Bliss Bibliographic Classification

Bliss Bibliographic Classification

Second Edition

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University of North London

Class AY General Science

Class B Physics

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A	Philosophy
AM	Mathematics
AY	Science
B	Physical sciences
E	Biological sciences
H	Human sciences and human studies
	Physical anthropology, health and medicine, psychology
J/T	Social sciences and humanities
U/V	Technology and useful arts
W/Y	The Arts (including music and philology)

Second outline

2 Generalia: physical forms & forms of arrangement of documents
3 Phenomena: objects of knowledge
* For completely multidisciplinary documents, unclassifiable under any one discipline.
Attributes, activities & processes, entities
Prolegomena
6 Universe of knowledge
Methods of enquiry... Disciplines (general)
7 Information science & technology
Information processing... computers
8 Information work... retrieval
Information systems & services
Primarily reference retrieval... computerised services
9 Primarily document retrieval... libraries
Disciplines: forms of knowledge
A Philosophy & logic
AM Mathematics, statistics & probability
AY Sciences, natural sciences
B Physics
Physics-based technologies
* Alternative only.
C Chemistry
Chemistry-based technologies
* Alternative only.
D Astronomy & space sciences
DH Earth sciences
Geophysics, geology, hydrology, meteorology...
Geography: regional... systematic...
E Biological sciences
EK Microorganisms
F Botany
G Zoology
GR Applied biology
Agriculture & animal exploitation
GY General & human ecology
H Human sciences & human studies
HA Human biology... physical anthropology
HH Health & medicine
I Psychology
J Education
K Society
K9Q Perspectives: sociology, social anthropology...
KAH Social ecology & environment... demography...
KC Social processes: change... social behaviour...
KK Social structure
KLK Collectivities: groups... classes... family...
KRS Inclusive societies... non-literate... literate...
KW Customs, folklore & mythology
LA Area studies
LB Geography
* Alternative only.
LC Travel & description, topography
LD History
LE Study of history... auxiliary sciences: archaeology
LF Prehistory
LG *By social activity*
Social history... political history...
* Alternative only.

[History LD]
By ethnic group
By broad period
LI Ancient history
Modern history
M Favoured country
* For example, UK in British libraries.
N Other countries
As Schedule 2.
O Local history... biography...
* Alternative only for local history.
P Religion... occult... morals & ethics
Q Social welfare & criminology
R Politics... public administration
S Law
T Economics... management of enterprises
U/V Technology & useful arts
Equipment, plant, instrumentation
Systems engineering... control... computers...
Technical testing, maintenance, design... production technology...
Materials handling... packaging... storing...
Energy technologies (general)
Physics–based technologies (nuclear, electrical, thermal, mechanical technologies)
Construction technology... architecture... physical planning...
Environmental technology... safety technology...
Transport technology
Military science & technology
* Alternative only.
Minerals extraction technology... oil & gas well technology...
Process industrial technology... chemical technology...
Manufacture & technology of special products
* Not classed elsewhere.
Agriculture & animal exploitation
* Alternative only.
Useful arts, personal services & technologies
Household management... catering... hotels...
Recreative arts, leisure arts
W Arts, fine arts
W8 Styles, schools, subjects & genres
WC Architecture as an art
WE Plastic arts: sculpture, glyptics, ceramics...
WJ Graphic arts: painting... reprographic arts...
WP Decorative arts
WV Music
WY Performing arts
X Philology: language & literature
XA Linguistics
XL Literature (general & comparative)
Individual languages & their literature
* As Schedule 3 (with modifications), e.g. YV French.
Y Favoured language
* For example, English in British libraries.
Z Religion... occult... morals & ethics
* Alternative is at P.

Volumes in the series

The second edition of the classification will be complete in twenty-two volumes. Thirteen have been published so far and are identified by their dates of publication.

Introduction and Auxiliary schedules. 1977.

Class 2/9: Generalia, Phenomena, Knowledge, Information science and technology.

Class A/AL: Philosophy and Logic. 1991.

Class AM/AX: Mathematics, Statistics and Probability. 1993.

Class AY/B: General science and Physics. 1999

Class C: Chemistry.

