

## PROGRAM GUIDE

for

## CANCER PROGRAM

This guide was first prepared in October 1967. Several additions were made in 1968-1970. All entries were reviewed in October 1970 and those that were out-of-date were revised.

The purpose of the guide is to provide a reference to all program policies and procedures. The Guide will undoubtedly prove incomplete. If you find that the guide does not answer a specific question or you consider that additional subjects should be covered, please insert a note to this effect in the front of the notebook containing the original copy. If you consider that any aspect of the guide is incorrect or incomplete feel free to make any proposed changes on the original copy in pencil.

The guide makes several references to attachments. If only one set of attachments is available, this set will be with the original copy.

The original copy of the guide is in a notebook on the wooden shelf in Room 228.

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CONFIDENTIAL INFORMATION

The fact that a plant is a confirmed active is confidential. This is primarily to protect the interest of the chemists. I feel it is reasonable, for they can hardly be expected to devote months to isolation and chemical characterization if there is any chance they may be "scooped" by an outsider. Botanists, for the most part, are not cut-throats, but chemists apparently are.

I would prefer in some respects for all interesting information to be made public immediately and let the chemists compete to see who gets the answers, and the patents as well. But this is not necessarily the best approach. For example, if our experience with Taxus was now public, every drug company would push this to the hilt in the hope they would be the one to develop and monopolize a valuable drug. One of the drug companies might beat Wall to the finish, perhaps by a significant amount of time, for their resources are great.

But what happens to some of our less spectacular leads. A drug company wouldn't push these, but Wall does as best he can.

I feel that our overall objectives are better satisfied under the policy we now follow and do my best to conform.

Sometimes it is impossible to conform. If we had followed current policy to the letter, we would have been able to obtain very little Camptotheca, and procurement of Taxus bark would have been much more costly and required a long delay. I just do the best I can to follow

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policy and still get the plant material needed. One can only hope that the information does not get into the wrong hands.

Hartwell and Wall understand this problem fully. Kupchan understands but doesn't particularly like it. To Davenport, it is an intolerable situation.

I find the word "cancer" magic. Relatively few people will disregard a request if they understand that this is what our material is used for.

When dealing with regular commercial suppliers, I never reveal that a plant is a cancer active. As a rule, when writing to a government employee, I speak freely but point out that our interest is confidential and why it is confidential.

If you get into this kind of problem, call Hartwell and get his advice on just how far you should go in revealing information.

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## PURCHASE OF FIELD SUPPLIES

We can usually use end-of-the-year funds to advantage for purchase of field supplies. An inventory should be taken each year about March 1 and we should prepare a list of our requirements for the following year. Orders should be placed no later than mid-April.

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## ACCESSION NUMBERS

A record is kept of accession numbers, as they are assigned, in the folder ACCESSION NOS. ASSIGNED, which is kept in Room 228 on the wooden shelf. A new folder is started at the beginning of each fiscal year. Old folders, representing previous years, are filed in drawer 18 in the section ACCESSION NUMBERS ASSIGNED.

The purpose of this record is two-fold: (1) as a point of reference to avoid using the same number for more than one sample, and (2) to provide a convenient means to determine the number and kinds of samples we have supplied, especially when we prepare our annual report.

MSH is responsible for assigning accession numbers and for keeping the record of numbers assigned. The reason for this is that past experience indicates that there is less chance of error if this task is done by one person. Others should assign numbers only in her absence.

We will assign accession numbers only when we are reasonably confident all the samples covered by an order are at the Inspection Station and ready for shipment. If, when a draft shipping list is prepared, we are not sure that all samples on the list are at the Inspection Station, the list should be sent to Mrs. Haines without numbers. After the samples are located she can call MSH for the numbers to be used.

When we are processing large collections of samples like those from East Africa, Mrs. Haines will assign numbers. She will call MSH for the first available number, then call back later to report numbers used. At such times, a note should be attached to the inside of the record folder - "Mrs. Haines is assigning numbers" - to warn others.

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## SPECIAL REQUESTS

Program policy requires that any special requests for plant material (like large amounts of plants that are not confirmed, unusually large quantities of confirmed actives) are funneled to us through CCNSC. We have no obligation to fill a special request made directly to us by Wall, Kupchan, Cole, etc. In practice, we accept any request that seems in the best interest of the program, whether or not it has passed through CCNSC, and do our best to fill it.

We do not hesitate to fill any request made by Hartwell or Abbott. Both are usually reasonable and are always ready to put their request in writing. Sometimes they (particularly Abbott) will make a request that is extremely difficult to comply with. In such cases, we usually discuss the matter with them and try to reach a reasonable compromise that will provide what they need and be easier for us to deal with.

We do our best to fill any request made by Wall. His requests occasionally go beyond the call of duty but not to an extent that puts us in a difficult position. We cooperate fully with Wall because he cooperates fully with us. The effort he went to in screening all the individual samples of Camptotheca and Taxus, primarily so we can get a few papers too, is a very good example.

We do our best to fill any request that Kupchan makes when we consider that it is in the interest of the program. But where this fellow is concerned, stop and ask yourself whether his requests are

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in the interest of the program or in the interest of Kupchan. Kupchan can be very pushy. We tolerate no veiled threats or innuendo. If Kupchan gets out of hand, do not hesitate to require that he forward his request through Hartwell.

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## REVIEW OF NAMES IN MANUSCRIPTS

Our review of Latin names of samples submitted for screening is certainly superficial. My philosophy is that we should be certain, to the best of our ability, that the name we use has appeared legitimately in print. I try to use acceptable names. I do not worry about submitting samples under the most desirable name. I have no doubt that we have on many occasions submitted samples of one species under several different names. However, if the names we use allow a seriously concerned individual to establish the identity and synonymy of all plants of one taxon, then I feel we have accomplished our objective. Further perfection is beyond our capabilities on a practical basis.

Once a plant reaches "confirmed active" status, I consider that further effort is justified. I have suggested to CCNSC (see my July 6, 1967, memo to J. L. Hartwell) that we devote special attention to names of all confirmed actives before the chemists publish. If they follow my suggestion, the chemists, particularly Wall and Kupchan, will send us a copy of their preliminary manuscripts. I do not consider that either you or I are competent to check such names. These names should be checked by Dr. Smith (or Terrell, if Smith is not available), just as names in manuscripts submitted by CRD authors.

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## LETTER-SIZE FILES

### Drawer 1. Plants of Special Interest

This file is a depository for any information of interest to the cancer program that can be filed logically under a genus name. A white carbon copy of every letter dealing with a specific plant is filed here.

The POSI file is a very useful cross index to the correspondence file. When we cannot remember the location and name of a supplier, we can usually at least remember the plant he supplied and the POSI file will usually lead to the proper folder in the correspondence file.

The POSI file includes many items for which our need is but temporary and they are to be removed when no longer needed. A good example is the Camptotheca folder which gradually grew to the point where it occupied a full file drawer. Most has been eliminated since all information has been incorporated into two manuscripts. Duplicate copies of correspondence were replaced with a list of names and addresses of correspondents.

