

مراجع العلوم النباتية

الدكتور محسن عباس الربي
سكرتير التحرير

يسير البحث البيولوجي عادة خطوات خمس: (١) فحص المؤلفات المتعلقة بالموضوع بنظرة ناقدة. (٢) تجميع دقيق للمعلومات الميدانية، أو ما يعادلها من الاستفسارات، وإكمالها — إذ الازم الأمر — بالفحص المعمق للعينات. (٣) تنظيم المعلومات التي جمعت وربطها بعضها ببعض، ثم تحديد الموضوع وتجزئته إلى أسئلة محددة. (٤) محاولة القيام بتخمينات ذكية للإجابة على هذه الأسئلة، مع النظر في أكبر عدد ممكن من الفروض Hypotheses. (٥) وضع تجارب للبدء باختبار أرجح الفروض المتعلقة بأهم الأسئلة الحاسمة.

ولكن عندما يبدأ الباحث بفحص المؤلفات المتعلقة بالمشكلة المراد حلها حتى يعلم قصارى جهود من سبقه من الباحثين، وهو ما سيشارك بمجده في إتمامه، واجهته استحالة مسيرته لأكثر من ذلك الجزء البسيط من المؤلفات التي تمت بصلة وثيقة إلى موضوع بحثه، فمثلاً هناك ماينوف على ١٢ ألف دورية علمية معاصرة تهتم بالبحوث الزراعية (ووفقاً لما جاء في طبعة عام ١٩٦٥ من Current Agricultural Series)، وبعملية حسابية بسيطة تتضح أن هذه الدوريات تنشر ما يقرب من ٣ مليون موضوعاً زراعياً سنوياً، أي ١٦ ألف موضوع أسبوعياً، وهو عدد يعجز الباحث الزراعي عن متابعته وحصره!

وكان طبيعياً أن تناقش المؤلفات الحديثة التي صدرت عن مناهج البحث العلمي مشكلة استحالة قراءة جميع المؤلفات المتعلقة بموضوع البحث (Wilson ١٩٥٢، Beveridge ١٩٥٧، Holman ١٩٦٢، Salmon and Hanson ١٩٦٤، وغيرها)، وهي لا تجد القراءة الزائدة التي قد يجعلها الباحث يرى المشكلة خلال أفكار ووجهات نظر من سبقه من الباحثين، ويصبح بذلك صعباً على الذهن أن يجد حلاً جديداً مشمراً متحرراً من الأنماط الفكرية السائدة، وفي هذا المعنى يقول العالم الفسيولوجي الفرنسي

● الدكتور محسن عباس الربي: كبير الباحثين ومدير قسم تربية القطن بوزارة الزراعة، وعضو لجنة بحوث وتكنولوجيا الإشعاع بأكاديمية البحث العلمي والتكنولوجيا، وسكرتير تحرير مجلة الفلاحة.

Claude Bernard (١٨١٣ - ١٨٧٨) : « إن مانعرفه بالفعل ، لاما نجهله ، هو أكبر عائق لدراستنا » .

ولكن لا تعرض النظرة المجددة والإصالة إلى ضرر كبير إذا استخدمت القراءة كحافز على التفكير ، وكان الباحث في الوقت ذاته من يمارسون البحث العلمى فعلا . وعلى أى حال فإن البدء في دراسة مشكلة علمية مع الجهل بما سبق أن عرف عنها ، عائق أشد خطراً . ماذا يكون الموقف عندما ينتهى الباحث من دراسة المشكلة ويشرع في كتابة البحث في صورته النهائية ، وهنا يتبين له من الاطلاع المتأخر على المؤلفات المتعلقة بالبحث أنه اتبع منهاجها Technique يتطرق الشك إلى دقته وسلامته ؟ أو استعمل موادا هناك ما يفضلها للدراسة هذه المشكلة ؟ أو أضاع كثيراً من الجهد اتركه مقالا هاما دون قراءة قبل بدء البحث ؟

وأفضل طريقة لمواجهة هذه المعضلة هي البدء بالقراءة الناقدة لبعض من أهم المراجع الحديثة الهامة المتصلة بالبحث ، مع مواصلة الاهتمام باستيعاب المراجع الاخرى الجديرة بالاطلاع كلما تقدم البحث ، على أن يكون مسعى القائم بالبحث الاحتفاظ بالتفكير المستقل به ، والزرعة الابتكارية الاصلية . ومنذ قرون بعيدة خلعت أكد ذلك لقارئة جابر بن حيان كيموى العرب الاول الذى عاش في النصف الثاني من القرن الثامن الميلادى والجزء الاول من القرن التاسع الميلادى فهو يقول : واتعب أولا تعباً واحداً ، واجمع ، وانظر ، واعلم ، ثم أعمل ، فإنك لا تصل أولاً ، ثم تصل لى ماتريد (المقالة الرابعة والعشرون من كتاب الخواص الكبير) ، وأتى بعده بثنائية قرون الفيلسوف الانجليزى Francis Bacon (١٥٦١ - ١٦٢٦) أحد فلاسفة المنهج الاستقرائى للعلم التجريبي الحديث ليقول : « أقرأ ، لالتعارض وتفند ولا لتؤمن وتسلم ، بل لتزن وتفكر » .

وبما لاشك فيه أن الاطلاع على البحوث ذات النتائج الإيجابية يكشف عن وجهات نظر ، وآراء من قاهوا بها ، والتي يستفاد منها في تصميم بحوث أخرى قد يكون من نتائجها إضافات جديدة لمعرفتنا الحالية . ولكن ينبغى ألا تلهينا مثل هذه البحوث الإيجابية عن الاطلاع على ما نشر من بحوث سلبية نتائجها ، أو غير

ناجحة ، فإنها تفيد الباحث في عدم إضاعة الوقت في إعادتها ، أو يتوصل إلى التعرف على مواطن الفشل فيها ويمكنه بذلك أن يسير بها نحو النجاح ، وبذلك فن الخطأ الحكم على بحث ما بعدم الاستمرار فيه طالما أن هناك محاولة أو أكثر بصدده باءت أو انتهت بالفشل .

صرايح العلوم النباتية وكيفية تقييمها

(أولاً) الموسوعات العلمية، و Handbooks ، والسكتب الموضوعية ، والجوامع ،

الموضوعية ، وتقارير ومناقشات الندوات العلمية :

الخطوة التالية بعد اختيار المشكلة هي الاطلاع على البحوث التي أجريت عليها من قبل ... وكثيرا ما تفيد المرسوعات العلمية Scientific encyclopedias كنقطة بداية، مثل McGraw-Hill Encyclopedia of Science and Technology ، Van Nostrand's Scientific Encyclopedia ، فهذه الموسوعات العلمية تتم بالكثير من الموضوعات البيولوجية من حيث التعريف لها، ووصفها، وخلفيتها، و مراجعها الرئيسية .

ولانقل Handbooks أهمية عن الموسوعات في التعريف بخلفية الموضوع المراد دراسته ، ولعل The Handbook of Biological Data يجداوله ولوحاته البيانية من أهم السكتب التي يستعين بها جبهة البيولوجيين المتخصصين . وهناك Handbook آخر صدرت طبعته الثامنة عام ١٩٥٠ هو Gray's Manual of Botany الذي يعرف النباتات المزهرة والمرخسيات الموجودة في وسط وشمال شرق الولايات المتحدة الأمريكية ، وفي كندا .

ولعله من الأدق بعد ذلك الاطلاع على السكتب الموضوعية Textbooks المتخصصة في العلوم النباتية التي تعطى للباحث موجزا متزنا للمعرفة الحالية ، كما تزوده بالمراجع الرئيسية . والسكتب الموضوعية تجميع وتصنيف لبعض الحقائق والفروض التي انتقاهما المؤلف كأهم الحقائق والفروض وقت تأليف كتابه، والتي يكون قد سد ما فيها من ثغرات، وسأوى ما تحويه من متناقضات حتى يقدم مؤلفه

في صورة مترابطة . وعلى أى حال لا يوجد كتاب موضوعى يمكن اعتباره
محتوياته كاملة ، أو شاملة أحدث نتائج ما نشر من البحوث .

وعلى ذلك فمن الأفضل أن يطالع الباحث فى جامع موضوعى Monograph
حديث يتناول الموضوع المهم بدراسته ، إذ أن هذه الجوامع الموضوعية تعطى
معلومات أكثر تفصيلا وعمقا من التى تحويها عادة الكتب الموضوعية ، كما تشير إلى
بعض نواحي الموضوع التى مازالت فى حاجة إلى المزيد من البحث والدراسات .
ومن أمثلة الجوامع الموضوعية التى صدرت أخيرا Cotton in India
الذى أصدرته فى أربع مجلدات Indian Central Cotton Committee ،
و Wheat and Wheat Improvement الذى أعدته American Society of
Agronomy ، فهما يعطيان أحدث وأهم معلومات عن محصولى القطن والقمح من
النواحي النباتية والزراعية والتكنولوجية والاقتصادية .

ولقد أصبحت للتقارير المقدمة إلى الندوات العلمية Symposia والمناقشات التى
تدور فيها أهميتها ، فأضيفت إلى الثقافة العلمية لإثرائها . وهذه الندوات العلمية تدعو
إليها المعاهد والجمعيات العلمية من حين إلى آخر ليحضرها المتخصصون فى ناحية من
نواحي المعرفة ، ليقدموا تقارير عن إنجازاتهم العلمية لمناقشتها . ولاهمية هذه
التقارير والمناقشات فإنها تصدر بعد ذلك فى مصنف . ومثلا لهذه الندوات العلمية ،
هناك الندوة التى دعت إليها اللجنة الدولية للطاقة الذرية وهيئة الأغذية والزراعة
فى عام ١٩٦٤ لدراسة استخدام الإشعاع فى تربية النباتات The Use of Induced
Mutations in Plant Breeding .

(ثانيا) مجلات المراجعات : Review Journals

بعد أن يكتب الباحث فكرة عامة عن الموضوع الذى يريد دراسته من
المراجع سابقة الذكر مبتدئا بالموسوعات العلمية ، و Handbooks ، ثم الكتب
الموضوعية ، والجوامع الموضوعية ، ومنتها بتقارير ومناقشات الدوات العلمية ،
يتجه الباحث إلى دراسة أكثر فهما وتعمقا بقراءته للموضوع فى مقالة ياحدى
مجلات المراجعات ، Review Journals ، وكانبوا مثل هذه المقالات يدرسون
البحوث المنشورة عن أحد الموضوعات منذ ابتداء البحث فيه ، ويقيّمون نتائج
هذه البحوث ، ويقدمون تأخيصة للفكر المعاصر عن موضوع المراجعة كما يرونه .

ولاشك أن هذه المراجعات تسهل سرعة للإمام الباحثين بالخلفية التاريخية للمشكلات البحثية المقدمون عليها ، والتي تسنلزم عادة وقتا طويلا وجهدا ، ضنيا لمعرفتها ، خصوصا بعد أن كثرت الدوريات العلمية وأصبح من العسير للإمام بكافة ما تنشره . مضافا إلى ذلك أن المراجعات تزود الباحثين بوفرة من المراجع المنشورة الهامة .

ومن أهم مجلات المراجع النباتية ، *The Botanical Review* التي صدرت عام ١٩٣٥ ، فإنها تحوى مراجعات كثيرة مذيلة بقوائم مطولة المراجع .

