Method Sheet 100

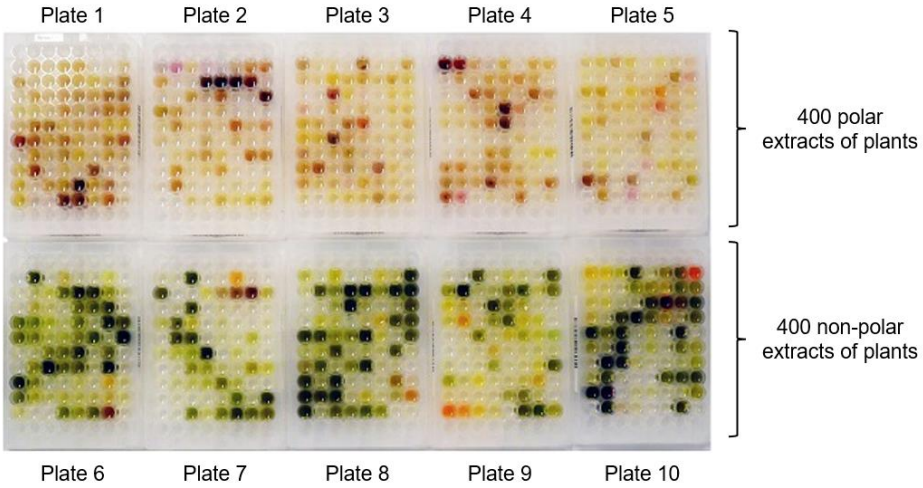
Introduction to the *Phytotitre* and *Puretitre* libraries

Overview

Modern drug discovery depends on the screening of many hundreds or thousands of different pure compounds or natural extracts to identify those with potential for development as drugs against a specific biological target. The *Phytotitre* and *Puretitre* collections were developed to enable researchers to maximise the hit rate of their high throughput screening assays, while minimise potential toxicity of the hits and enabling use of a cost-effective library of manageable size. These libraries have been a popular resource in academia and industry for the discovery of new leads for drugs, nutraceuticals, antimicrobials, agrochemicals and cosmetic additives.

The *Phytotitre* library

The *Phytotitre* natural product library is a collection of 800 plant extracts representing 367 unique plant species and 304 unique genera. The library has been carefully designed to maximise potential for the discovery of drug leads by including only plants which have a history of oral or topical medicinal use in man, or are foodstuffs which have been reported to be associated with reduced risk of disease in diet-focused epidemiological studies. This strategy is intended to maximise the potential for identification of molecules that may interact with biological pathways of interest, while at the same time minimising the risk of identifying compounds with excessive toxicity in mammalian systems.



The full-size *Phytotitre* kit (as shown above) comprises both polar and non-polar extracts of 400 plants, for a total of 800 extracts. We now also provide a half-size version of the larger collection to support student projects. The student project version of the *Phytotitre* library comprises only the non-polar extracts of the same 400 natural products present in the larger collection. Both collections are conveniently arranged in re-sealable 96-well microplates for ease of use in student projects.

Format of the *Phytotitre* library

The full-size version of the *Phytotitre* library comprises 800 extracts in ten 96-well plates, each containing 80 extracts per plate, as shown in the image above. The student project version of the *Phytotitre* library comprises five 96-well plates, corresponding to the non-polar extracts only of the full-size library (i.e. the 400 polar extracts are omitted). Both collections contain 50 µl per well of each extract at 10 mg/ml in DMSO.

The *Puretitre* library

The *Puretitre* natural compound library is a collection of 200 pure natural compounds at 10 mM in DMSO. 100 µl of each solution is provided in 96-well microplate format.

The key advantage of this library over the *Phytotitre* extract library is that there is no requirement for activity guided separation to isolate and identify the structure of active compounds after hit discovery, since every well contains a single pure compound. However, the philosophy of compound selection for this library is the same as that of the *Phytotitre* library, in that every compound in the collection is a natural product which can be isolated from a traditional medicine or herb.

Layout of *Phytotitre* and *Puretitre* library plates

Each 96-well plate in the *Phytotitre* and *Puretitre* collections contains 80 different extracts or compounds in the order shown in the diagram below:

	1	2	3	4	5	6	7	8	9	10	11	12
A	Empty	01	09	17	25	33	41	49	57	65	73	Empty
B	Empty	02	10	18	26	34	42	50	58	66	74	Empty
C	Empty	03	11	19	27	35	43	51	59	67	75	Empty
D	Empty	04	12	20	28	36	44	52	60	68	76	Empty
E	Empty	05	13	21	29	37	45	53	61	69	77	Empty
F	Empty	06	14	22	30	38	46	54	62	70	78	Empty
G	Empty	07	15	23	31	39	47	55	63	71	79	Empty
H	Empty	08	16	24	32	40	48	56	64	72	80	Empty

8x empty wells (for negative controls)

80 different plant extracts or natural compounds, numbered as shown

8x empty wells (for positive controls)

The first and twelfth columns of each stock plate are left empty to allow users to insert their own negative and positive controls for use in their specific assays.

Proven success in academic and industrial screens

The *Phytotitre* and *Puretitre* libraries have been a popular resource for workers in academia and industry in over a dozen countries since their introduction. Many hits have been discovered for diverse biological and therapeutic targets, resulting in numerous publications. Please see below for a selection of studies reporting discovery of novel hits using our *Phytotitre* and *Puretitre* libraries. For a more up to date list, please visit the publications page of our website.

Publications reporting *Phytotitre* screens

Fischer W, Currais A, Liang Z, Pinto A, Maher P. Old age-associated phenotypic screening for Alzheimer's disease drug candidates identifies Sterubin as a potent neuroprotective compound from *Yerba santa*. Redox Biol 21:101089 (2019) Link to article

Jenic D, Erridge C. Reversal of tetracycline resistance by clove and peony extracts in a multi-drug resistant *Escherichia coli*. Int Microbiol (2026) Link to article

Publications reporting *Puretitre* screens

Jenic D, Waller H, Collins H, Erridge C. Reversal of tetracycline resistance by cepharanthine, cinchonidine, ellagic acid and propyl gallate in a multi-drug resistant Escherichia coli. Nat Prod Bioprospect 11:345–355 (2021) Link to article

Augostine CR, Avery SV. Discovery of natural products with antifungal potential through combinatorial synergy. Front Microbiol 13:866840 (2022) Link to article

Harvey HJ, Hendry AC, Archer DB, Avery SV. Evaluating the potential of natural product combinations with sorbic acid for improving preservative action against food-spoilage yeasts. Fungal Biology 127:1218-1223 (2023) Link to article

Hu Y, Webb JS, An S. Host cell-based screening assays for identification of molecules targeting *Pseudomonas aeruginosa* cyclic di-GMP signaling and biofilm formation. Front Microbiol 14 (2023) Link to article