The POSI file is now divided into two sections "gymnosperm" and "general". The former is in the front of drawer 1.

### Drawer 2. Subjects of Special Interest

This file is primarily for information on topics pertinent to the cancer program but includes a few other topics of interest. Information

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that is of interest to PRI or NCRB as a whole and that should be readily available to everyone should be filed in the Tool Room.

Drawer 3.      NCRB Staff.

This is essentially a correspondence file but provides a place also to file any papers of any sort more logically associated with an NCRB staff member than with a subject.

Drawer 3.      Seed Sources

Drawer 3.      Collectors--Domestic

This file covers domestic collectors or commercial suppliers that we purchase plant material from. It does not include NCRB collectors.

If at any time we issue a blanket purchase order (this will be explained elsewhere) for the Cancer Program the supplier should be represented in this file. When the purchase order is issued a sheet should be prepared like that clipped to the inside (front cover) of the folder, "MARYLAND, Baltimore--Read, Clyde F." Each payment made to the supplier should be recorded here.

This file was originally intended as a depository of records concerning blanket orders and records concerning purchases from suppliers we deal with frequently.

I now feel, that with a single exception, we should have a folder for every supplier of plant material. The exception: I see no

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need for a special folder for an insignificant one-shot purchase that is based on a fixed catalog price that requires no negotiation. For example, if we buy 50 pounds of seed from Burpee and base the price directly on their catalog we generate only a CR-2 that can go in a notebook.

But when we have to negotiate the price, submit the standard letter from a supplier showing cost, amount, shipping directions, etc., and obtain signed invoices, I think a record should appear in this file.

Time, this file is not just a dead record of what we have purchased and from who. It also supplies good guide lines to how to set up new purchases.

Drawer 3. Collectors--Foreign

This file is essentially the same as Collectors--Domestic.

Note that Uhe was at one time in Samoa but has since moved to New Zealand and all of our records are filed in the New Zealand folder.

Drawer 3. Collectors--Old Records. (Both Domestic and Foreign)

Drawer 4. Travel

The first folder includes general information associated with REP travel.

The remaining folders each represent a separate trip (1963 to date) or period (1957 through 1963).

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This file is intended as a depository for financial and administrative records only, for example, travel requests, authorizations, travel vouchers, formal reports on foreign travel required for Director, CR, and so forth.

Drawer 4. Meetings

Similar to the "Travel" file, but, for information concerning REP attendance at meetings. Note that travel vouchers covering trips to meetings should always be filed under Travel.

Drawer 4. Administrative Files

Most of these files pertain to PRI as a whole and have little if anything to do with the Cancer Program.

Current Records. Contains only records of current interest. Note especially the files on Annual Reports and CRIS as we will probably be hearing more about these in the months ahead.

Old Records. These are all records left over from when Dr. Jones was Investigations Leader and are being held primarily for his use. These will be eliminated eventually.

Training. (Self explanatory)

Employee Suggestions. (Self explanatory)

Drawer 5. Supplies. (Additional supplies in drawer 23.)

Drawer 6. Maps.

Note that in the rear of this drawer are quite a few maps of U.S. field areas where Perdue collections for cancer program were made. (10-15-70)

Each of the U.S. highway maps should be labeled "Office Map File, Return to Room 228."

The maps are used by several people in the Branch. Some maps get lost. The entire collection of U.S. highway maps should be replaced every 2-3 years because of the many changes on new editions.

Complete replacement can usually be accomplished by a telephone call to the Esso and Texaco touring offices. They either mail them directly or advise where to write. Ask for two copies of each map available.

Note that the file includes Esso and Texaco city maps also.

Drawers 7, 8, and 9.      Publications

Reprints and other publications for distribution (others are in drawer 13).

Drawer 10.      Correspondence

Staff Correspondence. When a memo is addressed to PRI staff, each receives a carbon copy and the original is placed here.

Domestic Correspondence (A-M). All correspondence is filed by geographic location and under location, by correspondent or organization. Letters to and from a new correspondent are normally placed in a state folder. A special folder is prepared when enough correspondence accumulates to justify a separate folder for any one correspondent or organization.

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All correspondence is filed with most recent letters on top.  
Within State folders, correspondence is filed alphabetically.

Drawer 11. Domestic Correspondence (N-Z)

Foreign Correspondence (A-K). This file is organized like the Domestic Correspondence file. It provides a useful lead to our experiences in foreign purchases of plant material.

Drawer 12. Manuscripts

Carbon copies of manuscripts are filed here as:

Published

Completed, pending approval

Unpublished

Usually copies of manuscripts are filed here when they are submitted for approval. This file is not used for manuscripts in preparation.

Drawer 13. Publications

Reprints and other publications for distribution (others are in drawers 7, 8, and 9).

Drawer 14. Cancer Program.

Field Work.

Vehicles.

Buildings. Intended for any information about the future (?) new building at Glenn Dale.

Equipment. Any time we make a special purchase of equipment involving plans, specifications, etc., copies should be filed here. Any

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time we purchase an unusual item and need to keep a sample it can be placed here if adaptable to a file folder. Such samples should be documented so we can re-order if necessary. Attach a reference to the purchase order number or requisition or other identification as appropriate.

Drawer 15.      Cancer Program

Collectors Shipping Lists and Notes. This is a hodgepodge. Collectors shipping lists are placed here after his samples are processed through the Inspection Station. This is a depository for any information associated with a collector or his collections that cannot be filed appropriately elsewhere. Includes some B&W photos which eventually should be transferred to drawer 20.

Special Sources--Commercial. This, to a degree, duplicates the file in drawer 3. Here all folders are for regular commercial suppliers of bulbs, seed, etc. This file should eventually be re-organized and some of the material filed here should be moved to drawer 3. This file should be reserved for catalogs, lists, and general information not related to specific purchases. In contrast the collectors files in drawer 3 should be reserved for correspondence setting up purchases, for records of payment, etc.

Special Sources--Non-Commercial. Includes various records of accessions from Plant Introduction Stations, Botanic Gardens, etc.

Special Sources--P.L. 480.

Drawer 16.      File including drawers 14-19 is the only file we can lock.

This drawer is reserved for items that cannot be left out after hours like cameras.

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Drawer 17.      Kodachromes

This is intended primarily for kodachrome slides pertaining to the cancer program but other subjects are included, for example, Perdue's basketry slides.

Past experience indicates that it is unprofitable to file photos of our confirmed actives by plant name. Better to file according to state or country in which collected.

The master set of slides used for preparation of duplicates and color prints should be filed in this drawer and should be kept in a separate file pocket. Use a pocket with a tie down flap. This master set should never be used for anything other than duplication and should be handled with the greatest care.

This file needs re-organizing.

Drawer 18.      Cancer Program

Accession Numbers Assigned. As accession numbers are assigned, a record of those used is tabulated in a special folder. This folder is kept on the wooden shelf in Room 228. A new folder is used at the beginning of each fiscal year. The old folders are filed permanently in drawer 18. These old records are not used very often but are occasionally essential to resolve problems that arise. They must be retained.