لأنه تجب الإشارة إلى أن المراجعات تأخذ بعض الوقت في إعدادها وكتابتها ، ولذلك تنصرم عادة نحو سنة إلى ثلاث سنوات بين نشر البحوث في الدوريات العلمية والإشارة إليها في مجلات المراجعات ، ولذلك فللإمام بالمعلومات الحديثة التي لم تتناولها مجلات المراجعات يجب الاطلاع على مراجع أخرى هي : التقدمات الحديثة ، والمراجعات السنوية ، والسكتب السنوية .

(ثالثا) التقدمات الحديثة ، والمراجعات السنوية ، والسكتب السنوية :

وتلخص «التقدمات الحديثة» *Recent Advances Series* ، التقدم الذي يحدث في بعض ميادين العلم لفترة محددة لاستكمال ماسبق ذكره عن التقدم في هذه الميادين منذ نشر المجلد الأسبق . وتغطي التقدمات الحديثة فترة من الزمن أقصر عادة مما تغطيه مجلات المراجعات ، ولهذا فهى أكثر عمقا في تفصيلاتها .

وتتناول « المراجعات السنوية » *Annual Reviews* ، و«السكتب السنوية» *Yearbooks* بالمراجعة الناقدة أهم ما نشر من بحوث في موضوع معين خلال العام الذى انقضى ، أو اعادة سنوات خلت في بعض مجالات البحوث الأقل نشاطا . ويقوم المثقاة العلميون في مختلف الميادين بإعداد المقالات والفصول *Chapters* التي تضمها « المراجعات السنوية » و«السكتب السنوية» . وللإستفادة من هذه الاعمال ، فمن الأوفى البدء بالاطلاع على آخر ما ظهر من مجلداتها ، ثم الرجوع بالاطلاع إلى الوراء لخسة مجلدات على الأقل .

ولاشك أن للتقدمات الحديثة ، والمراجعات السنوية ، والسكتب السنوية

أهميتها ، فهي تلخص أهم التقدمات في ميادين العلوم ، وتمد الباحث بمين من المعلومات الضرورية في مجال تخصصه ، ولكها — بحكم الضرورة — تغفل كثيراً من المعلومات التي يهتم الباحث معرفتها قبل بدء تجاربه على المشكلة المراد دراستها كالمواد والطرق المستعملة التي اتبعها من سبقه من الباحثين ، مما يجعل قراءة البحوث الأصلية المنشورة ضرورية .

ومن أمثلة التقدمات الحديثة ، Advances in Agronomy التي تصدر منذ عام ١٩٤٩ ، وهي تعرض التقدم في البحوث البهتة لعلوم الأراضى والمحاصيل ، والتطورات في المعاملات الزراعية .

ومن أهم المراجعات السنوية ، Annual Review of Plant Physiology ، وصدر أول أعدادها عام ١٩٥٠ ، وهي تقدم مراجعة سنوية للثقافة المعاصرة في مختلف ميادين فسيولوجيا النبات .

ويعتبر Yearbook of Agriculture الذي تصدره وزارة الزراعة الأمريكية من أقدم الكتب السنوية ، الزراعية ؛ فقد صدر أول مجلد منه عام ١٨٩٤ ، وظلت مجلداته السنوية تحوى مختصرات عن التقدمات الزراعية خلال العام ، ولكن ابتداء من عام ١٩٣٦ خصص كل مجلد سنوى لموضوع معين ، فجلد عام ١٩٥٣ مثلاً خصص لأمراض النباتات ، ومجلد عام ١٩٥٧ للأراضى ، ومجلد ١٩٦١ للبذور .

(رابعاً) مجلات المستخلصات ومجلات الفهارس :

تعددت المؤلفات العلمية وتعدت ، وكثرت الدوريات باللغات المختلفة بحيث أصبحت تواجه الباحثين وطلاب المعرفة مشكلة الإطلاع على المعارف العلمية الجديدة في سهولة ويسر ، وتزداد هذه المشكلة صعوبة عاماً بعد آخر ، فالمعلومات العلمية — كما هو معروف — تتضاعف كل ثمانية إلى خمسة عشر سنة ، فبالعدد البحوث البيولوجية في العالم التي نشرت خلال ٣٥ سنة ، امتدت من سنة ١٩٢٦ حتى سنة ١٩٦١ ، لاتبجاوز مليون بحث ، بينما زادت هذه البحوث مليوناً ثانياً

خلال عشر سنوات فقط ، من سنة ١٩٦١ حتى سنة ١٩٧١ ، كما يتضح ذلك من إحصاء عدد المستخلصات التي نشرتها كبرى مجلات المستخلصات البيولوجية Biological Abstracts بين سنتي ١٩٦٦، ١٩٧١ . ومن هنا جاء التفكير في إصدار مثل هذه المجلات المستخلصة التي تعطى مختصرات وافية وجيزة لمحتويات البحوث المنشورة في الدوريات العالمية العلمية، أو التي تلقى في المؤتمرات والندوات والاجتماعات العلمية .

ويجب أن يحتوي المستخلص المثالي على جميع المعلومات التي وردت في البحث الأصلي ، ولكن بحارلة ضفط ما جاء بعدة صفحات شملها البحث الأصلي في مستخلص يحتوي عادة على فقرة واحدة تتطلب عناية فائقة في كتابته، وإلا خلا المستخلص من بعض المعلومات الأصلية ، مضافاً إلى ذلك أن المستخلصات مثلها مثل المراجعات يقف أمامها عدم إمكانها نشر الجداول والأشكال - رغم أهميتها - الواردة في البحث الأصلي

ويقرم بكتابة المستخلص إما أحد المتخصصين في ميدان البحث المنشور ويطلق عليه في هذه الحالة Abstract ، تمييزاً عن المستخلص الذي يقوم به المؤلف لبحثه العلمي وينشره مع البحث نفسه ، ويقترح مؤتمر اليونسكو الدولي عن الاستخلاصات العلمية المنعقد عام ١٩٤٩ إطلاق لفظة Synopsis على مثل هذه المستخلصات .

وستظل لمجلات المستخلصات أهميتها بالنسبة للباحثين الذين ليس في متناولهم كثرة من الدوريات ، أو الذين يريدون أن يحيطوا علماً بالتقدمات في ميادين العلوم الأخرى المرتبطة بميدان تخصصهم ، أو الذين يرغبون الاطلاع على ما جاء في البحوث المنشورة بلغات أجنبية .

وحيث إن مجلات المستخلصات تتخلف مضطرة بما يقرب من ٦ - ١٨ شهراً عن البحوث الأصلية ، ولذلك للاطلاع على أحدث البحوث المنشورة لا بد من الرجوع إلى مجلات الفهارس Index Journals التي تهتم بتغطية ما صدر من البحوث ذاكراً فقط أسماء مؤلفيها ، وعناوينها Titles ، ومكان النشر ، وتاريخه ،

تاركه عمل مستخلصات لها ، فهذا عمل مجلات المستخلصات ، ولكنها تسهل للباحثين معرفة النشاط البحثي في ميادينهم خلال الاثني عشر القليلة الماضية من الحاضر . وتعتبر Bibliography of Agriculture التي تصدرها وزارة الزراعة الأمريكية ، و Biological and Agricultural Index أهم مجلات الفهارس الزراعية .

(خامساً) البحوث الاصلية المنشورة : Original articles

ينبغي على الباحث بعد فحص المؤلفات المتعلقة بالمشكلة التي يبحثها أن يبدأ بالدراسة الناقدة لجميع ما يهمه من البحوث الاصلية في الدوريات العلمية ، وسيجد في كل بحث من هذه البحوث الاصلية إشارات إلى مراجع أخرى قد يرى قراءتها ودراستها ، ويتكشف بذلك أمامه أهم ما نشر عن المشكلة المراد دراستها ، واستكمال المراجع التي تكون قد فاتته خلال تتبعه المراجع العلمية بادئا بالموسوعات العلمية ، و Handbooks ، ثم الكتب الموضوعية ، والجوامع الموضوعية ، وتقارير ومناقشات الندوات العلمية ، والتفاته بعد ذلك إلى مجلات المراجعات ، والتقدميات الحديثة ، والمراجعات السنوية ، والكتب السنوية ، ومنها بمجلات المستخلصات ومجلات الفهارس حتى أمكنه تحديد البحوث الاصلية المرتبطة ارتباطا مباشرا بالمشكلة المراد بحثها ودراستها .

ونذكر في الصفحات التالية أهم المراجع المعنية بالعلوم النباتية ، خاصة علوم النبات Botany ، وفلاحة الأرض Agronomy ، وتربية النباتات Plant Breeding حتى يقسنى المشتغلين بهذه العلوم الاستعانة بها في الاطلاع على المؤلفات المتعلقة بالمشكلات التي يريدون دراستها .

ونظرا لاهمية توحيد كتابة المراجع فقد ذيلت هذه الصفحات بالنظام الذي توصى به غالبية الدوريات العلمية لكتابة مراجع البحوث المقدمة إليها للنشر . ونظرا لأنه مازالت هناك بعض الخلافات بين الدوريات العلمية في هذا الصدد ، فإنه من المستحسن اتباع النظام الذي تقترحه الدورية التي يريد الباحث نشر بحثه فيها .

introd.	introduction
l. ; ll.	line; lines
loc. cit. (loco citato)	in the place cited
MS ; MSS.	manuscript; manuscripts
n. ; nn.	note; notes
n.b. (or N.B.) (nota bene)	note well
n.d.	no date
n.p.	no place of publication
n.s.	new series
No.	number
no. publ.	no publisher
op. cit. (opere citato)	in the work cited
p.; pp.	page; pages
par. ; pars.	paragraph; paragraphs
passim (not an abbreviation)	here and there
pref.	preface
pseud.	pseudonym
pt. ; pts.	part; parts
q.v. (quod vide)	which see
rev.	revised
sec. ; secs.	section; sections
sic (not an abbreviation)	thus
st.	stanza
sup.	supplement(s)
supra	above
s.v. (sub verbo)	under the word or heading above
tr. (or trans.)	translator, translated (by), translation
v. ; vv.	verse; verses
viz. (videlicet)	namely, to wit
vol. ; vols.	volume; volumes

Institution as author
Fiscal year
Special part
Bulletin

Wisconsin Agricultural Experiment Station. 1950. What's new in farm science ; sixty-sixth annual report, 1948/49. Part I, Wis. Agr. Expt. Sta. Bul. 491, 88 p.

✻ *Abbreviations • Used in Bibliographies*

anon.	anonymous
ante (not an abbreviation)	before
art. ; arts.	article ; articles
bibl.	bibliography
bk. ; bks.	book ; books
c.	copyright
ca. (or c.) (circa)	about (used with dates, e.g., ca-1906)
cf. (confer)	compare, see
ch. (or chap.) ; chs. (or chaps.)	chapter ; chapters
col. ; cols.	column ; columns
comp.	compiler, compiled
ed. ; eds.	editor, edition, edited (by) ; editors
ed. ; edd.	edition ; editions
e.g. (exempli gratia)	for example
enl.	enlarged
et al. (et alii) ; also (et alibi)	and others ; and elsewhere
et seq. (et sequens)	and the following (page or line)
etc. (et cetera)	and so forth
f., ff.	and following page ; and following pages
fig. ; figs.	figure ; figures
ibid. (ibidem)	in the same place
id. (or idem)	the same
i.e. (id est)	that is, in other words
il. (or illus.)	illustration, illustrated
infra (not an abbreviation)	below (should not be substituted for ibid. or op. cit.)

Name repeated

Two papers same year lettered when citations not numbered

Riker, A.J. 1945b. Some possibilities for developing resistance to disease in trees. Amer. Nurseryman 81 (12) : 5-7.