Class D: Astronomy and Earth sciences.

Class E/GQ: Biological sciences.

Class GR/GZ: Applied: Agriculture and Ecology.

Class H: Anthropology, Human biology, Health sciences. 1980. Includes medicine.

Class I: Psychology and Psychiatry. 1978.

Class J: Education. 1990.

Class K: Society. 1984. Includes social science, sociology, social anthropology, customs, folklore and mythology.

Class L/O: History. Includes area studies, travel and topography, and biography.

Class P: Religion, the Occult, Morals and ethics. 1977.

Class Q: Social welfare. 1994. Includes criminology.

Class R: Politics and Public administration. 1996.

Class S: Law. 1996.

Class T: Economics, Management of economic enterprises. 1987.

Class U/V: Technology and Useful arts (including household management and services).

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Class X/Y: Language and Literature.

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An Annual General Meeting is held each November in London. The Association holds occasional other meetings, organises training in the use of the classification, raises funds, and publishes the Bliss Classification Bulletin each winter.

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Introduction to Volume AY/B
General science and Physics

1 This volume of BC2 contains the first two classes of the natural sciences — Class AY General science and B Physics. The full classification of the sciences in BC2 will occupy seven volumes. This volume is therefore somewhat unusual in that it does not contain the schedules for the complete class (Science and the natural sciences). It contains only those for the preliminary classes in AY (mainly Processes and properties, Operations, Agents and Common Subdivisions) and for just one of the individual sciences - Class B Physics. In order to avoid duplication in the explanation of features common to science as a whole, to its preliminary class (called general science here) and to the first of its particular sciences (physics) the following order of explanation is given:

1.1 A brief statement of the purpose of this classifcation of science and of its central features;

1.2 An introduction to Class AY/I (the sciences as a whole);

1.3 An introduction to Class AY, called General science since it contains those categories of concepts common to all the individual sciences;

1.4 An introduction to Class B Physics.

2 The classification is designed to perform two major functions:

2.1 To serve as a library classification. This makes possible the organization of a comprehensive collection of documents on science in a clear and logical sequence on library shelves, in other physical media, or of entries for them in catalogues and bibliographies or other linear displays. The fundamental purpose of its logical structure is to make the locating of any particular subject within the sciences, however complex, highly predictable - the central requirement of any instrument for information retrieval.

2.2 To serve as a highly structured and detailed map of the concepts in the field of science. This may be used as the basis for thesauri or other aids for searching an information store, through the control of synonyms and the comprehensive display of the connections of all kinds between the different concepts. (Ref.1: Aitchison, Jean. Bliss and the thesaurus: the Bibliographic Classification of H.E.Bliss as a source of

thesaurus terms and structure. Journal of Documentation, v.42, no.3. September 1986. pp. 160-181). This function is considered further in the Introduction to AY/I (section 10).

3 The central feature of a library classification, as distinct from any other kind of knowledge organization, is that it presents all its concepts, simple or complex, in a single, one-dimensional sequence. Most of the subject classes represented by books, journal articles, research reports, etc. are compounds of several different concepts and could equally well be classified in a number of quite different ways. For example, a work on radiography in the diagnosis of stomach cancer could go equally well under radiography, diagnostic techniques, stomach, or cancer. Such a compound reflects twenty-four different locations in a linear sequence, all of them are logically justifiable and sensible (twenty-four is the factorial product of four and represents the different combination orders in which the four concepts could be taken).

3.1 Whilst catalogues, bibliographies and other media can multiply the entries representing a document (so that the work above might get four separate entries, say, under Stomach, Cancer, Diagnosis and Radiography) this option is not open for the physical arrangement of the documents: a document can go in one place only. If the library user is to locate any given subject class easily, the sequence of classes throughout must reflect strict rules as to the combination order in such classes. So the work above might be located as Stomach - Cancer of - Diagnosis of - using Radiography, and nowhere else. Applying such rules minimizes the central (but uavoidable) weakness of the linear order, which is the scattering of some concepts by subordination to others (as works on cancer will be scattered under the different parts of the body in the order suggested above).