Annual Report. For several years we warned CCNSC informally that something should be done to provide for a future supply of Camptotheca. They chose not to heed our advice. Our first support from CCNSC came after some strongly worded advice on this subject was included in an (10-15-70)

annual progress report. The implication is that our recommendations are more likely to receive serious attention if they are included in our progress report. This is probably because these reports are reviewed by an outside advisory committee. This section of the file is intended as a depository for informal notes on subjects that should be included in the next annual report of progress or the proposal for the following year's work that must be submitted at the same time.

CCNSC Conferences. Notes and hand-outs from the formerly twice yearly, now once yearly conferences of suppliers, extractors, chemists.

CCNSC Protocols. The protocols of special interest to us are those for screening synthetics and natural products against the animal tumors and other systems like KB Cell Culture. These were published in Cancer Chemotherapy Reports, No. 25, December 1962. They have been amended and additional tumor systems, not included in the original program, have been added. The amendments and additions through about the end of 1968 are included with the copy of the protocols filed here.

CCNSC Transfer of Funds. Our annual Progress Reports to CCNSC, annual project proposals to CCNSC and formal budget estimate. We forward these three items each year with a standard letter. Correspondence covering these items should be placed in the regular correspondence file, not here.

Chemical Constituents. Dr. Hartwell has prepared several compilations of chemical data likely to be of interest to fractionators and others involved in the cancer program. These compilations are filed here.

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Chemists, Extractors, and Screeners. Miscellaneous notes concerning these people or organizations.

Folklore. Early in the program, when we planned foreign projects, Dr. Hartwell provided lists of plants used in the folklore of the countries to be visited that are reportedly used there for treating cancer or cancer-like diseases. These lists are filed here.

Publications. Includes publications related to the Cancer Program. Very incomplete. Other publications are in the POSI file. We are continuing to accumulate publications related to the program and will eventually incorporate these into one well-organized file.

Screening Data Evaluation. We started an evaluation of the program to determine if guidelines could be established for future procurement. This was intended to determine if activity was limited to plants from specific families, whether collection of certain types of samples was profitable, etc. This evaluation was premature. The notes here are largely left over from that effort. They are of no real value except that they offer ideas for future approaches to program evaluation.

Also included are notes and data used as basis for paper Perdue gave at SEB, Berkeley, California.

Miscellaneous. An absolutely last resort.

Hold for Future Reference. Old sheets from active books representing plants that reached Code 15 but failed to confirm. Probably should be thrown out but we will hold them for a while.

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Also in this section, materials for our list of confirmed actives and ONS samples. This is the list we started working on in 1966. It is being held in abeyance until Betty Abbott determines whether information we need can be incorporated into their quarterly list of confirmed actives.

Drawer 19. Overseas Field Project Areas

An unorganized collection of information on foreign areas where we have had or may have field projects.

Drawer 20. Black and White Photographs.

This is not well organized and can be much improved. All black and white prints and negatives without NCRB numbers should be filed here.

A negative that is assigned an NCRB negative number should be filed in the Branch negative file.

Note the general collection of photos illustrating the cancer program in the first packet. Negatives are attached. Legends are on the negative envelopes. This collection was prepared in the event photos are needed by Drs. Creech or Jones.

Any negative used in a publication should receive an NCRB negative number. This is a Branch rule unless the negative is personal property.

Drawer 21.

This is an old "pre-cancer program" file of material assembled for future publications. This will eventually be discarded as space is needed.

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Drawer 22.

General storage, now used primarily for IBM cards reporting tests on conifer samples.

Drawer 23.

General storage - office supplies (additional supplies in drawer 5).

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# CARD FILE (3 X 5 IN.)

When a shipping order is typed on the Flexowriter at the Inspection Station, a paper tape is produced for each shipment. A program tape is used with the first tape to convert single-line data on the shipping order to the card format. With this tape combination the Inspection Station provides 3 cards for each of our accessions.

These 3 sets of cards are filed as follows:

1. Genus file - alphabetical by genus and species, then in numerical order by PR number.
2. Family file - alphabetical by family, then by genus and species, then in numerical order by PR number.
3. Collectors - alphabetical by collector, numerical by collection number.

The first and last of the above files are essential. We use No. 1 almost every day; we use No. 3 quite often. No. 2 is rarely used but I am sure it will prove essential in the future.

All cards representing PR-1 to PR-10,000 are white.

Cards representing PR-10,001 to 15,000 are yellow.

Beginning with PR-15,001 we will change card color after each 5,000 accessions. This procedure will be very useful when we begin the evaluations and comparisons planned for future publications.

I am keeping a 4th temporary 3x5 card file representing all collections from East Africa. This is intended first for a direct

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comparison to determine to what extent this collection duplicates the Ethiopia collections. Secondly, it will be used to determine to what extent 1967-68 EA collections duplicate 1966-67 EA collections. This file will be discarded once it has served its purpose.

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No cards have been prepared for this file since early 1969. New Flexowriter tapes have been prepared from the original tapes and DSAD is now developing a program for a computer print-out of our accession records. When this print-out is available, the 3x5 card files can be discarded.

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## VOUCHER SPECIMENS, DISTRIBUTION OF

Our general policy is to send all vouchers representing samples collected for the Cancer Program to the Herbarium of the National Arboretum if the quality of the vouchers justifies permanent deposit. HNA mounts the vouchers and distributes them in their collection.

When a collection confirms, HNA returns the voucher to us on permanent loan, and the voucher is made a part of our voucher herbarium. We will retain this collection until the program is terminated at which time the entire collection will be returned to HNA.

Vouchers representing East Africa collections are an exception to this rule. Those from the first field project in East Africa were sent to HNA. We have been unable to locate some representing confirmed active plants. Now, we retain unmounted vouchers of East Africa collections here in a herbarium case. When a plant confirms, the voucher is located, sent to HNA for mounting, then returned here on loan for our collection.

Vouchers for the East Africa samples are collected in sets of five. We get one set. East African Herbarium retains two sets, one for their collection and one for their exchange program. Two sets are sent to Kew, one for their collection and one for exchange.

## VOUCHER HERBARIUM

Please do not write on the covers. Changes in names should be made on the white labels.

This collection is housed in Room 226. It is a collection of all voucher specimens available to us representing confirmed active collections, re-collections of confirmed active plants, and collections that are QNS. This herbarium includes photographs of many of our vouchers and photographs of other specimens to serve as vouchers.

Voucher specimens should be distributed as follows:

Manilla covers - for general use.

Green covers - for specimens of questionable identity or for those, which for some other reason cannot be considered as correctly and permanently filed; these folders are used so that our attention will be called to these specimens frequently and remind us there are problems to be resolved.

Orange covers - for specimens vouchering samples that are QNS; when testing of the refill is complete either (1) transfer voucher to manilla folder if sample confirms, or; (2) send voucher to Arboretum for deposit if sample fails to confirm.