Name repeated

Committee chairman as author

Preposition omitted from English serial name

Riker, A.J., chmn. 1952. Literature citations : how biologists like them. Amer. Inst. Biol. Sci. Bul. 2 (1) : 18-19.

Two authors

Proceedings of society

Series

Salaman, R.N., and F.C. Bawden. 1932. An analysis of some necrotic virus diseases of the potato. Roy. Soc. London, Proc., Ser. B. 111 : 53-73.

Illustrations not included in pagination, and important

Smith, E.F. 1917. Mechanism of tumor growth in crowngall. Jour. Agr. Res. 8 : 165-188, pl. 4-65.

Agency as author

Two or more volumes

U.S. Bureau of the Census. 1927. United States census of agriculture. 1925. U.S. Govt. Ptg. Off., Washington. 3 v.

Agency as author, omitted as publisher

Revised edition

U.S. Government Printing Office. 1945. Style Manual. Rev. ed. Washington. 435 p.

Prefix-anglicized

Miscellaneous publication

Van Dersal, W.R. 1938. Native woody plants of the United States, their erosion-control and wildlife values. U.S. Dept. Agr. Misc. Pub. 303, 362 p.

Miscellaneous publication

Whitlock, Carolyn 1939. Abbreviations used in the Department of Agriculture for titles of publications. U.S. Dept. Agr. Misc. Pub. 337, 278 p.

Man's name abbreviated to initials

Paper in a collection

Link, G.K.K. 1928. Bacteria in relation to plant diseases. In E.O. Jordan and I.S. Falk, ed. The newer knowledge of bacteriology and immunology. University of Chicago Press, Chicago. p. 590-606.

Newspaper

Pages separated

Maverick, M. 1944. The case against "gobbledygook". N.Y. Times Mag. May 21 : 11, 35-36.

Transliterated name

English title on original

Annals of society

Number paged separately

Summary in English

Nishikado, Y. 1921. On a disease of the grape cluster caused by Phyalospora baccae Cavara. (In Japanese). Phytopath. Soc. Japan, Ann. 1 (4) : 20-42. English summary.

Part of book

Overstreet, H.A. 1925. The psychology of effective writing. In this Influencing human behavior. Norton, New York, p. 87-109.

Patent

Original not seen

Penn, F. H. 1942. Hydrogenated butter method. U. S. Pat. 2,272,578. Feb. 10. Abs. in. U. S. Patent Office Off. Gaz. 535 : 322.

Special part

Edition

Preposition omitted from English serial name

Number paged separately

Riker, A.J. 1945 a. Leaflet X. Inoculations with bacteria causing plant disease. Ed. 3. Pure Cult. Study Bact. 13 (1), 15 p.

Prefix (not anglicized or French article)

Pages separated

Bary, A. de. 1886. Ueber einige Sclerotinien und Sclerotienkrankheiten. Bot. Ztg. 44 : 377-387, 393-404, 409-426, 433-441, 449-461, 465-474.

Woman's name

Bulletin

Bryant, Margaret S. 1951. Bibliographic style. U.S. Dept. Agr. Bibliog. Bul. 16, 30 p.

Woman's name

Editor as author

Edition

Additional information

Gregory, Winifred, ed. 1943. Union list of serials in libraries of the United States and Canada. Ed. 2. Wilson, H.W., New York. 3065 p. (Occasional supplements)

Two authors

Editors as authors

Subtitle

Grossman, Regina G., and Nina R. Thompson, ed. 1951. The cumulative book index; world list of books in the English language, 1949-1950. Wilson, H.W., New York. 2448 p.

Hyphenated name

(Compound name, without hyphen)

Subtitle

Gwynne-Vaughan, Helen. 1922. Fungi; Ascomycetes, Ustilaginales, Uredinales. Cambridge, London, 232 p.

Man's name abbreviated to initials

Abstract

Hildebrandt, A.C. 1948. Influence of some carbon compounds on growth of plant tissue cultures in vitro. (Abs.) Anat. Rec. 100 : 674.

5. **Volume and pages of serials** appear in Arabic numbers after the abbreviation of a periodical in this order : volume (a number or other part within a volume is shown in parentheses only when paged independently), colon, first page, dash, and last page. If a special series is given (e.g., Ser. 3, III, or C), this precedes the volume number.

6. **In book citations**, the following appear in sequence after the title : the edition other than the first, the publisher's surname or name shortened, e.g., according to Grossman and Thompson (1951), the place of publication, and the number of pages if one volume, but the number of volumes if 2 or more.

7. **Illustrations** are not mentioned unless separately paged from the text or of particular importance.

8. **Transliteration** (from Russian, Japanese, etc.) follows the procedure of the Library of Congress of the U.S. Government Printing Office in its style manual (1945).

9. **Explanations** added for clarity (e.g. supplied name, date, translation of title, publisher, or place of publication) appear in brackets.

For a comprehensive guide to cover various exceptions in citations, one may consult, e.g. Bryant (1951).

II. Examples

Most journals have their own style for the use of capitals, italics, bold face, and so on in literature citations. The editor of the publishing journal and not the author will indicate the acceptable procedure. For this reason, no special typographical treatment is indicated in the examples. Like other parts of a manuscript, literature citations are typewritten and double-spaced.

These references show a means for handling the items as listed in bold face above each citation. Items occurring more frequently are repeated only once to save space. If the citations are to be numbered, one does this at the last when no additions or deletions will be made. Among these examples abbreviations of serials follow Whitlock (1939), and names of publishers follow Grossman and Thompson (1951).

Society committee as author

Serial name of one word not abbreviated

American Phytopathological Society, Committee on Standardization of Fungicidal Tests. 1943. Definitions of fungicide terms. *Phytopathology* 33 : 624-626.

- (44) WINBURNE, J.N., ed. **Dictionary of Agriculture and Allied Terminology**. East Lansing, Michigan State University Press, 1962.
- (45) **WORLD WHO'S WHO IN SCIENCE**, a Biographical Dictionary of Notable Scientists from Antiquity to the Present. Ed. by Allen G. Debus. Chicago, Marquis-Who's Who, 1968.

(1)

✻ *Preparing Literature Citations*

I. General Principles

Making citations to literature raises numerous questions. The answers to many of them appear herewith.

Basic considerations are the reader's convenience and the librarian's time. Citations should contain all the data necessary for a co-worker, especially one in another country, to locate the source matter easily in the library. An author should check all parts of his citations against the originals. An inaccurate reference wastes time for readers and librarians and even may prevent its location.

The critical items follow :

1. **Authorship**. The last name of the first or sole author precedes the initials or given name. Names of all coauthors are given in natural order. Initials appear for a man's given name; a woman's given name is not abbreviated. Compound or hyphenated names are treated as last names.

2. **The year** of publication follows the authorship.

3. **The title** ordinarily appears exactly as on the first page of the article or on the title page.

4. **Abbreviations** are used particularly for the names of serials. Those consisting of one word ordinarily are not shortened. One may follow the list of abbreviations given by Whitlock (1939), cited among the examples. If an abbreviation is not included in the list, the first syllable of the word may be sufficient, but additional letters sometimes are necessary for clarity. Abbreviations of prepositions are omitted from English names of serials but are included with names in other languages.

(1) After A.J. Riker, chmn. 1952. Preparing literature citations. Amer. Inst. Biol. Sci. Bull., 2(2).

sects; 1953, Plant diseases; 1954, Marketing ; 1955, Water; 1956, Animal diseases; 1957, Soil; 1958, Land; 1959, Food; 1960, Power to produce; 1961, Seeds; 1962, After a hundred years ; 1963, A place to live ; 1964, Farmer's world ; 1965, Consumers all ; 1966, Protecting our food ; 1967, Outdoors U.S.A. ; 1968, Science for better living ; 1969, Food for us all ; 1970, Contours of change ; 1971, A good life for more people ; 1972, Landscape for living. Statistics are now published annually in **Agricultural Statistics**. Indexes : 1894-1900, 1901-1905, 1906-1910, 1911-1915.

- (40) U.S. DEPARTMENT OF AGRICULTURE LIBRARY.
Classification Scheme of the Bibliography of Agriculture,
January 1950. (Libr. List 30) 1950. 27 p.
A simple scheme designed especially for the **Bibliography of Agriculture**. No indexes.
- (41) USHER, GEORGE. **A Dictionary of Botany**. Princeton, New Jersey, D. Van Nostrand Co., 1966.
Includes terminology in biochemistry, soil science, and statistics.
- (42) VAN NOSTRAND'S SCIENTIFIC ENCYCLOPEDIA. Ed.
4. Princeton, New Jersey, D. Van Nostrand, 1968.
Includes the following major subject areas : aeronautics, astronomy and navigation, botany, chemical engineering, chemistry, civil engineering, electrical engineering, electronics, geology, guided missiles, mathematics, mechanical engineering, medicine, metallurgy, meteorology, physics, radio and television, statistics, zoology. In it are more than 100,000 definitions, 14,000 articles. Articles vary in length from a few lines to several pages.
- (43) WILCOX, E.V. **Modern Farmers' Encyclopedia of Agriculture; a Compendium of Farm Science and Practice ...**
New York, Judd, 1952. 543 p.
Presents in one volume summaries of scientific investigation in experiment stations, state and federal departments of agriculture, etc. Material is arranged in 8 sections : Field crops; Garden crops; Fruits and nuts; Beef cattle and dairying; Other livestock ; Poultry ; Drainage, fertilization, irrigation, soils ; Miscellaneous. Indexed by subject.

A comprehensive dictionary of genetical terms which should be useful as a supplement to Knight's **Dictionary of Genetics** ...

- (34) SOCIETY OF AMERICAN BACTERIOLOGISTS. **Bergey's Manual of Determinative Bacteriology**, by R.S. Breed, E.G.D. Murray, and A.P. Hitchens assisted by 60 contributors. Ed. 6 Baltimore, Williams & Wilkins, 1948 1529 p.

A basic manual on bacteriology, useful in plant pathology for information on bacteria and viruses causing plant diseases. Index of source and habitats, has sections for plant diseases and plant hosts of viruses.

- (35) TACKHOLM, VIVI. **Students' Flora of Egypt**. Ed. 2. Cairo University, 1974. 888 p.
- (36) TACKHOLM, VIVI, and MOHAMMED DRAR. **Flora of Egypt**, 4 v. Cairo University, Faculty of Science.
- (37) **TECHNICAL BOOK REVIEW INDEX**, 1917-1928, Pittsburgh, Carnegie Library. Continued 1935- New York, Special Libraries Association.

A useful guide to reviews of scientific and technical books, including many not included in the **BOOK REVIEW DIGEST** Monthly, except July and August.

- (38) U.S. BUREAU OF PLANT INDUSTRY, SOILS, AND AGRICULTURAL ENGINEERING. **Soil Survey Manual**. (U.S.D.A. Agr. Handb. 18) 1951. 503 p.

A revision of **Misc. P. 274**. An indispensable reference manual for soil scientists. Includes a brief bibliography on p. 443-454.

- (39) U.S. DEPARTMENT OF AGRICULTURE. **Yearbook of Agriculture**, 1894- Washington, 1895-

Issued annually. Titles vary. Volumes published before 1936 contain statistical information and summaries of developments in agriculture during the year. Since 1936 each volume has been devoted to a special subject, as follows : 1936, Better plants and animals, I; 1937, Better plants and animals, II; 1938, Soils and men; 1939, Food and life; 1940, Farmers in a changing world; 1941, Climate and man; 1942, Keeping livestock healthy ; 1943-47, Science in farming ; 1948, Grass; 1949, Trees; 1950-1951, Crops in peace and war; 1952, In-

ious year in every area of science and technology, and serves to keep the **ENCYCLOPEDIA** up-to-date.