3.2 Whilst the development of such rules is an absolute necessity if the location of any given class is to be highly predictabe, it is also the great strength of library classification as an instrument in retrieval. The harsh demands made by the need for comprehensive rules for a consistent order of combination force the designer of the classification to examine closely the categories into which the many concepts fall and the multifarious relationships between them more rigorously than is the case with any other system of retrieval. The exposure of synonymity or near-synonymity between terms is only one by-product of the rigorous mapping of the semantic (generic and partitive hierarchical) and syntactic (non- generic) relationships between them. It is no exaggeration to say that the modern faceted classification is the most comprehensive and sophisticated organization of knowledge to be met with in the field of information retrieval.

4 BC2 schedules are the result of a rigorous and detailed analysis of the vocabulary of each of the subjects in the field of knowledge, using the techniques of facet analysis. As such, they represents a radical revision and expansion of the first edition of the Bibliographic Classification of H.E. Bliss (BC1) (ref.2: Bliss, Henry Evelyn. A Bibliographic classification. New York, The H.W. Wilson Company, 1940-1953.

4v.). The general reasons for making the revision so radical a one are given in the Introduction to BC2 (ref. 3: Bliss Bibliographic Classification. 2nd ed. [by] J. Mills and Vanda Broughton. Introduction and auxiliary schedules (Butterworths, 1977). The particular changes in AY/B are considered briefly in section 15 below.

4.1 The summary outline of AY/I on page 1 (after the preliminary pages) is designed to give a clear view of the basic structure of the schedules for science and the natural sciences. If it is remembered that the outline schedule is, like all BC2 schedules, an inverted one (see the Introduction to AY/I (section 5.7) the outline will be seen to show not only the general sequence of categories and their classes but also the basic operational rule in applying the classificationl This is the rule that compound classes (those reflecting the intersection of two or more simpler classes) are located under the class appearing later (lower down) in the schedule. For example, in Class AY, the subclasss Spectrographic instruments (AY7 M4) is located under Spectroscopy (AY7 M) and not under Scientific instruents (AY4; Geophysics (DGB) is located under Earth sciences (DG) and not under Physics (B); Biochemistry goes under Biology (E) and not uner Chemistry (C).

4.2 The basic operational rule demonstrated above is supported by a number of other basic rules governing both the design and the application of BC2 schedules. These rules are described fully in the Introduction to BC2 (Ref.3) and are repeated briefly in each separately published class, with examples demonstrating their application to the class in question. In this volume, these rules are briefly described in the introduction to Class AY/I Science and the natural sciences.

5 Acknowledgments

We are deeply indebted to Eric Coates, former Editor of the British Technology Index, and Editor of the Broad System of Ordering for his absolutely invaluable and unstinting help throughout the production of these particularly demanding two classes. Not only has his unique experience in the field of indexing technology been indispensable in the Operations and Agents facets of AY, but the whole structure and vocabulary of Class B has benefited from his unerring grasp of classificatory relations. His work on the schedules of the Broad System of Ordering (BSO) has been a constant reference point when wrestling with the complex relations manifested in the physics schedule. His contribution to this volume of BC2 has been incalculable.

We are pleased also to acknowledge the valuable contribution made by friends and colleagues in the Classification Research Group. CRG discussions have been a constant help and stimulus in designing the schedules. In particular, we are very pleased to thank Magda Whitrow, Editor of the Isis Cumulative Bibliography [of the history of science] for her valuable help in deciding the structure of the big history of science class in AY; Jean Aitchison, whose work on faceted thesauri (particularly her Thesaurofact for the English Electric Company) has been very helpful; Chris Preddle for his excellent section on the use of BC2 in automated systems in his revised edition of

Class Q. In the accumulation and monitoring of vocabulary we have been helped by the full schedules of the UDC and by the Unified classification and its accompanying Thesaurus of INSPEC (Institution of Electrical Engineers, 1973/1983).