Negatives from which voucher photos were prepared should be filed with the photos in large manilla envelopes taped to the covers. Mrs. Noble prepared the covers and filed the photographs. For sake of uniformity she should continue to do so.

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## PRIORITY FOR RE-COLLECTION

About mid-October 1970 there was a meeting involving CCNSC and clinicians. Clinicians have little, if any, active interest in working with drugs active only against WM. For our purposes what does this mean?

1. Thallicarpine (from Thalictrum dasycarpum) is a WM active. It is scheduled for clinical trial. Apparently, current plans for this drug will be followed through but interest could rapidly fade. We should follow this closely. The status of thallicarpine will be an important factor when we have to decide next spring whether we will devote any field work to Thalictrum in the north-central states. Right now this does not appear to be a profitable area for us.

2. Currently, it appears that WM actives will join the group that includes SA, CA, etc. They will probably become candidates for 5 lb. collections for testing in PS and B-16 melanoma and will be dropped completely if they are inactive.

3. The only actives that will be candidates for 50 lb. collections are likely to be those active in PS, L-1210, and KB.

4. The number of actives that are candidates for 50 lb. collections will be drastically reduced. The reduced number of actives will not be adequate to keep the fractionators busy. General screening will probably get a big boost and we will probably be called on to give increased emphasis to procurement of small samples. The logical answer is to increase our present quota of small collections from the present 1,000 to at least 2,000, preferably 3,000.

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5. It would be a good idea for LAS to begin giving some thought (while REP is in the Orient) to:

a. Under present funding, if annual quota of re-collections is reduced to 50, to what extent can we increase quota of small collections?

b. If our budget is increased by \$25,000, to what extent can we increase our quota of general collections and still maintain our present quota of 100 re-collections per year?

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## PRIORITY FOR RE-COLLECTION

During the first few years of the Cancer Program we had many preliminary actives and very few confirmed actives. There were quite a few occasions when a botanist would go out for confirmed actives only to return and find that a preliminary active from the area visited had since confirmed.

It was obvious that at least in some cases it would be profitable to collect large samples of preliminary actives so the sample would be available if the plant confirmed.

A priority code for re-collection was set up by Hartwell:

1. Confirmed Active

- A. For isolation of additional large quantities of active agent for pre-clinical pharmacology or clinical trial.  
Large sample, amount to be arranged; special collection.
- B. Large sample QNS. To continue fractionation. Large sample, amount to be arranged; special collection.
- C. QNS. For re-confirmation; to begin fractionation.  
Large sample, (about 50 lbs.); special collection.<sup>1/</sup>

2. Code 15

- A. QNS. Passed 1 dose response test toward confirmation.  
Large sample; special collection.

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<sup>1/</sup> Make a special effort here to collect also large samples of the different plant parts and, where feasible, at different seasons of the year.

- B. ONS. For confirmation. Code 15 results look promising.  
Large sample; special collection.
- C. ONS. For confirmation. Code 15 results marginal.  
Large sample; incident to other collecting.
- D. Showed promising preliminary activity. Large sample;  
incident to other collecting.
- E. Showed promising preliminary activity but failed confirmation. Large sample; incident to other collecting.
- F. Other species in same genus or family. Small sample  
(1 to 2 lb.); incident to other collecting.

3. Preliminary Screening Incomplete (ONS)

- A. Code 11 or 13. Looks promising for code 15. Large  
sample; incident to other collecting.
- B. Code 11 or 13. Not promising. Small sample; incident  
to other collecting.
- C. No preliminary activity yet. Small sample; incident  
to other collecting.

This code was prepared purely from Hartwell's point of view at the time. We have followed his "degree of importance" scale to the point that we find it acceptable. These priorities are now ignored at the Code 15 and Code 11 or 13 ONS level when domestic collecting is involved but they are very useful in judging the importance of overseas re-collections.

## PRIORITY CODE FOR RE-COLLECTION OF ACTIVE PLANTS

When this program began in 1960 all extracts were screened routinely against three tumors: sarcoma 180 (SA), adenocarcinoma 755 (CA) and lymphoid Leukemia L-1210 (LE). Some extracts were also screened against KB (Eagle) cell culture (KB). After several years, screening was expanded to include testing of all extracts against KB and many were tested against other systems like Lewis lung carcinoma (LL), Friend virus leukemia (FV). Dunning ascites leukemia (DA), etc.

About 1966 CCNSC completed a study that indicated that of the tumor systems then in use for general screening, only LE had good predictability for clinical activity in man. This study also indicated that another tumor system had good predictability for clinical activity, particularly against one kind of Leukemia. This was the Walker 256 intramuscular (WM). This system had not been used previously for screening.

The screen was then modified to include only LE, WM, and KB. The latter was retained, not because of good predictability for clinical activity, but primarily because it had been responsible for detecting activity of plants like Taxus and Cephalotaxus, fractions of which later proved active against LE. Crude extracts of these plants were inactive against LE in the initial screening tests.

A great many plants have since proved active against WM. About 40% of this activity is due to either tannis or phytosterols, neither of which offer promise as useful drugs. Since a great many plants

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were active against WM and this system is predictable for clinical activity against a limited number of cancers in man, CCNSC concluded that little would be gained from further screening in WM and this tumor was dropped from the screen. If, in the future, agents isolated from WM active plants offer promise, as useful drugs, WM will again be added to the screen.

More recently, P-388 leukemia (PS) was added to the screen. although LE has good predictability, it is highly selective and probably misses some useful activity. PS is expected to detect some of the useful activity that LE fails to detect. If future experience indicates that PS detects the activity that is now missed by LE, the latter will probably be dropped from the screen.

The screen has provided the initial basis for the development of drugs useful against rapidly growing tumors in man but has failed to provide drugs useful against slow-growing tumors. The latter are far more difficult to treat. CCNSC is now placing emphasis on development of a screen that will detect activity against slow-growing tumors. LL is in this category and there has been a renewed interest in plants active against this tumor. These plants recently received fairly high priority for re-collection (but see below). Another tumor that fills this need, the B-15 melanoma, is now being evaluated as a screening system and may be added to the screen later.

Current policy on procurement, testing, and fractionation of confirmed actives (exclusive of WM actives) is as follows:

1. Re-collections will be made of all confirmed actives regardless of which tumor they were active against.

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2. Re-collections will all be tested against LE and PS.
3. When re-collections reconfirm in LE or PS, fractionation will proceed as usual.
4. When re-collections do not reconfirm in LE or PS, no fractionation will be done. Thus a plant that confirms in testing against KB, SA, CA, DA, etc. will be dropped if it is not active against LE or PS.

Current policy on procurement, testing, and fractionation of WM actives is:

1. If fractionation is already in progress with WM, it will be continued.
2. If fractionation of a WM active has not started, a re-collection will be processed as above, that is, tested in LE and PS then dropped if it is not active.