- (29) **NOUVEAU LAROUSSE AGRICOLE**, Publié sous la Direction de Raymond Branconnier ... et de Jacques Glandard. Paris, Librairie Larousse, 1952. 1152, 78, XVI p.
A modern illustrated encyclopedia with a classified arrangement and a dictionary index.
- (30) OCHSE, J.J., M. J. SOULE Jr., M.J. DIJKMAN. and C. WEHBURG, ed. **Tropical and Subtropical Agriculture**. 2 v. New York, Macmillan Co., 1961. 1446 p.
Information about selected tropical and subtropical crops and allied subjects in brief yet reasonably comprehensive form.
- (31) **PAREY'S Landwirtschafts-Lexikon**. Ed. 7. Hrsg. von L. W. Ries. Hamburg and Berlin, Parey, 1956. 2 v.
Well-illustrated encyclopedia covering the whole field of agriculture. Sixth ed., by W. Borgman, E.U. Brodermann, and P. Giseirus, has title : **Illustriertes Landwirtschafts Lexikon**.
- (32) **PUBLISHERS' TRADE LIST ANNUAL**. New York, Bowker, Office of the **PUBLISHERS' WEEKLY**, 1873-
Collection of American publishers' catalogs arranged alphabetically according to the names of the publishers, and bound in two volumes. There is no uniform system of entries, each publisher issues his own catalog independently, hence the information concerning books ranges from very brief descriptions in some catalogs to full data in others. Since 1948 an index volume, **BOOKS IN PRINT**, which includes authors, titles, and series, has added greatly to the usefulness of this tool. Starting from 1967, **BOOKS IN PRINT** is issued in two volumes, Authors Index, and Titles Index. From 1957, **PUBLISHERS' TRADE LIST ANNUAL** usefulness was further increased by the addition of a subject volume, **THE SUBJECT GUIDE TO BOOKS IN PRINT**, which lists in its first issue (1957 issue), 80,000 in-print titles from over 850 U.S. publishers under 30,000 subjects. Since 1968 in two volumes.
- (33) REIGER, R., and A. MICHAELIS. **Genetisches und Cytogenetisches Wortebuch**. (Der Zuchter. Sonderheft 2, 1954). Berlin, Springer, 1954. 140 p.

- (25) LANJOUW, J., and F.A. STAFLEU. **Index herbariorum**. Ed. 2. Pt. 1- (Regnum Vegetabile, v. 2). Utrecht, Netherlands, International Bureau for Plant Taxonomy and Nomenclature of the International Association for Plant Taxonomy, 1954-
- Pt. 1, "The Herbaria of the world", lists herbaria alphabetically by location. Contains list of herbarium abbreviations, a list of herbaria by country, and a general index. Pt. 2, "Collectors" lists world collectors and the institutions with which they work. First installment, A-D, issued in 1954. Pt. 3, "Geographical index of collections", and pt. 4, "Authors of types", were projected to be issued by 1956.
- (26) **THE MCGRAW-HILL ENCYCLOPEDIA OF SCIENCE AND TECHNOLOGY**, rev. ed. 15 v. New York, McGraw-Hill Book Co., 1971. 11,000 p.
- Presents concise, and factual basic data in all areas of the physical sciences, earth sciences, life sciences, and engineering. The **ENCYCLOPEDIA** is crossed-referenced, contains extensive bibliographies and includes a comprehensive index volume containing both an analytical and a topical index. Kept up-to-date by **AN ANNUAL MCGRAW-HILL YEARBOOK OF SCIENCE AND TECHNOLOGY** published each year; usefulness further enhanced by the **MCGRAW-HILL BASIC BIBLIOGRAPHY OF SCIENCE AND TECHNOLOGY** (1966), and the **MCGRAW-HILL MODERN MEN OF SCIENCE** (1967).
- (27) **MCGRAW-HILL MODERN MEN OF SCIENCE**. 2 v. New York, McGraw-Hill Book Co., 1966, 1968. 624, 686 p.
- Supplements the **MCGRAW-HILL ENCYCLOPEDIA OF SCIENCE AND TECHNOLOGY**, who does not contain biography, it can also be used as biographical dictionary of twentieth century scientists ; gives essential data and describes the most significant contribution.
- (28) **MCGRAW-HILL YEARBOOK OF SCIENCE AND TECHNOLOGY**. New York, McGraw-Hill Book Co., 1961- (Annual).
- Planned as an annual supplement to the **MCGRAW-HILL ENCYCLOPEDIA OF SCIENCE AND TECHNOLOGY**. It summarizes the significant events and advances of the prev-

initions are in customary biological terms and, where possible, reference is made to the English or vernacular names of the plants or animals.

- (19) GRAY, PETER. ed. **Encyclopedia of Biological Sciences**. Ed. 2. New York, Van Nostrand Reinhold Co., 1970.
- (20) **HANDBOOK OF BIOLOGICAL DATA**, ed. by W.S. Spector. 854 p. Philadelphia, Saunders, 1956.
This remarkable collection of a great range of data in brief handbook form, was compiled with the aid of 17,000 scientists under the general direction of the National Academy of Science and the National Research Council. The user will be aided in finding the information sought by an extensive table of contents and index. The arrangement is topical. "The handbook is largely in the form of highly condensed tables and charts, and for that reason will be of greater use to the technically trained person than to the undergraduate student. However, it will be of use to all biologists, and is considered by some to be one of the most important biological publications of this century".
- (21) HAWKINS, R.R. ed. **Scientific, Medical, and Technical Books Published in the United States of America**. Ed. 2. New York, R.R. Bowker Co., 1958.
Describes selected titles in science, medicine, and technology.
- (22) HENDERSON, ISABELLA F., and W.D. HENDERSON. **Dictionary of Scientific Terms Pronunciation, Derivation, and Definition of Terms in Biology, Botany, Zoology, Anatomy, Cytology, Genetics, Embryology, Physiology**. Ed. 8. Ed. by John H. Kenneth. Princeton, New Jersey. D. Van Nostrand, 1963.
- (23) INTERNATIONAL UNION OF BIOLOGICAL SCIENCES. **Index des Généticiens**. Paris, 1953. 113 p.
An index of world geneticists arranged alphabetically by name and geographically by institution.
- (24) KNIGHT, R.L. **Dictionary of Genetics Including Terms Used in Cytology, Animal Breeding, and Evolution**. (Lotsya, A Biological Miscellany, v. 2) Waltham, Mass., Chronica Botanica, 1948. 183 p.

- (12) **DICTIONARY OF GARDENING**, a Practical and Scientific Encyclopædia of Horticulture, ed. by Fred J. Chittenden. Ed. 2, by Partick M. Synge. 4 vols. Oxford, Clarendon Press, 1956.
——— Supplement, ed. by Patrick M. Synge, ed. 2. Oxford, Clarendon Press, 1969.
- (13) **FEATHERLY, H.I. Taxonomic Terminology of the Higher Plants.** Ames, Iowa State College Press, 1954. 166 p.
“About half of the book is given over to a glossary which is ample but internationally not exhaustive. Obsolete and seldom used words have been omitted purposely”. Bibliography, p. 163-166.
- (14) **FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS. List of Plant Breeders in Canada and the United States of America; a reference list of classified information giving the addresses and activities of plant breeders in these countries.** Washington, 1949, 64 p.
List breeders in official institutions only.
- (15) **FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS. World List of Plant Breeders.** Rome, 1961. 195 p.
——— Supplement 1, **World List of Plant Breeders (Austria, Bulgaria, Czechoslovakia, Federal Republic of Germany, Hungary, Poland, Romania, U.S.S.R. and Yugoslavia).** Rome, 1965. 102 p.
- (16) **GRAHAM, ELSIE C. ed. Basic Dictionary of Science.** New York, Macmillan Co., 1965.
- (17) **GRAY, ASA. Gray's Manual of Botany.** Ed. 8. New York, American Book Co., 1950.
Identifies the flowering plants and ferns of the central and northeastern United States and nearby Canada. Centennial edition of a standard handbook.
- (18) **GRAY, PETER. The Dictionary of the Biological Sciences.** New York, Reinhold Publishing Corporation, 1967.
Contains definitions, or synonymous, of nearly all taxa of ordinal rank and above and the great majority of families; def-

and journals. Limited for the most part to books of a general character; does not attempt, for example, wide coverage even of important books in the physical and natural sciences. List about 5000 books a year. Gives for each book : author, title, publisher, price, summary of contents and in most cases, excerpts from selected reviews with exact reference to the periodical containing the review. Indicates whether or not the review is favorable and gives its length in number of words. Arranged alphabetically by author of book, with subject and title index. Published monthly except February and July with four-month and permanent annual cumulations. Every fifth year the annual volume contains a cumulated subject and title index for the five-year period.

- (10) CARPENTER, J.R., comp. **An Ecological Glossary**. Norman, University of Oklahoma Press, 1938. 306 p.
Has definitions of 3000 terms with references to sources in which terms are used.

- (11) **CUMULATIVE BOOK INDEX, a World List of Books in the English Language, 1929-**; supplementing the **UNITED STATES CATALOG**, Ed. 4., ed. by Mary Burnham and Regina Goldman. New York, Wilson, 1928.

Appears monthly, with bound semi-annual and permanent two-year cumulations. There are also cumulations covering the periods 1928-32, 1933-37, 1938-42, 1943-48, 1949-52, 1953-56. Author, title, and subject entries are in one alphabet. Each issue has a list of publishers at the end, and the cumulated volumes contain the most complete list available of publishers issuing books in English. Began publication in 1898 but since the beginning of 1929 the scope has been enlarged to include books in the English language regardless of the country in which published. The list of new books appearing regularly in the **PUBLISHERS' WEEKLY** serves as a supplement to the **CUMULATIVE BOOK INDEX** for books published in the U.S. For books published in England, an excellent guide is the weekly **BRITISH NATIONAL BIBLIOGRAPHY**. The **UNITED STATES CATALOG**, Ed. 4, which the **CUMULATIVE BOOK INDEX** supplements, is a list of books that were in print (i.e. available from the publishers) on January 1, 1928.

Gives "the living stories of more than 1,000 great scientists from the Age of Greece to the Space Age, chronologically arranged" (subtitle).

- (4) **ASSOCIATION OF OFFICIAL AGRICULTURAL CHEMISTS. Official Methods of Analysis.** Committee on Editing Methods of Analysis. H.J. Fisher (and others). Ed. 7, 1950. Washington, 1950. 910 p.

Methods of analysis of soils, fertilizers, insecticides, agricultural products, etc. Standard solutions, reference tables and definitions of terms, fertilizers, and liming materials are included. Indexed.

- (5) **BAILEY, L.H. Manual of Cultivated Plants Most Commonly Grown in the Continental United States and Canada.** Rev. ed., completely restudied. New York, Macmillan, 1949. 1116 p.

Arranged systematically with indexes to scientific and common names. Has a glossary and keys to families.

- (6) **BAILEY, L.H. Standard Cyclopedia of Horticulture.** New York, Macmillan, 1914-1917. 6 v. 1947 reissue in 3 v. Purpose is to describe "the plants horticulturally grown within its territory" (North America, Porto Rico, Hawaii, and the other islands) to the close of year 1912, discuss growing practices, and to "depict the horticultural capabilities of the states and provinces". In spite of "editions" dated as late as 1949 there have been no significant revisions since the original edition of 1917.