Introduction to Class AY/I
Science and the natural sciences

1 Scope of the class and its place in BC2

1.1 The natural sciences study the phenomema of the natural world, using as their fundamental mode of enquiry what is generally known as the scientific method. Although philosophers of science dispute certain of its features, its essence is that close observation of the phenomena, combined with the use of induction and deduction, leads to the advancing of an hypothesis as a provisional explanation of what is observed. This hypothesis is then analyzed and tested objectively by a wide variety of procedures in which measurement of the data involved and controlled experiments, as far as these are possible, are major features.

From consideration of the evidence thus established the hypothesis is accepted, modified or rejected. Hypotheses which are thus validated may then form the basis of further hypotheses, thus building up the vast corpus of what is called scientific knowledge. Those parts of it which have been validated beyond any reasonable doubt take on the status of scientific laws. But it is fundamental to the idea of scientific enquiry that if further evidence demands the modification or even abandonment of a theory, however immutable it may seem to be, so be it. This may be a question of limiting its applicability rather than falsifying it, as in the well-known example of Newton's laws of gravitation being modified by the theory of relativity. But whatever the nature of the revision, the readiness in science to accept criticism and revise opinion makes science the most modest of the major fields of knowledge in the claims it makes for its product.

1.2 When the classification of the vast and endlessly multiplying body of scientific knowledge is considered, the principle of gradation, supported by and reinforcing the concept of integrative levels, has proved to be a powerful and effective instrument. It produces a major organization of the field whereby phenomena are grouped into particular sciences which can then be presented in a sequence in which each successive science builds on the preceding ones. Successive sciences then study phenomena at higher and higher levels of complexity, in the sense that they require for their explanation not only knowledge of preceding classes but also of new or emergent phe-

nomena. Bliss called this ordering 'gradation in speciality'. Thus, energy and matter at its most fundamental level is the subject matter of physics. Organized into more complex forms, at the molecular level, it gives the subject of chemistry and this is therefore regarded as being more 'special' than physics in its scope. At more complex levels, molecular aggregations give celestial bodies and planetary systems (the subject of astronomy and the earth sciences) and these constitute environments for the development of yet more complex forms in living matter.

1.21 Human biology, the science of the most complex animal in the evolutionary progression, at present seems to mark the end of the line for the indisputably natural sciences. Whilst the demonstrably physical phenomena studied in anatomy and physiology are still amenable to the full rigour of the scientific method, the study of human behaviour, the central phenomenon underlying all the social sciences and human studies comprising Classes J/Z in BC2, has proved far less so. Whilst the principles of rational enquiry, based on logic, are still fundamental, the complexity of the relationships evident in human behaviour have not as yet allowed anything like the predictability which is taken as axiomatic in scientific enquiry (see Ziman, John. Reliable knowledge; an exploration of the grounds for belief in science. Cambridge University Press. 1977).

1.22 Although the natural sciences display systems of great complexity (eg the near-chaos found in the behaviour of our planetary atmosphere) these are all reducible to systems of atomistic facts, reflecting energy forms, particles, atoms molecules, molecular aggregates, minerals, planetary bodies, etc. The nature and behaviour of these constituents allows accurate measurement and the development of models (explanatory theories) which can be tested, disproved or validated to form a highly reliable body of knowledge

This is not the case with human behaviour and the great systems of artefacts (from social organizations to semiconductors) and mentefacts (both intellectual and imaginative) which are the products of human behaviour. No equivalents of the atomistic and eminently quantifiable phenomena found in the natural sciences have as yet been isolated in the human studies (as Bliss called them). Although psychological and sociological theoretical constructs abound and some of the social sciences (especially some parts of economics) allow some degree of quantification, there is nothing remotely approaching the predictability which marks those throughout the natural sciences.

However, it should be remembered that on the scale of human history these studies are still in their early infancy, as is science itself, however lusty that infancy may seem already.

1.23 Another classificatory feature which marks the natural sciences but is much less evident in the social sciences and humanites is that of gradation. Bliss argued that sociology (interpreted as the basic theorizing science on which all the succeeding social sciences draw) was analogous to biology in its relation to the biological sciences (in BC2 parlance, the Properties and processes facets in relation to the Part and

Types). Apart from this, no claim was made in respect of gradation amongst the other classes of J/Z.

