herbarium specimens. It is very desirable that photographs of such material should also be made, of natural size if possible; otherwise on some definite scale, which is best shown by placing a small paper with centimeters ruled on it on the background of the specimen.

INSTRUCTIONS FOR PRESSING SPECIMENS.

Specimens should be transferred to the press as soon as possible after returning from the field, particularly in hot weather. If unavoidable they may be left over night in the portfolio, if this is strapped up tightly. The collecting sheets containing the specimens are laid in the press in alternation with the driers and strawboards in the following order: Drier, collecting sheet, strawboard, and so on. The press is then strapped up tightly and placed in the sun or in some well-aired place, as before an open window. At the end of the first day the specimens should be examined and the driers exchanged for fresh ones, when folded leaves may be straightened and the appearance of the specimens improved. Stems which have been bent and tend to straighten out, such as those of grasses, may be secured by passing the bent portions through slit strips of paper. (See fig. 2.) It is important that the dried specimen should show both sides of the leaves when it is mounted, and this may be attended to now, when the specimens are limp after their first day in the press. The press should then be tightly strapped again. In the case of ordinary specimens no further change of driers is required if plenty of strawboards have been used. If these are not available and driers only are used, it is necessary to change the latter every day for five or six days, substituting each day fresh, preferably warm, sun-dried driers. Average specimens will be dry in a week and thin or delicate ones, such as grasses and ferns, in two or three days, while very fleshy plants will require a longer period.

[1] Formaldehyde used as a preservative should have a strength of 2½ per cent. This may be obtained by diluting the commercial formaldehyde, or formalin, which is of a strength of 40 per cent, with 15 times its volume of water.

Artificial drying.—Considerable difficulty is sometimes experienced in properly drying plants in very wet regions or seasons. In such cases plenty of strawboards should be used and the press suspended 2 feet above some source of heat, such as a small 1-burner oil stove of the old-fashioned sort, made of iron with mica windows, or a camp fire if nothing better is at hand. In case an oil stove is used, a cloth apron drawn around the base of the press and hanging from it to the stove, at a safe distance from the flame, will lead the heat directly to the press and expedite drying. Artificial drying is to be avoided when possible, as it tends to make the specimens brittle, and care must be taken not to obtain a temperature much over 120° F., as with higher temperatures the waxy coatings of many leaves may melt off, thus injuring the quality of the specimens.

LABELING SPECIMENS.

Assuming that specimens are correctly prepared, their value for scientific purposes is in direct proportion to the fullness of the accompanying data. These include locality, date, habitat, altitude, collector's name and number, and notes on the color of the flowers, the habit of the plant, whether shrub or tree, its uses, and such other facts as deserve to be recorded. This is especially important in the case of tropical plants. Many, if not most, of the tropical species in herbaria, often those represented by full series of specimens, are unaccompanied by any notes of this sort, and their value is consequently diminished. The collection of the underground portions of plants, even of many of our common species, deserves much more attention than it has yet received.

It is especially desirable that collectors who are traveling in little-known regions should secure as much information as possible about the plants they collect. A label form, 6 by 3½ inches, is used by the Bureau of Plant Industry which provides for field records of the following points: Latin name, local name, collector, locality, habitat, altitude above sea, habit (tree, shrub, herb, woody or herbaceous vine), height of plant, diameter of trunk breast high, flowers (color, odor, etc.), fruit (kind, color, odor, taste, size), special notes (habit, abundance, associations, milky juice, etc.), uses, and date. Any additional particulars can be entered on the back of the label.

All the specimens of a given species collected at the same time and place should receive the same serial number, and the numbers should run consecutively through all the collector's work. Many collectors make a practice of starting a fresh series of numbers each year, and some have even given the same number to the same species collected on different dates or in different localities, but such practices are productive of great confusion and are to be condemned. Under each

number full data should be entered in the collector's notebook, sample entries being as follows:

789 *Viburnum nudum* L. Great Falls, Va. May 9, 1918. Edge of Potomac River. Shrub 2.5 meters high; fls. white.

888 *Dioscorea villosa* L. Cabin John, Md. May 19, 1918. Twining over bushes in woods. Fls. pale greenish yellow.

990 *Physalis* . . . Great Falls, Va. July 7, 1918. In sand near river. Corolla yellow with maroon eye, about 12 mm. wide.

Labels containing full data should always accompany specimens when they are sold or sent in exchange. Specimens collected from cultivated plants should always be so designated and should bear statements as to the native country or the business house from which they were obtained, with information as to their economic uses.

Labels should be of good quality of white paper, 4 by 1⅞ inches, and should be as simple as possible. The method of writing data used in herbaria is shown in figure 3.

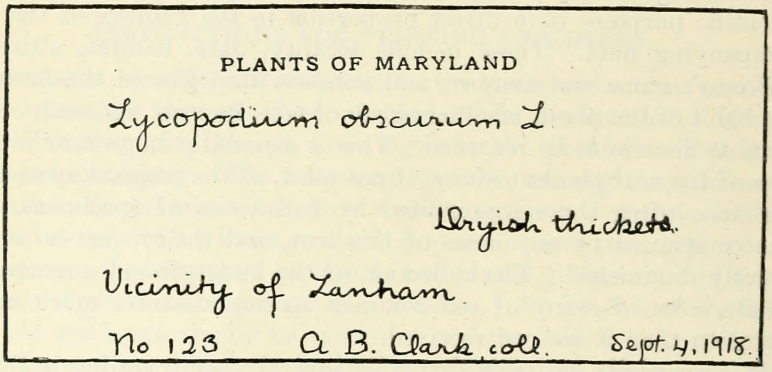

FIG. 3.—Sample of label form used in the United States National Herbarium.

PACKING AND SHIPPING SPECIMENS.

Pressed specimens should be shipped in the original sheets in which they were collected, and these should be securely tied in bundles of about 50 between pieces of heavy cardboard or binder's board of the same size. Care should be taken to alternate thin and thick specimens in such a way that a flat package is obtained. Such bundles can be sent through the mails singly without damage, or if too numerous they can be packed in boxes. In the latter case care should be taken to pack tightly and fill all vacant spaces with crumpled paper in order to hold the bundles firmly in place.

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