- (7) **BAWDEN, F.C. Plant Viruses and Virus Diseases.** Ed. 3. Waltham, Mass., Chronica Botanica, 1950. 335 p.

An important text which reviews the literature of the subject and provides references at the end of each chapter.

- (8) **BEDEVIAN, A.K. Illustrated Polyglottic Dictionary of Plant Names, in Latin, Arabic, Armenian, English, French, German, Italian, and Turkish Languages; Including Economic Medicinal, Poisonous, and Ornamental Plants and Common Weeds ...** Cairo, Argus & Papazian Presses, 1936. 2 pts. in 1 v. 664, 450 p.

- (9) **BOOK REVIEW DIGEST.** v. 1- 1905- New York, Wilson, 1906-

A digest and index to book reviews appearing in 70 periodicals

- (59) WEIJER, J. **A Catalogue of Genetic Maize Types Together with a Maize Bibliography**, with support by UNESCO. The Hague, Netherlands, Martinus Nijhoff, 1952. (Reprint from **Bibliographica Genetica XIV**, pp. 189-425).
- (60) WINCHELL, CONSTANCE. **M. Guide to Reference Books**. Ed. 8. Chicago, American Library Association, 1967.
— Supplement, 1965-1966, ed. by Eugene P. Sheehy. Chicago, American Library Association, 1968.
- (61) **WORLD LIST OF SCIENTIFIC PERIODICALS PUBLISHED IN THE YEARS 1900-1960**. Ed. 4, by Peter Brown and G.B. Stratton. London, Butterworths, 1972, 3 v.

Lists scientific periodicals concerned with the natural science and technology of which issues were published during this period of sixty-one years, and their holdings in British libraries. Important for the identification of periodicals in agriculture and related fields, and as a guide to the abbreviation of names of scientific journals.



Encyclopedias, Dictionaries, Directories,

Handbooks, Manuals, and Yearbooks

- (1) ALTMAN, P.L., and DOROTHY S. DITTMER, ed. **Biology Data Book**. Washington D.C., Federation of American Societies for Experimental Biology, 1964.
- (2) **AMERICAN Men of Science ; a Biographical Directory**. V. 1-6. Physical and Biological Sciences, Ed. 11, Edited by the Jacques Cattell Press, New York, R.R. Bowker Co. 1965-1967.

Identifies and gives brief personal data about more than 135,000 active United States and Canadian scientists in every field; kept up-to-date by supplements.

- (3) ASIMOV, ISSAC. **Asimov's Biographical Encyclopedia of Science and Technology**. Garden City, New York, Doubleday and Co.

Subject list of several hundred titles, with author index and list of publishers' addresses. Revised approximately every two years.

- (54) U.S. LIBRARY OF CONGRESS. REFERENCE DEPARTMENT. SCIENCE DIVISION. **Biological Sciences Serial Publications, A World List 1950-1954**. Philadelphia, Biological Abstracts, University of Pennsylvania, 1955. 269 p.

Lists the majority of current biological journals which are of interest to the agricultural scientist.

- (55) U.S. NATIONAL AGRICULTURAL LIBRARY. **Dictionary Catalog of the National Agricultural Library, 1862-1965**. New York, Roman and Littlefield, 1967- (In progress).

Author, title, and subject entries for monographs, serials, and analytics. Descriptive information is reproduced as it appears in the card catalog. Supplemented by the **National Agricultural Library Catalog** (New York, Rowman and Littlefield, 1966-), a monthly list of all additions to the collection.

- (56) VERDOORN, F. **Selected referenes on current research in plant taxonomy, ecology, and geography in Europe, Africa Asia, and Australia**. In *Chron. Bot.* 6 (1941) : 265-287, 298-311.

Arranged alphabetically by author, giving address and nature of research. New World botanists excluded.

- (57) WALFORD, A.J. ed. **Guide to Reference Materials, v. 1. Science and Technology**. Ed. 2. London, The Library Association. 1966.

Aims to provide a signpost to reference books and bibliographies published mainly in recent years; international in scope but the emphasis on items published in Britain; for both general and specialized use.

- (58) WARNER, MARJORIE F., MARTHA A. SHERMAN, and ESTHER M. COLVIN. **A Bibliography of Plant Genetics**. (U.S. Dept. Agric. Misc. Pub. 164) Washington, 1934. 552 p.

- (48) U.S. DEPARTMENT OF AGRICULTURE. LIBRARY.
Bibliographical Contributions. no. 1-35, June 1919- September 1939. Washington, 1919-1939; 35 nos.
The contributions cover various subjects.
- (49) U.S. DEPARTMENT OF AGRICULTURE. LIBRARY.
Bibliography of Agriculture. v. 1- 1942- Washington, D.C., 1942-
Issued monthly. V. 1-2, issued in 6 sections : Agricultural economics and rural sociology, Agricultural engineering, Entomology, Plant science, Forestry, and Food processing and distribution. Beginning with v. 3, all sections were combined in a single publication and the scope of the bibliography broadened to cover the whole field of agriculture. Checklists of U.S. Department of Agriculture publications, state agricultural experiment station publications, and state agricultural extension service publications are provided. Classified by subject, indexed monthly by author and annually by author and subject. Subject and author indexes are provided semi-annually from 1943-1947. The most comprehensive single index to agricultural literature.
- (50) U.S. DEPARTMENT OF AGRICULTURE. LIBRARY.
Cotton Literature, Selected References. Washington, 1931-1942. 12 v.
Continued by the **Bibliography of Agriculture.** A comprehensive list useful for years covered.
- (51) U.S. DEPARTMENT OF AGRICULTURE. LIBRARY.
Library List. No. 1- June 1942- Washington, 1942-
These lists each dealing with a special subject.
- (52) U.S. DEPARTMENT OF AGRICULTURE. LIBRARY.
Plant Science Catalog : Botany Subject Index. 15 v. Boston, MICROphotography Co., 1958.
International in scope. Includes references to botanical literature in books and serials from the earliest times. Also includes references to related subjects of interest to botanists.
- (53) U.S. DEPARTMENT OF AGRICULTURE. LIBRARY.
Selected List of American Agricultural Books and Periodicals. (Libr. List 1, rev.) June 1954. 24 p.

in the Library of the U.S. Department of Agriculture. v. 1-16, 1919-1934. Washington, 1919-1934.

Continued by **Plant Science Literature**, 1935 to 1942, and by **Bibliography of Agriculture**, 1942 to date.

- (44) U.S. BUREAU OF PLANT INDUSTRY. LIBRARY. **Plant Science Literature** ; selected references comp. by the Library staff... (mainly for the Botanical catalog) from publications received in the U.S. Department of Agriculture Library ... Washington, 1935-1942. 15 v.

Formed by the union of **Agronomy Current Literature** and **Botany Current Literature**. Superseded by the **Bibliography of Agriculture**.

- (45) U.S. BUREAU OF PLANT INDUSTRY, SOILS, and AGRICULTURAL ENGINEERING. DIVISION OF WEED INVESTIGATIONS. **Bibliography of Weed Investigations**. 1950-

Issued as an annual in 1950. Quarterly since 1951. The issue for 1950 and the issues for the first two quarters of 1951 were published as monographs in processed form at the Plant Industry Station in Beltsville, Md. Since the July, August, and September issue of 1951 the bibliography has appeared in **Weeds**, a quarterly journal published by the Weed Society of America. It has also been issued separately as a preprint. Includes references to the economic aspects and general problems of weeds, the botany of weeds, weed control, etc. There are no cumulated author or subject indexes.

- (46) U.S. DEPARTMENT OF AGRICULTURE. **Bibliographical Bulletin** No. 1- July 1943- Washington, 1943-

These bibliographies each cover a special subject or topic.

- (47) U.S. DEPARTMENT OF AGRICULTURE. LIBRARY.

Agricultural Library Notes. v. 1-17, no. 6, January 1926-June 1942. Washington, 1926-1942. 17 v .

Continued by **Bibliography of Agriculture**. Lists principal Library accessions, publications of U.S. Department of Agriculture workers issued outside the Department, articles by state experiment station workers, translations, state extension publications, and bibliographies. Has an annual index.

Includes literature pertaining to all kinds of effects of ionizing radiation on plants, i.e., cytological, genetic, morphological, physiological, etc. Taxonomically the coverage extends from the lower forms (Fungi, Algae and Bryophytes) to the Gymnosperms and Angiosperms. Bacteria are not included.

- (39) STECKLER, P.B. ed. **American Scientific Books, 1960-1962-**
New York, R.P. Bowker Co., 1962- (Annual).
A cumulation of scientific, technical, and medical books appearing in **American Book Publishing Record**; arranged by Dewey Decimal Classification System; provides a basic selection of books in these fields; some annotations; author and title index.
- (40) STUBBE, H. **Genetisch-pflanzenzüchterische Bibliographie, 1939-1946 (1947)**. (Der Züchter. Sonderheft (1) 1948).
Berlin, Springer, 1949, 287 p.
A survey of reference to world research in plant breeding during the war years. Arranged by subject. No author index.
- (41) **ULRICH'S INTERNATIONAL PERIODICAL DIRECTORY**. Ed. 12. New York, R.R. Bowker Co., 1967-1968.
2 v. Vol. I : Scientific, Technical, and Medical Periodicals, 1967. Vol. II. Arts, Humanities, Business, and Social Sciences, 1968.
——— Annual Supplement, 1966-
Arranged by subject, lists world periodicals in each field, giving detailed information regarding contents, sponsorship, frequency, and language of text.
- (42) U.S. BUREAU OF PLANT INDUSTRY. LIBRARY. **Agronomy Current Literature**. v. 1- v. 9, no. 26; January 1926-December 1934. Washington, 1926-1934.
Absorbed into **Plant Science Literature**. Essentially a check list; useful only occasionally in a literature search. References published during the period can usually be found in the **Experiment Station Record** or other sources.
- (43) U.S. BUREAU OF PLANT INDUSTRY. LIBRARY. **Botany Current Literature**. Additions to the botanical catalogue, Bureau of Plant Industry, comp. from publications received

- (34) NATIONAL RESEARCH CENTER. EGYPT. **Documentation Bulletin** v. 1- 1954-
Monthly publication in two parts, published in every issue. Part I, embodies a list, classified according to subjects, of titles in English and French, of articles published in periodicals received by the Center. Part II, presents short abstracts of scientific and technical papers appearing in Egypt and other Middle East countries.
- (35) ROYAL SOCIETY OF LONDON. **Catalogue of Scientific Papers** 1800-1900. London, Clay, 1867-1902. 19 v.
An author index to literature of zoology and other sciences. No subject index to zoology sections available.
- (36) SCIENCE BOOKS, a **Quarterly Review**, ed. by H.J. Deason. v. 1- 1965- Washington, D.C., American Association for the Advancement of Science, 1965-
Provides informative descriptive annotations, both positive and negative; indicates appropriate age levels for which each book is suitable; includes first two years of college; covers trade books, textbooks, and reference works.
- (37) SCIENCE CITATION INDEX. Philadelphia, Institute for Scientific Information, 1961-
A science literature index, including citations to journals, books, meetings, dissertations, reports, contracts, patents, circulars, and personal communications from several countries, covering every major subject category in science. Arranged alphabetically by author, grouping under each reference all authors and papers referring to that work since its publication. Each of the author's cited works, accompanied by its citing authors, is arranged chronologically. Issued quarterly, with annual cumulations in three parts : Citation Index, Source Index, and Permuterm-Subject Index.
- (38) SPARROW, A.H., J.P. BINNINGTON, and VIRGINIA POND. **Bibliography on the Effects of Ionizing Radiations on Plants, 1896-1955.** Biology Department, Brookhaven National Laboratory, Upton, New York, 222 p.