It should be remembered, however, that a principle like gradation has been used in BC2 not as an assertion of a particular interpretation of the nature of the sciences but as an instrument of proven value in the organization of knowledge. It contributes significantly to an organization which is readily communicable, operates with exceptional consistency, and facilitates the locating and relating of classes of knowledge with a high degree of predictability - a major virtue in an instrument for information retrieval.

1.3 In the metascientific fields of knowlege which Bliss characterized as the human studies, the subject of technology (covering most of the physical artefacts of humanity) has a particularly close relationship to science. This is reflected in the fact that the general science class (AY2/AYY) is preceded (at AY1) by an even broader class, science and technology in general. The appearance of this class at AY1 is entirely a reflection of literary warrant and not of the principles of gradation or integrative levels. There is a symbiotic relationship between science and technology. It is well know that many significant developments in science have waited on the invention of artefacts to assist the process of scientific enquiry. Major examples are the dependence of optics on the development of effective optical instruments and, in turn, the dependence of other sciences on these (of biology on the microscope, of astronomy on the telescope and so on). The reverse process, in which scientific discoveries prove the basis for the development of new technologies, is equally well known and has been particularly conspicuous in the past two centuries.

1.31 This close relationship does not mean that technology should be regarded as applied science. Much of it is not particularly 'scientific' and its objectives are quite different. The cental objective of science is to elucidate the nature of phenomena dispassionately and objectively. The purpose of technology is to serve the material interests of humans. The principle of gradation implies not only that a clear distiction be drawn between technology and science but that the latter, as a product of human social activity, should file after those studies which have the structure of society and its major social processes as their subject

1.32 Nevertheless, having acknowledged these differences, the fact remains that some of the products of technology play an important and even crucial role in science. It is not merely that scientific instruments (a major part of the Agents facet in general science) are primarily the product of technology. There is also the fact that some of them raise acutely the distinction between natural phenomena (the legitimate object of scientific enquiry, demanding a location within science itself) and applications of these (which are not). Whilst some artificial products are readily accepted as quasi-natural phenomena (eg the transuranic elements, which are artificial radionuclides, produced by bombarding heavy atoms with high-energy particles) this is partly because their production is primarily an element in the scientific study of the closely

related natural phenomena. But many occasions now arise where natural phenomena are subjected to highly sophisticated and contrived manipulations designed primarily to serve utilitarian human purposes; an obvious example concerns the application of optical phenomena associated with holography. Whether such concepts should be regarded as part of physics or of physics-based technology poses a problem in the classification of science and technology. This problem is considered further in the introduction to Class B Physics (section 10).

1.33 The conclusion reached by Bliss after considering such problems was that technology should be a separate class, following the social sciences and collocated with economics, the social science concerned with the production and distribution of society's material wealth. However, Bliss provided alternative locations whereby a library could collocate a technology with its dominant scientific base in cases where a close relationship held. BC2 continues this policy but with an important modification. In the case of biological technology, the study of the science and its possible applications is so intimately connected that a complete separation would be both extremely difficult and unlhelpful. This is particularly true of medicine; here, problems of human biology which are indisputably 'natural' phenomena and the legitimate province of the science are nevertheless studied primarily because of the utility that knowledge of them would have for human welfare. A classification of medicine which did not embrace human biology would be a very defective one. So the biology classes in BC2 (E/I) include substantial portions of applied science - ie technology.

2 Structure of Class AY/I

2.1 All classes in BC2 are designed consistently according to a basic pattern which reflects the six fundamental features of a modern documentary classification. In the design operation, these six features are taken (analogously to the principle of gradation) in an invariant order in which each step depends on the proeceding ones, but not vice-versa. The steps are, in order:

2.11 Organizing the terms into broad facets;

2.12 Organizing the terms in each facet into specific arrays (sub-facets);

2.13 Deciding the citation order between the facets and between the arrays;

2.14 Deciding the filing order of the facets and of the arrays within them;

2.15 Adding a notation, in which every class is represented by a symbol possessing ordinal value, to faciitate locating the class in the file;

2.16 Adding an alphabetical index, whereby a user can go directly from the name of a class to its position in the notation and file.