In the future, we will guide our procurement according to the following priorities. This is especially applicable to plants that are difficult to collect:

- |                            |                          |
|----------------------------|--------------------------|
| 1. LE active               | 50 lb. collection urgent |
| 2. PS active               | 50 lb. collection urgent |
| 3. KB active               | 50 lb. if practicable    |
| 4. WM active (in progress) | 50 lb. if practicable    |
| 5. All others              | 5 lb.                    |
| 0. Do not collect          |                          |

We will still try to procure 50 lb. samples of confirmed actives when the plants are easy to collect or the sample can be purchased at very reasonable cost.

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These priorities differ from those followed during the 1970 field season. The changes are based on information received from Dr. Hartwell via telephone on October 8, 1970. The changes were made because: (1) LL has declined in importance. It is proving unacceptable for following fractionation because of a loss of sensitivity, (2) No WM actives are being followed up unless they are already under fractionation or show activity against LE or PS.

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## ETHIOPIA ACTIVES

A set of photos of Ethiopia actives (with notes) is in Ethiopia pocket in drawer 19.

Desta Hundessa has a copy of all typed notes and the photos that go with them.

If anything else is needed from Ethiopia, send him a photo of the voucher and critical fragments as a basis for identification. Any re-collections made by Desta should be made at the same location as the original to decrease chances he will collect a related species.

With a photo of voucher and fragments, Desta can reliably re-collect any of Perdue collection from Ethiopia. This includes Perdue re-collections of plants originally collected by Meyer and Perdue general collections. He can probably also collect any of the Meyer actives, though he did not work with Meyer in 1961-62.

Desta also accompanied Jones and Smith when they were in Ethiopia and will be familiar with their collection sites and the plants they collected.

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## SOUTH AFRICA SAMPLES

We are supporting procurement of samples for general screening in South Africa. A purchase order has been issued to the Botanical Research Institute (BRI), Pretoria, for 500 1-2 lb. samples; the order totals \$2,500.00. When this order is filled we will try to set up a new order for a similar amount.

The funds we supply are intended to cover travel and other field expenses; BRI supplies the manpower.

We have agreed to provide BRI with screening data for all samples they submit. CCNSC has provided us a supplier's number (41F, in the name of IAS) to permit us to receive this data.

The South Africa samples should begin arriving here in late 1970 or early 1971.

When these samples are shipped to WARP the shipping list should be stamped with the following instructions:

Please add source code 41F to shipping list (WS-35) and send copy of WS-58 to L. A. Spetzman, NCRB, Plant Industry Station, Beltsville, Maryland 20705

All data we receive on South Africa plants will be addressed to IAS and should be kept separate from similar reports addressed to REP.

Supplier number 41F must be used only for South Africa plants, otherwise, we can be faced with a very difficult and time consuming task in separating out the data that is to be forwarded to BRI.

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No data should be forwarded to BRI until a procedure is developed to accomplish this efficiently.

See also CONIFER SAMPLES, as some of the comments under that subject are appropriate to this matter and are not repeated here.

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## CONIFER SAMPLES

We hope to eventually publish a paper on the anti-tumor activity of the conifers. To do so we will need the screening data generated by the CCNSC computer system.

CCNSC has assigned us a supplier number (in the name of REP) so that we can receive this data.

All draft shipping lists covering conifers shipped to WARF should be stamped with the following instruction\*:

Please add source code 41E to shipping list (WS-35) and send copy of WS-58 to R. E. Perdue, NCRP, Plant Industry Station, Beltsville, Maryland 20705.

Mrs. Haines has a similar stamp for use on the original and all carbon copies of the final shipping list.

This stamp can be used for other samples that are of sufficient interest to us that we want to receive the data directly; but, it should not be used indiscriminantly for we can be flooded with IBM cards and other paper.

When WARF receives a shipping list with our stamp, they add our supplier number to their shipping list (WS-35) which accompanies their extracts sent to the screener. They send us a copy of their NIH 1329

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\* This stamp should not be used on shipping lists for confirmed active conifers shipped to fractionators. Once our number is in the computer for a sample, we automatically receive data on all further testing under the CCNSC number assigned to that sample.

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(formerly WS-58). The latter is used to prepare the CCNSC "header cards". The NIH 1329 shows the CCNSC number and our PR number and permits us to identify all data recorded under a CCNSC number on IBM cards, Screening Data Summaries, etc.

See also: SOUTH AFRICA SAMPLES.

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## SPECIAL ACTION BOOK

This notebook contains actives sheets for confirmed actives that create special procurement problems. Many of these actives were originally supplied by Smith, Kline, and French and their collections were widely scattered. Others are based on samples we obtained from Plant Introduction Stations.

We will need to further review data on distribution of these plants to determine which occur in areas where we have contacts, can develop contacts, or expect to conduct further field projects. Plants represented in this book should be plotted on the world map on the Bulletin board in Room 230.

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# HOST/TEST SYSTEM CODES

Host/test system codes are combinations of three digits or letters.

A digit always appears first and indicates the host:

3	mice	8	egg
5	rats	9	cell culture
7	hamsters		

The last 2 digits or letters indicate the tumor.

<u>Code</u>	<u>Test System</u>
3SA	Sarcoma 180
3CA	Adenocarcinoma 755
3LE	L-1210 Lymphoid leukemia
3LL	Lewis Lung carcinoma
3FV	Friend Virus Leukemia, (solid)
3OS	Osteogenic sarcoma HE 10734
3HE	Hepatoma 129
3LX	L-1210/740 (methotrexate)
391	S-91 Cloudman melanoma
5WA	Walker carcinosarcoma 256 (subcutaneous)
5MS	Murphy-Sturm lymphosarcoma
5WM	Walker carcinosarcoma 256 (intramuscular)
5H1	HS1 Human sarcoma
5DL	Dunning leukemia (solid)
5DA	Dunning leukemia (ascites)
5DX	Dunning leukemia/26271 (cytoxan) (ascites)
5DR	Dunning leukemia/29189 (a thiopurine) (ascites)
7SB	Adenocarcinoma of the small bowel
7EN	Adenocarcinoma of the endometrium
7D1	Adenocarcinoma of the duodenum
7P1	Plasmacytoma No. 1
7PX	Plasmacytoma No. 1/26271 (cytoxan)
7MM	Melanotic melanoma
8H1	HS-1 Human sarcoma

# TEST STATUS CODES

Test status codes are explained on the printed sheet "Interpretation of Screening Data Summary Reports."

This table provides additional information and is self explanatory.

RESULT	FIRST TEST THIS TUMOR	MATERIAL RETESTED BECAUSE		
		PREVIOUSLY TOXIC	PASSED (T/C) 1	PASSED (T/C) 2
TOXIC	1	3	5	7
NON-TOXIC INACTIVE	2	4	6	8
PASS (T/C)	11	13	15	17

Since plants are tested in 2 stages (some materials are tested in 3 stages) we never see anything designated Code 7, 8, or 17.

## CCNSC NUMBERS

The following was taken from a CCNSC memo dated April 7, 1961.

1. No tests can be scheduled on any material without an assigned NSC number. The assignment of synthetic NSC numbers is made by the Chemistry Section, CCNSC. Block assignment of NSC numbers or other assignment for natural products (B numbers) is made by the Data Processing Office, CCNSC, Rm. 2A21, Robin Building. In the fermentation product program, the assignment of NSC numbers to specific samples is made by the supplier.