Issued annually. Text in English and French. Covers primarily technical publications. References are annotated and classified by product. Indexed by author.

- (28) KNIGHT, R.L. **Abstract Bibliography of Cotton Breeding and Genetics, 1900-1950.** Cambridge, Eng., 1954. 256 p.
- (29) LAUCHE, R. **Internationales Handbuch der Bibliographien des Landbaus.** World Bibliography on Agricultural Bibliographies. Braunschweig, Forschungsanstalt für Landwirtschaft. (In preparation, 1957).
When completed will be an important contribution to the bibliography of agriculture.
- (30) LAWRENCE, G.H.M. **Literature of taxonomic botany. In his Taxonomy of Vascular Plants.** New York, Macmillan, 1951. Chap. XIV, p. 284-313.
A succinct and most useful guide to the important literature and reference works used in taxonomic botany.
- (31) MATSUURA, H. **A Bibliographic Monograph on Plant Genetics (Genic Analysis) 1909-1929.** Ed. 2, rev. Sapporo. Hokkaido Imperial University, 1933. 787 p.
Pt. 1, Genic analysis of plants (arranged alphabetically by plant name with abstract of work done); pt. 2, Bibliography; pt. 3, Author and subject indexes.
- (32) McCLELLAND, C.K. **The Genetics, Breeding and Improvement of Corn and Cotton.** (Published by the compiler), 1930.
- (33) **McGraw-Hill Basic Bibliography of Science and Technology.** New York, McGraw-Hill Book Co., 1966. 738 p.

Lists recent titles (books only) on more than 7,000 subjects compiled and annotated by the editors of the **McGraw-Hill Encyclopedia of Science and Technology** under subject headings corresponding with **ENCYCLOPEDIA** articles. Refers to readings beyond the **ENCYCLOPEDIA** articles. Emphasis is on recently published books. Arranged by subject.

- (19) IMPERIAL BUREAU OF PLANT GENETICS. **Interspecific and Intergeneric Hybridization in Relation to Plant Breeding.** Cambridge, Eng., 1932. 30 p.
- (20) IMPERIAL BUREAU OF PLANT GENETICS. **Oat Breeding Bibliography.** Cambridge, Eng., 1931. 21 p.
- (21) IMPERIAL BUREAU OF PLANT GENETICS. **Rice Breeding Bibliography.** Cambridge, Eng., 1932, 26 p.
- (22) IMPERIAL BUREAU OF PLANT GENETICS. **Rye Breeding Bibliography.** Cambridge, Eng., 1932. 26 p.
- (23) IMPERIAL BUREAU OF PLANT GENETICS. **Wheat Breeding Bibliography.** Cambridge, Eng., 1931. 3 v.
- (24) IMPERIAL BUREAU OF PLANT GENETICS. SCHOOL OF AGRICULTURE **Tobacco Breeding Bibliography.** Cambridge, Eng., 1937.
- (25) **INDEX BIBLIOGRAPHICUS**; Directory of Current Periodical Abstracts and Bibliographies, comp. by Theodore Besterman. Ed. 3 (UNESCO Publication no. 863. IFD Publication no. 247) Paris, UNESCO; The Hague, International Federation for Documentation, 1952. 2 v.
In French and English. V. 1, "Science and Technology", is a useful guide to agricultural abstracting publications. However, certain publications listed have very little reference value, and a few items listed have ceased publication.
- (26) INTERNATIONAL ASSOCIATION OF AGRICULTURAL LIBRARIANS AND DOCUMENTALISTS. **Quarterly Bulletin.** v. 1- January 1956-
"Bibliographical news" section reviews important new agricultural reference works and periodicals. Editor is D.H. Boalch, Librarian, Rothamsted. Experimental Station, Harpenden, Herts, Eng.
- (27) INTERNATIONAL INSTITUTE OF AGRICULTURE. **Bibliographie d'Agriculture Tropicale... Bibliography of Tropical Agriculture, 1931-1940.** Rome, 1932-1942. 10 v.

- (12) COMMONWEALTH BUREAU OF SOILS. **Bibliography of Soil Science, Fertilizers, and General Agronomy.** Harpenden, Herts, Eng. 1935-
- Serves as a cumulative index to **Soils and Fertilizers**. Triennial classified title bibliography of world literature : Indexed by author and subject. Each entry gives the name (s) of the author(s), the title of the paper in English and the journal reference, and indicates the language in which the paper is written. The 1959-1962 **Bibliography** also contains a key to the classification system used, and a list of some 1200 periodicals, with place of publication, in which the items in the **Bibliography** were originally published. This **bibliography** was discontinued with effect from the 1959-1962 volume.
- (13) IMPERIAL BUREAU OF PLANT BREEDING AND GENETICS. **Bibliography on Cold Resistance in Plants.** Cambridge, Eng., 1939. 22 p.
- (14) IMPERIAL BUREAU OF PLANT GENETICS. **Barley Breeding Bibliography.** Cambridge, Eng., 1931. 24 p.
- (15) IMPERIAL BUREAU OF PLANT GENETICS. **Bibliography on the Breeding and Genetics of the Millets and Sorghums.** Cambridge, Eng., 1932. 21 p.
- (16) IMPERIAL BUREAU OF PLANT GENETICS. **Breeding Resistant Varieties, 1930-1933.** Cambridge, Eng., 1935. 32 p.
- A supplement to **Breeding Varieties Resistant to Disease**. Comprise papers summarized in **Plant Breeding Abstracts**.
- (17) IMPERIAL BUREAU OF PLANT GENETICS. **Breeding Varieties Resistant to Disease.** Cambridge, Eng., 1930. 43 p.
- Papers on this subject after 1930 are listed in **Plant Breeding Abstracts**, and in **Breeding Resistant Varieties, 1930-1933**.
- (18) IMPERIAL BUREAU OF PLANT GENETICS. **The Experimental Production of Haploids and Polyploids.** Cambridge, Eng., 1936. 28 p.

- (6) BOALCH, D.H. ed. **Current Agricultural Serials. v. 1. Alphabetical List.** International Association of Agricultural Librarians and Documentalists. Oxford, 1965. 2 v. 351 p. Each entry includes the date of first publication and frequency of issue for over 12,000 current serials publications dealing with agriculture, and a rough Universal Decimal Classification (U.D.C.) of field of cover.
- (7) CATON, D. **Selected bibliography-range resources and management.** Moscow, Idaho, University of Idaho, 1954. Unpaged.
A mimeographed list, arranged alphabetically by author, of references in range management published in American periodicals, bulletins, and other sources .
- (8) CHILEAN NITRATE EDUCATIONAL BUREAU, INC. **Bibliography of the Literature on the Minor Elements and Their Relation to Plant and Animal Nutrition.** Ed. 4. New York, 1948-1955. 4 v.
Abstracts and references originally were obtained from **CHEMICAL ABSTRACTS, Experiment Station Record, and Soils and Fertilizers.** Has author, element, general nutrition, and botanical index.
- (9) CLAY, E.W., comp. **List of Available Publications of the United States Department of Agriculture.** (U.S. Dept. Agric. Pub. Div., Off. Inform., List No. 11). 1963. 109 p.
Lists by subject all publications of the Department that are available either for free distribution or by purchase from the Government Printing Office. Gives information on distribution of publications and describes the various series and periodicals. Frequently revised.
- (10) COMMONWEALTH BUREAU OF PLANT BREEDING AND GENETICS. **Bibliography on Insect Pest Resistance in Plants.** Cambridge, Eng., 1944.
- (11) COMMONWEALTH BUREAU OF PLANT BREEDING AND GENETICS. **New and Promising Varieties Recently Described in the Literature.** Cambridge, Eng.
List 8 appeared in 1953.

- (3) **BIBLIOGRAPHIC INDEX; a Cumulative Bibliography of Bibliographies.** 1938- New York, Wilson, 1938-

Semiannual with annual and larger cumulations. Lists alphabetically by subject current bibliographies, including those published separately as books and pamphlets, and those appearing as parts of books, pamphlets, and articles, both in English and foreign languages.

- (4) **BIOLOGICAL AND AGRICULTURAL INDEX; a Cumulative Subject Index to Periodicals in the Fields of Biology, Agriculture, and Related Sciences.** (Formerly **Agricultural Index**). v. 1- 1916- New York, Wilson, 1919-

Issued monthly (except September). Monthly issues are superseded by permanent bound annual cumulative volumes. Alphabetical subject index to 146 periodicals in the fields of agricultural chemicals, agricultural economics, agricultural engineering, agriculture and agricultural research, animal husbandry, biology, botany, dairying and dairy products, ecology, entomology, feeds, forestry and conservation, genetics, horticulture, microbiology, mycology, nutrition, physiology, plant science, poultry, soil science, veterinary medicine and zoology. All publications now indexed are in English, most foreign publications having been dropped in 1949. An indispensable reference work for any library serving agricultural interests.

- (5) **BLANCHARD, J.R., and HERALD OSTVOLD. Literature of Agricultural Research.** Berkeley, University of California Press, 1958. 231 p.

Within the broad areas of agriculture in general, plant sciences, animal sciences, physical sciences (agricultural chemistry, soils, etc.), food and nutrition, social sciences, the chief bibliographies, abstracting journals, indexes, encyclopedias, manuals, directories and other important reference sources are listed and described under each specific topic, such as botany, pest control, poultry husbandry, and the like. Because of its wide scope, the inclusion of foreign as well as American sources, its brief descriptive or critical notes when needed, and the detailed subject and the author index, this bibliography is of immense value to the student in the field.

stations, which are not indexed in the **BIOLOGICAL AND AGRICULTURAL INDEX**. Tables of contents for each volume list station and U.S. Department of Agriculture publications abstracted. Abstracts of important articles are detailed and were written by specialists. Original titles for foreign publications are given with English translation in brackets. Yearly indexes are by author and subject. General indexes covering five or more years, by subject only. Still useful as a guide to agricultural literature published during the period covered.

- (24) **ZFITSCHRIFT FUR PFLANZENZUCHTUNG**. v. 1- 1912-
Berlin, Parey, 1913-

Issued quarterly. Has original articles plus lengthy abstracts of important items. Annual author and subject indexes.

- (25) **DER ZUCHTER; ZEITSCHRIFT FUR THEORETISCHE UND ANGEWANDTE GENETIK ...** v. 1- 1929- Berlin, 1929-

Issued 8 times a year. Majority of articles are on plant genetics. Has abstracts and book reviews of recent literature in each issue. Annual author and subject indexes.

✻ *Bibliographies of Bibliographies, Bibliographies, Indexes, and Periodical Lists*

- (1) **BESTERMAN, T. A World Bibliography of Bibliographies and of Bibliographical Catalogues, Calendars, Abstracts, Digests, Indexes, and the Like**. Ed. 4. Lausanne, Societas Bibliographica, 1965-1966. 5 v.

A monumental and uncritical list of separately published bibliographies. The author has strengthened his list of scientific agricultural bibliographies in the third edition. Still incomplete for agriculture but nevertheless of the first importance.

- (2) **BIBLIOGRAPHIA GENETICA**; v. 1- 1925- 's-Gravenhage, Nijhoff, 1925-

Issued irregularly. Each volume contains lengthy monographs on separate subjects. Of reference value because of the excellent bibliographies.