2.2 The theory underlying these feature is explained in detail in the Introduction to BC2 (Ref.3). Here, the structure of Class AY/I is described in the same order of funda-

mental features and it is assumed that users of this class will familiarize themselves with the essentials of the theory explained in the Introduction.

3 Facet structure of Class AY/I Science and the natural sciences

3.1 The main feature of the schedule is a strict adherence to the principles of facet analysis. A facet consists of the sum of classes produced when the vocabulary of a subject is divided by one broad principle of division. So the terms making up the vocabulary of science are initially organized into ('divided into') broad facets, so that terms representing concepts which all stand in the same broad relationship to the containing class are found in the same facet. For example, all terms reflecting the notion of a natural phenomenon investigated in science (eg energy, matter, molecule, star, planet, atmosphere, river, plant, animal) are brought together in an Objects of scientific enquiry facet. All terms reflecting a subsystem of any of the above (eg the lithosphere, hydrosphere and atmosphere of a planet, the regional parts or organs of an organism) are brought together in a Subsystems (Parts) facet - and so on.

3.2 Facets in Class AY/I

The facets identified are summarized below; their scope and relations are considered in more detail under citation order (section 4.5).

3.21 The entities and systems defining the objects of scientific enquiry; eg energy and matter, molecular systems, stars, planets, living things.

3.22 Subsystems and parts of the entities; eg lithosphere, nervous system.

3.23 Properties and processes of entities and subsystems; eg distribution, dimension, deformation, diastrophism, respiration, reproduction.

3.24 Operations: actions performed on all the above by human agents - eg recording, measuring, visualizing, analyzing. Operation are distinct from processes, which are activities internal to a system, as in the examples in 3.23.

3.25 Agents of processes and of operations; eg catalysts, equipment, instruments, materials. This facet also includes scientific personnel.

3.26 Common subdivisions (CSD); concepts which are to be found in all subjects and which refer largely to the human study and practice of the subject and the conditions (eg of time and place) under which is or has been pursued.

3.3 Arrays within facets

3.31 Most facets contain terms which reflect different specific principles of division, whereas a facet as a whole reflects only one broad principle of division. For example, in biology, a major facet is that of Types of organisms; these may be further divided by specific principles like taxonomic status, habitat, sex, age and so on.

3.32 This operates at every level of the classification; eg as specific a concept as fluid flow (itself reflecting the intersection of an entity, the state of matter Fluid, and a process, Flow) may still be divided by a large number of different specific principles of division, giving such classes as conical flow, compressible flow, viscous flow, laminar flow, etc.

3.33 Terms in an array are mutually exclusive, so that there is no question of compoundsing between them; eg there is no class of turbulent laminar flow. So the crucial problem of citation order between the components of a compound (see section 7) no longer arises within an array - only between them (eg to give a compound like viscous laminar flow).

4 Citation order (combination order)

4.1 This refers to the order in which the elements of a compound class (one consisting of more than one element, whether from different facets or from different arrays) are combined (cited) in a heading; eg whether the heading (which reflects the order in which the classes and subclasses are taken) is

Animals - Birds - Aquatic birds - Charadriiformes - Behaviour
or
Animals - Birds - Behaviour - Aquatic birds - Charadriiformes
or
Animals - Behaviour - Birds - Aquatic birds - Charadriiformes
or any of the other 21 permutations possible here.

4.2 Citation order reflects the order of application of principles of division and determines which concepts are subordinated to which; eg using the first heading above would scatter literature on animal behaviour according to the various types of animals.

4.3 If a consistent citation order is followed, the scattering of some subjects because of their subordination to another (an inevitable feature of classification applied to a linear order, whether of documents on library shelves or entries in manual catalogues) is strictly controlled and the location of quite complex classes (reflecting the compounding of several different facets or arrays) is always predictable. The retrieval of the information on the scattered classes is thus ensured.

4.4 Citation order is the most important single feature of a classification system. But clear and consistent rules for it can only be expressed in terms of the facets and arrays involved - hence the prior need to organize terms into their facets and arrays (see the order of operational steps in section 2.1).