2. NSC Core Number

This is the number containing one to six digits.

3. Prefix:

The letter appearing in front of the core number. This identifies the class of material. Synthetics have no prefix. "B" identifies a natural product. The prefix "A", formerly used, has been replaced by the prefix "B".

4. Suffix:

The letter following the core number

Synthetics: Two suffix codes

A) "D" designates a discreet material

B) "E" designates an Endocrine substance (to be suspended in steroid suspending solution and injected subcutaneously).

Natural Products (Fermentation, Plant, and Animal Products):

Several codes which describe the state of isolation or evaluation as follows:

Suffix Code	Description
none	Original sample
A	refermentation or extract to complete sequential testing
B	refermentation or extract to confirm activity following status code 15, and/or to complete testing
D	fermentation research (media, time, temperature studies in flasks) plant collection studies (for large isolation collection)
E	fermentation research (jars or tanks)
F	fractionation or isolation studies
K	purified or crystalline products
L	superseded by K
J	pilot plant production studies

## CCNSC NUMBERS

CCNSC assigns a number to every extract. This is a six digit number with a letter prefix. This number may or may not have a suffix. For example: B610258.

B6---indicates this is a natural product (plant, animal, anti-biotic, etc., in contrast to a synthetic).

B61--indicates this is an aqueous extract of a natural product. This number obviously was assigned when two extracts were prepared from each sample. Thus B630258 is the number for the alcoholic extract. (Synthetics have no prefix. "A", used formerly for natural products, has been replaced by "B".)

The last 4 digits of the number make up the core number.

Another series preceded the B61---B63 series. In this case B60--- designates an aqueous extract and B65 designates an alcoholic extract.

The six digit number with B prefix is assigned to the first extract submitted. Every additional extract of the sample submitted and extracts of new samples submitted in follow-up are designated by a suffix as follows:

001 the initial extract is considered the 001 extract but it is never designated as such.

002 the second extract regardless of why it is requested.

003 the third extract, etc.

A002 is a new extract submitted because the first is QNS.

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B002 is a new extract submitted to confirm a Code 15.

D003 is an extract from one of our re-collections submitted  
for re-confirmation.

F004 indicates a fraction.

K236 represents a crystalline compound.

Take a hypothetical case in which:

- (1) We submit a sample.
- (2) An extract is prepared but is inadequate to complete the first stage (as when toxicity is involved and a long series of tests is required).
- (3) A second extract is prepared from the same sample (or from a new sample if the first is inadequate).
- (4) Second extract reaches Code 15.
- (5) A third extract is submitted and confirms.
- (6) We submit 2 50-pound re-collections.
- (7) Extracts of the re-collections are submitted for test.
- (8) Re-collections re-confirm and fractionation begins.
- (9) We supply a third 50-pound re-collection which re-confirms.
- (10) Fractionation continues.

Numbers would be assigned as follows:

B610258	assigned to initial sample
B610268 A002	assigned to second extract from initial sample
B610258 B003	assigned to third extract from initial sample prepared for confirmation of Code 15

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B610258 D004  
B610258 D005

assigned to each of our 50-pound  
re-collections

B610258 F006  
F007  
F008  
F009  
F010  
etc. to  
F112

assigned to chemists fractions

B610258 D113

assigned to extract of our third  
re-collection submitted for  
re-confirmation

B610258 F114  
F115, etc.

assigned to additional fractions

Under normal circumstances, when we submit a re-collection, a simple extract is submitted with a "D" suffix. In the case of Taxus brevifolia, Wall extracts with alcohol, then with chloroform. Thus re-confirmation of our T. brevifolia samples is based on a faction and data is recorded opposite an "F" suffix.

CCNSC NUMBERS (SUFFIX CODE)

The following statement was prepared by CCNSC for the October 4, 1962, meeting of suppliers, extractors, and chemists:

"In order that we may readily identify extracts in the isolation procedure which might be of interest for special testing, we are initiating a new use of the suffix "D" as follows:

1. Whenever it becomes necessary to make a new crude extract from the large plant sample, this extract should be assigned a "D" suffix with the next available suffix number being used.

For example, if after preparing fractions F004 through F009 it becomes necessary to make an additional amount of the original crude extract, this extract should be submitted to check for the original activity as "D010".

2. Whenever it becomes necessary to reproduce an active fraction in order to have sufficient quantity to continue the next series of fractions, this repeat fraction should be identified with the suffix "D" and the next sample number available.

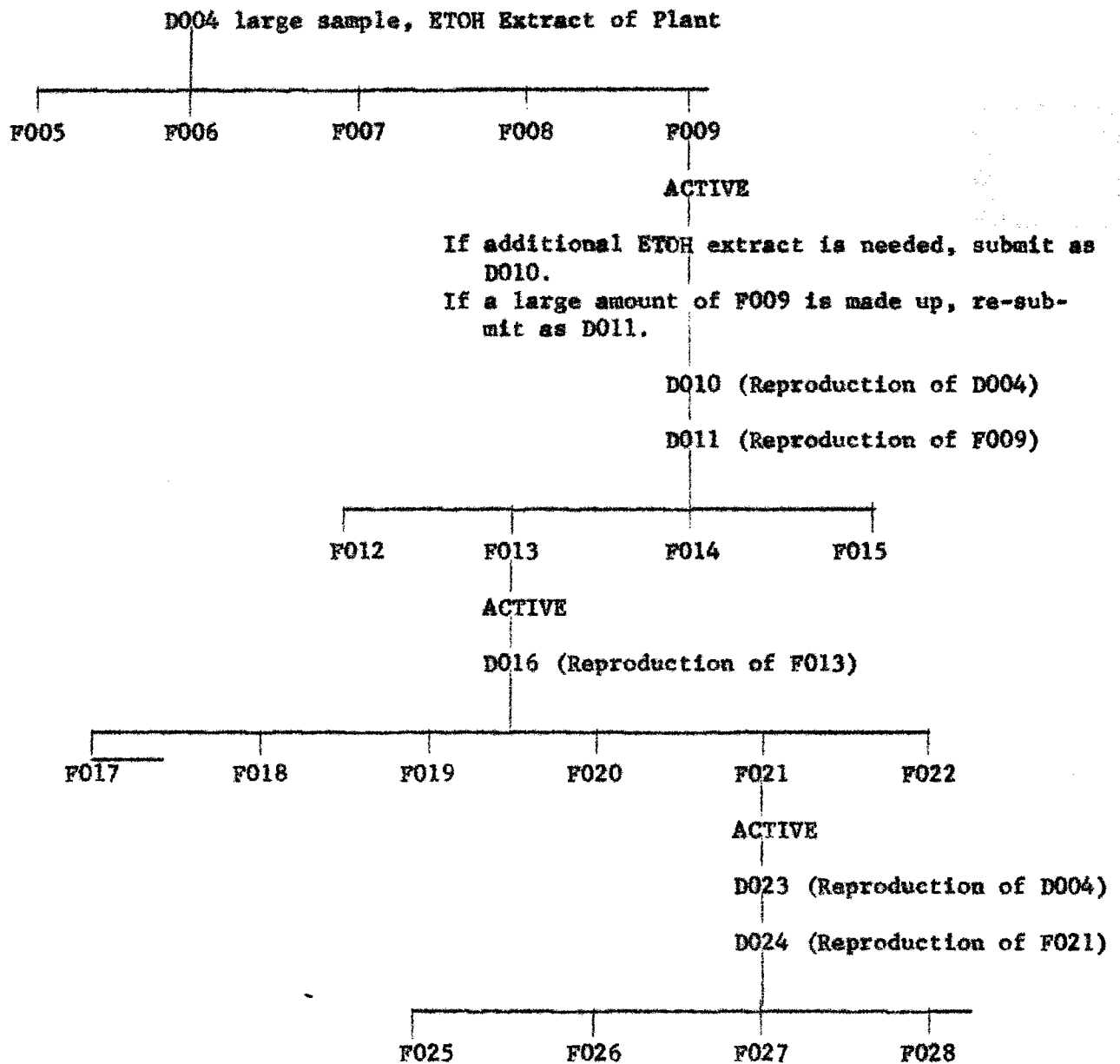
For example, if an F009 fraction shows activity and additional quantity is needed as the basis for