Landtechnik; Abt. 2, Pflanzliche produkt; Abt. 3, Tierzucht, tierernährung; Abt. 4, Veterinärmedizin. Is said to contain abstracts from some 1000 periodicals prepared by about 750 scientists.

- (21) **RESUMPTIO GENETICA.** v. 1-19. 1925-1953. The Hague, Nijhoff, 1926-1953. 19 v.

Each volume lists new literature on genetics and abstracts the most important items. Has author, subject, and Latin name indexes.

- (22) **TROPICAL ABSTRACTS,** Compiled from World Literature on Tropical and Subtropical Agriculture. Published by the Advice and Documentation Bureau, Tropical Products Department, Royal Tropical Institute, Amsterdam, Netherlands, in cooperation with the Agricultural University, Wageningen. v. 1- 1953-

Issued monthly. A selection of abstracts compiled from over 1200 periodicals, reports, and occasional publications received from more than 130 countries. The aim is to present a general view of progress made in the field of tropical and subtropical agriculture with special reference to the application of research to agricultural practice, and to consider agriculture in its interrelation with other branches of science and in its connection with economic and social conditions. A review article on a subject of current interest, and a limited number of book reviews are included in each number of the journal. Abstracts are classified according to the Universal Decimal Classification system (U.D.C.).

- (23) **U.S. OFFICE OF EXPERIMENT STATIONS. Experiment Station Record.** v. 1-95, September 1889—December 1946. Washington, 1890-1948. 95 v.
——— General index, v. 1-70, 1889—June 1934. Washington, 1903—1937. 6 v.

Primarily an abstract record of American agricultural experiment station and U.S. Department of Agriculture research and of articles by station and department men in nonofficial journals. Important foreign publications were also abstracted. Covers certain publications, such as the annual reports of the

Mycology). v. 1- 1922- Ferry Lane, Kew, Richmond, Eng., 1922-

A monthly abstract journal compiled from the world literature on plant pathology. The subject covered are : (a) **Diseases** of crop plants, ornamental plants, and forest trees caused by fungi, bacteria, viruses, and non-parasitic factors and their control ; (b) **Decay** of timber, textiles, and vegetable products by fungi; (c) **Fungicides** and antibiotics in relation to the control of plant diseases and the prevention of fungal spoilage ; **General** and systematic mycology with particular emphasis on fungi of agricultural importance. Review articles are included. Has monthly author indexes and annual author and subject indexes.

- (17) **FORTSCHRITTE DER BOTANIK**; unter zusammenarbeit mit mehrern fachgenossen. v. 1- 1931- Berlin, Springer, 1932.

An annual systematic review of international research in the principal branches of botany. Has lengthy bibliographies and annual subject indexes.

- (18) **L'INSTITUT NATIONAL de la RECHERCHE AGRONOMIQUE**. Series A. **Annales agronomiques**. v. 1- 1950- Paris, 1950.

The "Documentation" section abstracts selected world periodical literature concerning soils, fertilizers, plant physiology and pathology, and related subjects. The "Bibliographie" section reviews books and the "Sommaire des periodiques" section lists the contents of journals published throughout the world. Useful as a guide to French and European material. Series B. **Amélioration des plantes**, Series C. **Epiphyties**, and Series E. **Annales de technologie agricole** also have documentation sections which may be of interest to the plant scientist.

- (19) **INTERNATIONAL REVIEW OF CYTOLOGY**, ed. by G. H. Bourne and J.F. Danielli. v. 1- 1952- New York, Academic Press, 1952-

- (20) **LANDWIRTSCHAFTLICHES ZENTRABLATT**. 1955- Berlin, Deutsche Akademie der Landwirtschaft, 1955-
An agricultural abstracting journal, issued in 4 parts; Abt. 1,

jects of interest are published four times a year. Subject and author indexes are provided, and a cumulative index is provided at the end of the year.

(14) COMMONWEALTH BUREAU OF PLANT BREEDING

AND GENETICS. **Plant Breeding Abstracts**. v. 1- 1930-
Department of Applied Biology, Downing Street, Cambridge, Eng., 1930-

A monthly abstract journal covering the world periodical literature in the genetics, cytology, breeding, and varietal trials of all the principal agricultural crops, including cereals, grasses, leguminous forage crops, roots and tubers, fiber plants, sugar and starch plants, tobacco, tea, and cacao, oil plants, spices, medicinal plants, fruits, vine, nuts, forest trees, vegetables and economic lower plants such as mushrooms. An introductory section covers theoretical genetics and cytology, evolution and taxonomy. Material relating to plant breeding is also excerpted from annual reports, and reports of symposia. Reviews of relevant books and notices of new journals complete each number.

(15) COMMONWEALTH BUREAU OF SOILS. **Soils and Fertilizers**. v. 1- 1932- Rothamsted Experimental Station, Harpenden, Eng., 1938-

A comprehensive abstract journal of soil and fertilizer sciences, issued monthly. Formerly issued by Imperial Bureau of Soil Science. Each issue contains about 450 abstracts and references to current literature, besides short editorials, reviews, and other matter of general interest. The abstracts cover : pedology (general), soil chemistry, techniques and analysis, soil physics, soil classification, soil fertility, soil biology, soil formation, soil cultivation, soil conservation, fertilizers, soil-borne plant diseases, crop culture, fruit culture, and forest soils. Annual subject and other indexes. **Bibliography of Soil Science, Fertilizers, and General Agronomy**, issued triennially by the Commonwealth Bureau of Soils, serve as a cumulative index to this publication, but this bibliography was discontinued with effect from the 1959-1962 volume.

(16) COMMONWEALTH MYCOLOGICAL INSTITUTE. **Review of Plant Pathology** (formerly **Review of Applied**

- (12) COMMONWEALTH BUREAU OF PASTURES AND FIELD CROPS. **Field Crop Abstracts**. v. 1- 1948- Hurley, Maidenhead, Berks, Eng., 1948-

Issued monthly. An abstract journal compiled from the world's current scientific literature on annual crops, temperate and tropical. The main topics covered are the agronomy, botany, and physiology of annual field crops, principally the following : **Cereals** (wheat, oats, rye, barley, corn, sweet corn, millet, sorghum, rice); **Legumes** (cowpea, soybean, groundnut, pea, bean, chickpea); **Root crops** (sugar beet, fodder beet, turnip, potato, sweet potato, cassava, yam); **Fiber crops** (cotton, flax, hemp, jute, kenaf); **Oil seed crops** (castor, sesame, linseed, safflower, sunflower, rape) ; **Miscellaneous crops** (tobacco, buckwheat, kale); Green manures and cover crops. In addition, the following subjects are dealt with in relation to the crops covered : control of weeds, pests, and diseases; surveys, land use, and farming systems; soil and water conservation, land reclamation, irrigation, and agrometeorology. There is a book review in each number, and review articles on subjects of current interest are published. Subject and author indexes are provided and a cumulative index is provided at the end of the year.

- (13) COMMONWEALTH BUREAU OF PASTURES AND FIELD CROPS. **Herbage Abstracts**. v. 1- 1931- Hurley, Maidenhead, Berks, Eng., 1931-

Issued monthly. Supersedes **Current Literature Lists**, **Herbage Research Circulars**, and **Monthly Abstracts Service**. An abstract journal compiled from the world's current scientific literature on sown and natural grassland, pasture plants, and fodder crops. The main topics covered are : management and evaluation of sown grasslands, natural grasslands and fodder crops ; descriptions and performance of species and cultivars ; fodder conservation; composition and nutritive value; seed production, testing, storage, and treatment; botany, plant physiology, and grassland ecology. Other subjects dealt with from a herbage standpoint include : control of weeds, pests and diseases; toxic plants; surveys, land use, and farming systems; soil and water conservation; land reclamation; irrigation; meteorology and climatology; techniques and apparatus. There is a book review section in each number, and review articles on sub-

- (9) **THE BOTANICAL REVIEW** ...v. 1- January 1935- Lancaster, Pennsylvania, 1935-

Has many review articles with lengthy bibliographies.

- (10) **CHEMICAL ABSTRACTS**. v. 1- 1907- Columbus, Ohio, American Chemical Society, 1907-

Issued semi-monthly. The most comprehensive of the abstracting services, covering all articles and reports of chemical interest throughout the world. Chemical patent literature is also covered. Has annual author, subject, and formula indexes. Decennial indexes are available. The following sections are widely used by plant scientists and agriculturists : Organic chemistry, Biological chemistry, Foods, Soils and fertilizers, Pesticides and crop-control agents, The fermentation industries. Chemical Abstracts has much the largest circulation of any scientific abstract journal in the world.

- (11) **COMMONWEALTH BUREAU OF HORTICULTURE AND PLANTATION CROPS. Horticulture Abstracts**. v. 1- 1931- East Malling Research Station, Maidstone, Kent, Eng., 1931-

Issued monthly, this journal provides, in about 9,000 abstracts a year, a coverage of the world's scientific literature on horticultural and plantation crops, both temperate and tropical, and in addition, provides, through its comprehensive monthly and annual subject indexes, the simplest, cheapest, and most complete work of reference in this field. Its coverage includes : **Material of general scientific interest** — including basic research, and details of new experimental, and practical techniques, and equipment; **Temperate fruits** — tree and small fruits, vines and nuts, including varieties, propagation, culture and soil management, control of pests and diseases, harvesting, packing and storage; **Vegetable and flower crops** — varieties, culture, pest and disease control, harvesting and packing; **Industrial crops** — yielding spices, drugs, essential oils, seed oils, hard fibers, hops and other products; **Tropical and sub-tropical fruit and plantation crops** — including citrus, olives, bananas, cacao, coffee, oil palms, rubber, sugar cane, and tea.

- (7) **BIOLOGICAL ABSTRACTS** ; from the World's Biological Research Literature with the Cooperation of Individual Biologists, Biological Industries, and Biological Journals. Published semi-monthly by BioSciences Information Service of Biological Abstracts, Philadelphia, Pennsylvania. v. 1- December 1926-

An indispensable reference work for all workers in the biological sciences. The more than 450 topics and subtopics that collectively make up Biological Abstracts' classification of biology form the basis for placement of abstracts in each of the semi-monthly issues, and demonstrate the extent of Biological Abstracts' comprehensive coverage of the important developments in all fields of life science research. Five self-contained searching aids : (a) current Subject Index, B.A.S.I.C. — gives quick reference to the abstracts in each semi-monthly issue; (b) Author Index — published in each issue; a cumulative Author Index is published annually; (c) Biosystematic Index — a key to taxonomic aspects of each abstract in each issue; (d) The CROSS Index finder — full range coordinate search mechanism providing general to ultra specific subject; (e) guide to new books and periodicals is published each issue. Before 1963 monthly author indexes were issued plus the general index which was published some months after the last abstract number in each volume. The general index had an "Author Index", followed by "Systematic Index" and "Geographical Index", and finally the long analytical "Subject Index" which occupied three fourth of the index number.

- (8) **BOTANICAL ABSTRACTS** ; a Monthly Serial Furnishing Abstracts and Citations of Publications in the International Field of Botany in its Broadest Sense. v. 1-15, September 1918 — November 1926. Baltimore, Williams & Wilkins, 1919-1926. 15 v.

Merged with **BIOLOGICAL ABSTRACTS**, November 1926. Has classified abstracts with author indexes in v. 1-6, 8-10 and a cumulated author and subject index to the first 10 volumes. V. 11 has a separate author and subject index. V. 12-15 have no indexes. Sections on agronomy, forest botany and forestry, horticulture, and pathology are of particular interest to agriculture.