4.5 Citation order between facets

In all its classes, BC2 seeks to observe as far as possible the 'standard' citation order. In any subject, this takes as the primary facet (the first-cited one) that facet which reflects the ultimate purpose or object of study in the subject, and within which the

other concepts and their facets are defined. Each class in the facet may then be divided into the following facets and in the following order:

Types, Parts, Properties, Processes, Operations (actions on it), Agents (of processes and operations), Common subdivisions

The following notes explain how these general rules have been applied to Class AY/I.

4.51 The primary facet consists of the entities defining the objects of scientific enquiry. They embrace fundamental manifestations of energy and matter (kinetic energy, forms of motion, waves, electromagnetism, particles and more complex aggregations of these (molecular, astronomical and planetary, living organisms, etc). The concepts making up these classes are easily recognized as defining the well-known sub-disciplines of science (physics, chemistry, etc).

4.52 The second-cited facet consists of the Subsystems and Parts of these; this facet has no general class independently of the entities above, only those subsystems special to a given entity and which vary widely according to the entity. It includes subsystems of chemical molecular systems, parts of planets such as lithospheres and atmospheres, the regional parts and organs of living things and so on.

4.53 The third-cited facet consists of Properties and Processes of systems and subsystems. These range from ubiquitous concepts appearing in all systems (eg distribution, variation, frequency, dimension) to specialized ones such as oxidation and reduction in chemical substances, tectonic and degrading processes in planets, and respiration, evolution, etc. in living things.

4.531 Properties are conceptually distinct from processes (actions internal to a system); eg colour is a property, change is a process.

4.532 Where the distinction is clear, two different facets will be recognized; but in many fields the distinction is so blurred that the two facets are conflated. In terms of citation order, property is always subordinated to whatever it qualifies, whether this is an entity, a process or even another property (eg the durability of a colour).

4.54 The fourth-cited facet consists of Operations; these are actions performed on all the above by human operators and their agents, as distinguished from processes, which are activities internala to a system, such as the physiology of living things.

4.55 The fifth-cited facet consists of Agents; these are usually agents of external human Operations, such as equipment and instrumentation. But the relationship of action/agent also occurs with processes (eg enzymes acting as biochemical agents in a physiological process).

4.56 The sixth-cited facet consists of Common Subivisions (CSD); these are concepts which are to be found in all subjects and provided for in BC2 by Common Auxiliary Schedules 1/4, applicable to all classes. They range from bibliographical forms (dictionaries, graphic materials, etc) to operations like study and research and agents of these such as organizations.They also include the two major facets of Time and Space in their

commonly occurring manifestations of chronological periods and geographic places. The concepts of Time and Space as fundamental parameters in natural phenomena are regarded as subject classes in physics (at B9B).

4.6 Citation order within facets (between arrays)

4.61 In contrast to citation order between facets, there are no general principles available for deciding citation order between arrays. Decisions are largely empirical, based on considerations of whether any given compound (reflecting two or more different arrays) would most helpfully go.

4.62 The number of different arrays is often so large that it is out of the question to list them in citation order as is done for facets in section 5. However, the order in which they should be cited is shown clearly by the inverted filing order (see section 5.2 below); an array filing later (further down) in the schedule should be cited before one filing earlier (see examples in section 5.22).

4.7 General indexing rules for citation order

4.71 The rules described above govern by far the greater number of decisions for compounding in BC2. However, a number of well-established indexing rules, all of them consistent with the standar citation order, are also observed and are very useful in practical classification (see Introduction to BC2 (Ref. 3) section 7.331). Sometimes, these demand that synthesis should be by building forward, not retroactively. This is because the normal relationship between the facets or arrays has changed. The most prominent of these is probably the rule for citing in the order Patient (ie recipient of action) - Action - Agent. This is usually taken care of by the normal citation order; eg Techniques in scientific investigation AY6/AY7 file after Equipment and Materials AY3/AY5 and are cited before them. But when one thing influences another (a special case of the agent relationship) the influencing factor, which is cited second, may file after the thing affected; eg thermal acoustics BRG HGP is built by citing acoustics (BRG H) before thermal properties (BRG P) although acoustics (here, the thing affected) files before thermal properties.