additional fractionation, the new batch of this fraction should be assigned the suffix "D" with the next sequential numerical code."

An example is given on the following page.

CCNSC NUMBERS (SUFFIX CODE)



## TESTING IN KB CELL CULTURE

The KB system involves a cell line from a human carcinoma of the nasopharynx. This is an in vitro system, that is, tumor cells are grown in media, not in a living animal.

KB testing picks up cytotoxicity that may or may not be accompanied by anti-tumor activity.

KB actives are fractionated to concentrate the active constituents then tested in animal systems. When inactive in animal systems, they are dropped. Complete fractionation and isolation to pure crystalline substances from plants active only in KB is no longer attempted.

During the early months of the program about 10% of our samples were tested in KB. Later, about December 1962, all samples were tested in KB. About a year ago, CCNSC considered dropping KB completely. However, it continues to use KB because a fair number of plants active in KB and inactive in WM later gave good WM activity after active constituents were concentrated by sample fractionation.

Taxus brevifolia is a good example. In preliminary screening, it was active only in KB. Now fractions are active in about 6 systems including WM and L-1210.

At present, all extracts are tested in KB as well as LE and WM.

## NOTES ON COLLECTORS

A Abraham These are all P.L. 480 samples from Israel. Information about where these plants originated within Israel is in Dr. Barclay's 4x6 card file. What information we have is in drawer 15 under SPECIAL SOURCES--Non-Commercial.

ARG Arguelles These are all samples collected by Dr. Gentry's field assistant in Mexico. Information about the origin of these samples in Mexico will be available from Dr. Gentry or on field notebook sheets in Dr. Barclay's 4x6 card file.

B Barclay These samples were collected largely in the southwestern and western United States. Records as to the origin of the samples are in Dr. Barclay's field books arranged numerically by collector's numbers.

BK Uruguay P.L. 480. We have vouchers.

CS Smith Information about the origin of Dr. Smith's collections is in his field books.

D Stone These samples were collected by Dick Stone, Miami, Florida. Initial arrangements for this collection were made through Mrs. Julia Morton, Morton Collectanea, University of Miami. Stone's collections are all Florida poisonous plants.

EU Eastern Utilization A four-digit number preceded by EU refers to a sample collected for the Cortisone Program. These numbers are very unlikely to be encountered now.

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FM Meyer These samples were collected largely in Ethiopia. Information on the origin of the collections within Ethiopia is in Dr. Meyer's field books. These field books are in Perdue's 4x6 file.

G Gentry Records of the origin of Dr. Gentry's samples are in his field books. Dr. Gentry has in his letter file a record of determinations of the South African collections and another record which gives the determinations for many of his samples collected elsewhere.

J Jones Records of Dr. Jones' collections are in his field books.

K Godfrey Dr. Godfrey's samples were collected largely in Florida. The only information we have for most of his samples is that included on his shipping lists. We have no vouchers. Dr. Godfrey or his students can do all re-collection of his samples and arrangements for re-collection are made by correspondence with him.

KR Korea P.L. 480.

M Miscellaneous This series is used for odds and ends from miscellaneous sources and for large lots for which a more precise designation is not appropriate.

Records of the origin of these samples are in the field books labeled "Miscellaneous" located on the table in Room 228.

The more important collections involved in the "M" series are:

Brown Bulb Ranch samples. Our records are under SPECIAL SOURCES--Commercial. For name under which samples should be ordered see the typed list in that folder. Procedure for determining name under which samples should be ordered is like that for Herbst seed samples.

Glenn Dale samples. Many but not all are assigned M numbers.

For a few the PI number was used. Our records are under SPECIAL SOURCES--Non-commercial. Note that this folder includes a list of samples submitted before we formally participated in the cancer program.

This list is our only record of those samples.

Greer Drug Co. samples. Our records are under SPECIAL SOURCES--Commercial. For name under which samples should be ordered see the typed list in that folder.

Herbst seed samples. These were purchased from Herbst Brothers Seedsmen, Inc. The original purchase was based on their January 1961 catalog. Our records pertaining to the Herbst samples are in drawer 15, SPECIAL SOURCES--Commercial. To order new samples based on activity in one of the Herbst samples find the typed list showing "HERBST LISTING", "PRICE", "CORRECT NAME", etc. Locate the name under which the sample was submitted in the column under "CORRECT NAME." The name under which the sample should be ordered is opposite that under "HERBST LISTING." The latter should be exactly as the plant is listed in the 1961 catalog. The typed list referred to above has the names alphabetically in two series. Woody plants are in the first part of the list, "flower seeds" (herbs) in the last.

These directions cover most of the samples from Herbst. The only exception involves the separate 2-page list attached to the Herbst correspondence (first name is "Chamerops humilis mediterranean palm"). This covers the last large lot of seed from Herbst. The first 10 items are palms from p. 4 of the 1961 catalog; the next 4 are in the "flower seed" section (p. 23); and the remainder are in the "vegetable seed"

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section (p. 45). Latin names for the vegetable seed were all taken from the list at the end of Hill's Economic Botany.

Hong Kong samples (PR-1782-1817). Our notes are under SPECIAL SOURCES--Commercial.

Miami (PIS) samples. Our records are under SPECIAL SOURCES--Non-commercial. In the "Miami" folder are two typed lists on which the appropriate "M" numbers are indicated opposite the listings for each sample.

Pakistan P.L. 480 samples. These are samples for which collection was arranged by Dr. Jones. In most cases they bear "Zp" numbers but a few early ones are in the "M" series. For those in the "M" series the only information we have is in the field book. Additional information as to their origin and date of collection will be in Dr. Barclay's file.