* *Abstracting Journals and Annual Reviews*

- (1) **ADVANCES IN AGRONOMY**, ed. by N.C. Brady. v. 1-1949- New York, Academic Press, 1949-
Reviews progress in basic research in soil and crop science and developments in agronomic practice. Contains references. Issued under the auspices of the American Society of Agronomy.
- (2) **ADVANCES IN BOTANICAL RESEARCH**, ed. by R.D. Preston. v. 1- 1963- New York, Academic Press, 1963-
- (3) **ADVANCES IN GENETICS**, ed. by M. Demeric. v. 1- 1947- New York, Academic Press, 1947-
- (4) **ANNUAL REVIEW OF BIOCHEMISTRY**. v. 1- 1932- Stanford, Calif., Annual Reviews, 1932-
Of reference value because of the extensive bibliographies appended to the review articles. Has author and subject indexes.
- (5) **ANNUAL REVIEW OF PLANT PHYSIOLOGY**. v. 1-1950- Stanford, Calif., Annual Reviews, 1950-
Surveys current literature in various areas of plant physiology. Contains references.
- (6) **AGRICULTURAL RESEARCH COUNCIL WEED RESEARCH ORGANIZATION. Weed Abstracts**. v. 1- 1954- Begbroke Hill, Yarnton, Oxford, Eng., 1954-
Issued monthly. Abstracts of current literature on weeds, weed control, and allied subjects. The subjects covered are : (a) control of weeds in annual field and herbage crops, in vegetable, fruit, ornamental and plantation crops, grasslands and forestry; (b) control of individual weed species, woody weeds and aquatic weeds, including weeds in non-agricultural situations; (c) biology of weeds, including ecology and crop/weed competition effects; (d) herbicides, including their chemistry and properties, methods of analysis, toxicology, soil relations and the physiological effects and mode of action of herbicides and growth-regulating substances in plants.

- Freedman, Paul. 1960. **The principles of scientific research.** Oxford : Pergamon Press. 227 p.
- Holman, H.H. 1962. **Biological research method, a practical guide.** Edinburgh : Oliver and Boyd. 262 p.
- Van Norman, R.W. 1963. **Experimental biology.** Englewood Cliffs, New Jersey : Prentice-Hall, Inc. 243 p.
- Salmon, S.C., and A.A. Hanson. 1964. **The principles and and practice of agricultural research.** London : Leonard Hill. 384 p.
- Noltingk, B.E. 1965. **The art of research, a guide for the graduate.** Amsterdam : Elsevier Publishing Co. 142 p.

Holman (1962) for the purpose of his book breaks down an investigation into the following parts : (a) Choice of an investigation. (b) Critical review of the literature. (c) Collection of data. (d) Analysis of data. (e) Formulation of an hypothesis to explain the data. (f) Experiments to test the most likely hypothesis. (g) Writing up the investigation. (h) Consideration of the possible application of the results to a wider sphere.

VI. Guide to the Literature of Plant Sciences :

Here follows a list containing many of the most useful literature sources in plant sciences including botany, agronomy, plant breeding, and plant pathology. The reference sources are listed and described under these categories : (a) Abstracting journals, and annual reviews. (b) Bibliographies of bibliographies, bibliographies, indexes, and periodical lists. (c) Encyclopedias, dictionaries, directories, handbooks, manuals, and yearbooks.

It was found appropriate to include in this publication a guide for preparing literature citations, and a list of abbreviations used in bibliographies.

quickly whether the desired facts are contained in an article, or whether the article is of sufficient interest to him to warrant his reading it.

The abstract journals are most valuable to research workers who have not access to a large number of journals, but they are of only limited help. Abstracts may not indicate the full content of the papers, and they, as well as most reviews, have the disadvantage of not presenting evidence in the form of tables and illustrations. Without detailed knowledge of the facts and an estimate of the validity of the methods used, the conclusions of a research are ambiguous, and may be of little value.

Since abstracts necessarily lag some considerable time (6-18 months) behind the original articles, the more recent articles should be located consulting **index journals** which are useful in providing a comprehensive coverage of references on a subject to within a year or so of the present .

V. Original articles :

It is important for the investigator to examine current original papers that he suspects may contain material pertinent to his research. The latest of these will not yet have been abstracted and can therefore be found only by searching through the current issues of appropriate journals. Finally, of course the investigator must study critically all the papers that bear directly upon his research. Each paper will contain references to earlier work, and in this way the search can be carried backward with the object of picking up references missed in going through books, review periodicals, and abstract and index journals. There will be such missed items because of the deficiencies of all systems of indexing.

Suggestions on conducting research, and on common sequence in an investigation will be found in the following books, chronologically arranged :

- Wilson Jr, E.B. 1952. **An introduction to scientific research.** New York : McGraw-Hill Book Co. Inc. 375 p.
- Arber, Agnes. 1954. **The mind and the eye, a study of the biologist's standpoint.** Cambridge : Cambridge University Press. 146 p.
- Beveridge, W.I.B. 1957. **The art of scientific investigation,** 3rd ed. Melbourne : William Heinemann Ltd. 178 p.

as many papers do unless superseded by better ones. (d) They are excellent sources of bibliography.

However, there are some disadvantages of published literature summaries, both to the authors and users : (a) There are few avenues of publications. (b) Such summaries must of necessity omit much information, particularly about methods and procedures, which are of considerable value to the individual research worker. Therefore, the reader cannot and should not depend wholly on published summaries. (c) They tend to minimize the importance and value of the original papers. (d) A critic says, "Published summaries are an invitation to mental laziness and parasitism".

IV. Abstract Journals, and Index Journals :

The articles in various types of review periodicals may have missed or neglected some important papers. For comprehensive and detailed search of the literature, the investigator must rely chiefly on the abstract journal and the index journal, working backward in time until the desired coverage has been obtained, or until a year is reached which has adequately dealt with in a book.

The **abstract journals** provide one of the principal methods of keeping up with current scientific progress, since in these days of rapid progress and voluminous publications no one can hope to read every issue of every periodical. In fact, keeping up-to-date is more difficult each decade, partly because of the apparent truth of recent declarations that the facts of science double every eight to fifteen years. It is more complex, too, because so much work is being done at the borders of biological and botanical sciences.

An abstract may be written by the author of the paper, or by some other scientist familiar with the field who uses the technical paper as his source of information. So that any reader can find the original paper if he chooses, the abstract lists the title, authors, the periodical with volume and page numbers and the date of publication. The abstract gives a complete and concise summary of the contents of the article. Ideally the abstract should include all of the information contained in the original paper, but to compress several or many pages into an abstract, usually of one paragraph, without loss of information would take extremely careful writing. This ideal is approached, but never attained. However, the abstract enables the investigator who is seeking information on a subject to determine

II. Review Journals :

After obtaining a general view of the subject, the investigator is prepared for understanding and evaluating the more detailed treatment of the subject in review articles, and references given in these lead quite directly to the original technical reports.

The author of a review article examines all available papers on a particular segment of the field in great depth, and attempts to review all the work ever done on that subject. Thus, the review article helps to pull the literature together, but it is subject to the opinions and judgment of the author.

The writing and publication of the review take time, so the review will be one to three years behind the original work.

III. Recent Advances Series, Annual Reviews, and Yearbooks :

Newer material, not covered in the review journal is available in current volumes of the recent advances series, and the annual reviews or yearbooks. Together with the review journals, these give the research worker a well-organized fund of information in his field, and a selected bibliography. They tell him what is currently being done in his research area, and what the reviewers consider to be important.

The **recent advances series** summarize the progress that has been made in particular fields during a period of several years, since the publication of the preceding volume. It usually covers a shorter period of time than the review journal, and thus can go into greater detail.

The **annual reviews** and **yearbooks** give critical reviews of the literature published on a particular subject during the preceding year, or, in case of less active phases, during several years. They have chapters or articles by authorities in various fields, and point to important research papers. In using these publications, it is best to begin with the most recent volume and then work back through at least five volumes.

Review journals, recent advances series, annual reviews, yearbooks, and sources of literature summaries have the following advantages : (a) The new investigator can acquire the historical background of his problem with a minimum of time and effort. (b) Many individuals are particularly successful in preparing these summaries. (c) They are likely to be used indefinitely and do not go out of date.

the risk of making ludicrous blunders, already described by others, is so great that few are willing to take this course.

Consequently, it is almost always necessary to undertake some sort of study of the literature of a subject before entering the planning stage. Reading needs to be done with a critical, reflective attitude of mind if originality and freshness of outlook are not to be lost. It should not be carried too far, or it will go on forever and serve as a complete bar to action, but it should be adequate.

I. Encyclopedias, Handbooks, Textbooks, Monographs, and Symposia :

In acquiring a background in a given subject, it is best for the research worker to read the most general treatment first, as for example in an **encyclopedia**. Several encyclopedias are excellent starting points, giving quite detailed coverage of many biological topics, and many of the articles provide references.

This can be followed by a more detailed but still quite broad discussion in a **handbook**.

The next level of specialization is formed by the books in the field. Textbooks provide the basic material; monographs give much more detail.

A **textbook**, however, is only a compilation of certain facts and hypotheses selected by the author as the most significant at the time of writing, with gaps and discrepancies may have been smoothed out in order to present a coherent picture.

Usually, however, no book exists which is complete or entirely up-to-date. Next, the research worker will normally do well to consult the most recent **monograph** that includes the subject of his special interest. Any monograph provides a longer and more thorough treatment than is contained in the textbook, and indicates phases of the subject that need further investigation.

The **symposium** volume is one of the relatively recent innovations in the scientific literature. Institutions or societies call together the various persons working on some subject to discuss recent work and problems. In this meeting or symposium, generally each contributor summarizes his work or comments at length on interpretations. The "minutes" of such meetings, whether as formal reports or as transcriptions of informal discussions, can be exceedingly valuable.

Fore word

Science, by its very nature, is a structure which grows by the addition of new material on top of a great edifice formed by earlier workers. An individual completely ignorant of what was known before has little chance of making a worth-while new contribution. Consequently, before beginning a new research project, it is essential to find out the existing state of the field.

It might be imagined that it was desirable to know everything that had been learned about the subject. In practice this is quite impossible, and attempts in this direction are usually a sterile waste of time. When one considers that there are for example over 75,000 articles of a research character published annually in some 12,000 current agricultural serials, it should be clear that the listing, let alone the study, of all the papers in a given field is ordinarily a hopeless undertaking, especially in the present chaotic state of the scientific literature.

Instead of the unattainable ideal of completeness, there are two goals which are usually important and feasible. The first of these is to find out if the information which is the object of the proposed research is already available. The second is to acquire a broad general background in the given field. Achieving the first aim can be difficult if the research is one which could have been successfully carried out at any time back to an early date. Usually, however, a general knowledge of the field shows that no satisfactory solution of the problem could have been accomplished before some rather recently discovered technique became available. Naturally much depends here on the kind of problem involved. The other goal, a satisfactory general understanding of the subject, can usually be attained by reading a small but carefully selected part of the available material.

However surprising as it may seem at first, some very successful scientists claim that they make no attempt, before starting a problem to find out what has previously been done. They contend that reading what others have written on the subject conditions the mind to see the problem in the same way and makes it more difficult to find a new and fruitful approach. There is, indeed, something to be said for this argument. However, usually those who put it forward are better acquainted with their subjects than they admit. Furthermore,