4.72 The situation may be generalized thus: whenever the relationship between concepts varies from that embodied in the standard citation order, these general indexing rules should be invoked.

5 Filing order

5.1 This is the order in which the individual classes, simple or compound, file one after the other, whether in the schedule, on the shelves or in a catalogue or bibliography. It has two quite separate components - facet filing order and order in array.

5.2 Facet filing order

5.21 This is the order in which the different facets, each one containing a block of different classes, file one after the other.

5.22 All schedules in BC2 are inverted ones; ie the facets file in an order which is the reverse of the order in which they are cited when compounding terms to form compound classes. So the primary facet files last, the second-cited facet files next to last, and so on.

5.23 The reason for this (see the Introduction to BC2 (Ref.3) is solely to preserve a consistent order of general-before-special. The assumption that a general class should file before its subclasses is virtually universal.

5.24 Example of an inverted schedule:

G	Zoology, animals
	(Processes)
GHT	Behaviour
	(Types of animals)
	(Types by development)
GL	Young
	(Types by habitat)
GN	Aquatic
	(Types by taxonomy)
GP	Birds
GPH T	Behaviour
GPN	Aquatic birds
GPP T	Eagles
GPP THT	Behaviour

5.25 In the file above, the compund Bird behaviour (GPH T) files after both the more general classes to which it belongs (Animal behaviour GHT and Birds GP). If the schedule were not inverted, and the Processes facet filed after the Types of animals facet (just as it is cited after it) the general class Animal behaviour would file after its subclass Bird behaviour.

5.26 Similarly, within each each facet the arrays are inverted; the first-cited array files last, the second-cited array files next to last, and so on.

5.27 It was noted in section 4.62 that the inverted filing order embodies within itself a comprehensive guide to the citation order. The sequence of classes in 5.24 demonstrates this. It implies, inter alia, that a process is cited after a type of animal; also, that within the Types facet an animal characterized by its taxonomic class is cited before its habitat.

5.3 Order in array

5.31 The classes in an array are mutually exclusive and cannot normally be compounded (see section 3.33). So their filing order cannot be determined by citation order. Where there is an obviously helpful order, that is used; eg chronological order of periods in AY7 History of science; evolutionary order, reflecting development over time, of organisms in biology; geographical order of places in DU Geography.

5.32 However, order in array is usually pragmatic. The filing order of the individual sciences is a somewhat special case and is probably best regarded as that of a quasi-facet order. The order is essentially one of gradation and integrative levels (see sec 1.3) and provides both a filing order and a citation order. Compounding between the special sciences (which is not uncommon) conforms to the basic retroactive rule, the class filing later being cited before that filing earlier; so the physics of chemical substances, of astronomical bodies, of terrestrial processes, of biological processes. etc all go under the class filing later, not under physics.

6 Alternative treatments and arrangements in the order of classes

6.1 These serve the demands of particular types of libraries. In each case, the notation has been designed specifically to allow alterations to be made to the preferred arrangement. In all cases, the preferred arrangement is stated clearly and any special notational instructions needed to implement the alternative are indented under the note for it. The general pros and cons of alternatives are explained in the Introduction to BC2 (Ref.3).

6.2 The main alternatives in Class AY/I are noted in the separate introductions to the classes concerned. One common to all the sciences is that for the collocation with its science of the applied science or technology of that science. But note that in the case of the biological sciences, the collocation of the technology with biology is the preferred arrangement.

7 Notation

This is explained in detail in the Introduction to BC2 (Ref.3), Only its main features are described here.

7.1 Notation is a system of classmarks representing the terms (classes) of a classification. Its function is to locate in a mechanical fashion the position of each and every class, simple or compound, in the system. It does this mechanically because the symbols (in BC2, capital letters and numerals) have an ordinal (positional) value already well known to the users. The only special ordinal value the user of BC2 must remember is that a number files before a letter; eg AY9 files before AYA.

7.2 The notation is purely ordinal - ie it makes no attempt to express hierarchical relations by adding another character to symbolize each step of division. Such an attempt must