Schumacher seed samples. Our records pertaining to this collection are under SPECIAL SOURCES--Commercial. The procedure for re-ordering Schumacher samples is essentially the same as for re-ordering Herbat samples.

Spain P.L. 480 samples. Samples were received through arrangements made by Dr. Jones. Our only records for this collection are notes in the "M" series field books and the labels taken from the samples and filed in the 4x6 card file under "cancer plants - Spain." These labels bear the PR number of each sample. Note that they also show the name under which the sample was received here and the date of

T Terrell Dr. Terrell field notes are in his office desk.

To Tosum These are all P.L. 480 samples from Turkey for which collection was arranged by Dr. Jones. Field notes are in Dr. Barclay's 4x6 file.

U Uhe Mr. Uhe's samples are all from Samoa or New Zealand. Field notes covering this collection are in Dr. Barclay's 4x6 file.

Zp Pakistan P.L. 480 This series is used to cover Pakistan P.L. 480 samples even though the samples were collected by more than a single collector. Records of these collections, in the form of herbarium specimen labels, are in Dr. Barclay's 4x6 card file. Our PR number is added to the label documenting each of our samples.



# PREFIXES FOR COLLECTORS

A	Israel P.L. 480
ARG	Juan Arguelles (Gentry's Mexican field assistant)
B	A. S. Barclay (NCRB)
BK	Uruguay P.L. 480
CG	C. R. Gunn (NCRB)
CJ	C. B. Jones (NCRB)
GS	C. E. Smith, Jr. (NCRB)
D	Dick Stone (Miami, Fla.)
FM	F. G. Meyer (formerly NCRB)
G	H. S. Gentry (NCRB)
J	Q. Jones (NCRB)
JDC	Juan Diaz Colon (Puerto Rico)
K	R. K. Godfrey (Florida State University, temporarily 1966-1967 with NSF in Washington)
KR	Korea P.L. 480
LS	L. A. Spetzman (NCRB)
M	Miscellaneous Sources
P	R. E. Perdue, Jr. (NCRB)
POM	Arturo Pompa (Mexico City)
R	Clyde Reed (Baltimore)
RM	R. H. Miller (NCRB)
S	Bernice Schubert (formerly NCRB, now Arnold Arboretum)
T	E. E. Terrell (NCRB)
TO	Turkey P.L. 480
U	George Uhe (Samoa & New Zealand)
Y	Yugoslavia P.L. 480
ZP	Pakistan P.L. 480

## PROPOSED PUBLICATIONS

Proposed titles or subjects of publications that can now be foreseen are listed.

- \* minor publications, data readily available; these can be completed in a short time.
- \*\* fairly comprehensive publications; data now available or will soon be available.
- \*\*\* will not be ready for publication within next three years but we should begin organizing data soon.

Primary responsibility for each publications is indicated by initials following each entry.

- \* (1) Screening plants for anti-tumor activity. I. Procurement of plant samples for screening. General review of the procurement activity as a general introduction to this series of which No. II has already appeared. (for publication in Lloydia or Economic Botany). REP
- \*\* (2) Screening plants for anti-tumor activity. III. Plant toxicity as a by-product of screening. Manuscript in preliminary draft. Needs comprehensive review by toxicologist before preparation of final draft. (for publication in Lloydia). REP
- \*\* (3) Screening plants for anti-tumor activity. IV. The systematic distribution of anti-tumor activity in higher plants. Which families are the best sources of useful activity and should be further explored, which families are such poor sources that they should not be screened further. This paper will try to coorelate the distribution of anti-tumor activity with the distribution of chemical agents known to show biological

activity. (for publication in Economic Botany or Lloydia). REP

- \*\* (4) Anti-tumor activity of Ethiopian Plants. Compilation of screening data on Ethiopian plants with detailed discussion of active species including their activity, uses in Ethiopia and elsewhere, their active agents, etc. (for publication in Journal of Ethiopian Studies). REP
- \*\* (5) Procurement of plant material for biological screening. Field Project Jilore. Paper will describe field experience at Jilore, Kenya, how project was conducted in response to difficult field conditions. (for publication as an ARS publication, possibly in condensed form in Lloydia or Economic Botany). REP
- \* (6) Weight-volume ratio of dried plant material. A very short publication, primarily in tabular form, to show weight-volume relationship of different types of dried plant material. Intended to serve as a guide for estimation of bulk and cost of shipping by sea-freight. (for publication in Economic Botany or Lloydia). LAS
- \* (7) Commentary on authorities for Latin names of plants. Chemists and pharmacognocists, when publishing compilations of data from the literature, commonly add authorities to Latin names even though they were not given in the references cited. This paper will point out some errors that can be made and show that this practice suggests a degree of authenticity that is not justified. (for publication in Lloydia). REP

- \* (8) Species sampling. How profitable is duplicate sampling. If a plant species is tested once and is inactive, what are the chances that a second or third collection will be active? LAS
- \* (9) In re-collecting active plants, how important is duplication of site and season? Compare re-confirmation of re-collections made from same site and at same season as original with re-confirmation of re-collections made from other sites or during other seasons. Examine as many specific examples as possible like Aster, Holacantha, Cephalotaxus, etc. where we have made a fair number of re-collections. LAS
- \*\* (10) Economic botanical monograph of Taxus. Complete literature review and report on the anti-tumor activity of the genus. Testing of samples of this genus is complete; part of the data has been compiled. (for publication in Lloydia or Economic Botany). LAS
- \*\* (11) Anti-tumor activity of Cephalotaxus. Probably not enough information in the literature to term this a monograph. Publication will probably have to dwell largely on the anti-tumor activity of the two species available to us. But a complete literature review will be required. Should give this paper special attention as soon as data from Japanese and Formosan samples (to be collected during November 1970) is available. (for publication in Lloydia or Economic Botany). REP

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- \*\*\* (12) Anti-tumor activity of Gymnosperms. Samples are still coming in as a result of our special procurement effort initiated about two years ago. Publication cannot be cleared until fractionation of actives is complete. But a massive amount of data is now available and organization of this data should be initiated. (for publication in Lloydia or Economic Botany). REP
- \*\* (13) Anti-tumor activity of Holacantha. Will need literature review but doubtful any appreciable amount of information is available. Should organize data to see what we have and what is needed that might be collected in early 1971. (for publication in Lloydia or Economic Botany). LAS
- (14) Economic botanical monograph of Thalictrum. Complete literature review and report on the anti-tumor activity of the genus. LAS
- (15) Economic botanical monograph of Ecballium. Complete literature review and report on the anti-tumor activity of this monotypic genus. (REP)
- \*\* (16) Plant virus inhibitors from higher plants. (for publication in Lloydia, Economic Botany, or Plant Disease Reporter) (H. G. Kirkpatrick and REP).
- \*\*\* (17) Anti-tumor activity of Mexican plants. Compilation of screening data on Mexican plants with detailed discussion of active species including their activity, uses in Mexico and elsewhere, their active agents, etc. (for publication in Lloydia or Economic Botany). LAS

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