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# Stratigraphic Policy of the Illinois State Geological Survey

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# STRATIGRAPHIC POLICY OF THE ILLINOIS STATE GEOLOGICAL SURVEY

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ABSTRACT

The current policy of the Illinois State Geological Survey on stratigraphic classification and nomenclature is evaluated in terms of present-day needs and in the light of recommendations of the American Commission on Stratigraphic Nomenclature. Multiple classification is adopted. Rock-stratigraphic, time-stratigraphic, biostratigraphic, cyclical, facies, and soil-stratigraphic classifications are discussed.

## INTRODUCTION

The policies of the Illinois State Geological Survey on stratigraphic classification and nomenclature have been based on continuing practice and gradually have been modified to suit changing concepts. During the past several years we have been engaged in evaluating these policies in the light of present-day needs and of the recommendations of the American Commission on Stratigraphic Nomenclature (1947-1957). It has become apparent from this examination that it is desirable to change from a single to a multiple system of classification and to present a statement on current policy for the guidance of our own staff and other interested geologists working in Illinois.

It is not the intent of this report to establish an inviolate code, because the nature of sedimentary rocks makes it imperative to allow for flexibility and for future changes. It is our hope that this statement of policy, while providing a needed degree of uniformity in stratigraphic classification and nomenclature in Survey publications, will at the same time increase the flexibility of the classification, and will direct attention to fundamental problems in this field.

Nor is it our intent at this time to revise the ranking and nomenclature of the entire stratigraphic column of Illinois to conform to the present statement. Specific changes will be made only after study of individual parts of the column.

## SIMPLE VERSUS MULTIPLE CLASSIFICATION

A relatively simple scheme of stratigraphic classification has been used in Illinois in the past. It consisted of a single systematic arrangement of rock terms, augmented by a parallel arrangement of time units. This basic pattern was modified for the Pennsylvanian System and the Pleistocene Series, thus

eliminating the possibility of uniform treatment throughout the stratigraphic column. In other parts of the section certain units, although available, were never used. The classification formerly in use recognized the following units:

| General classification | | Pennsylvanian classification | | Pleistocene classification | |
|---|---|---|---|---|---|
| Rock terms | Time terms | Rock terms | Time terms | Rock terms | Time terms |
| | Era | | | | |
| System | Period | System | Period | | |
| Series | Epoch | | | Series | Epoch |
| Group | Subepoch | Group | | Stage | Age |
| Formation | Stage | Cyclothem | Cycle | Substage | Sub-age |
| Member | Substage | Member | | | |

In recent years a system of multiple classification, in contrast to the traditional simple usage, has received wide support. The concept of multiple stratigraphic classification is based on the fact that stratified rocks have many types of properties, and that different schemes of classification may be erected using these different types as bases for differentiation.

Thus, the same rocks may be classified in several schemes, each corresponding to the type of characteristic selected. One category of classification recognizes divisions derived from the physical character of the rock layers; another category recognizes zones defined by their fossil content; a third category recognizes divisions based on time of origin; and still other categories employ other discriminating features.

We are accepting as basic the principle of multiple classification. The classifications adopted at this time are given in the chart on page 3. Other classifications may become necessary in the future.

I. ROCK-STRATIGRAPHIC CLASSIFICATION
(Units of rock differentiated on lithology)

Group
Subgroup
Formation
Member
Bed

II. TIME-STRATIGRAPHIC CLASSIFICATION
(Units of rock differentiated on time of deposition)

GEOLOGIC-TIME CLASSIFICATION
(Derived units of time)

| | |
|---|---|
| | Era |
| System | Period |
| Series | Epoch |
| Stage | Age |

III. BIOSTRATIGRAPHIC CLASSIFICATION
(Units of rock differentiated on the basis of paleontology)

| Range of single taxon | Abundance of single taxon | Fauna or flora |
|---|---|---|
| Range-zone | Peak-zone | Assemblage-zone |

IV. CYCLICAL CLASSIFICATION
(Units of rock differentiated on sedimentary cycles)

| Upper Paleozoic Units | Corresponding unit of geologic time |
|---|---|
| Cyclothem | Cycle |

V. FACIES CLASSIFICATION
(Units of rock differentiated on lateral changes in composition)

Informal name - facies

VI. SOIL-STRATIGRAPHIC CLASSIFICATION
(Units of rock differentiated on weathering profiles)

Soil

Certain difficulties have arisen in the use of the older simple classification. The bases for differentiating and ranking units have changed from time to time, reflecting differences in common usage as well as individual preferences. Inconsistencies in the ranking and naming of stratigraphic units have accumulated, in part because of the scarcely avoidable failure to review and revise the entire column with the introduction of each new practice. Parts of the stratigraphic column of Illinois have been subdivided much more finely than comparable sequences in other parts - for example, formations in some systems would be called groups in others. Some formations were defined as lithologic units, others were differentiated primarily on their content of specific fossils. Some units were subdivided laterally on minor facies changes whereas others were traced through major facies.

The simple and traditional classification had the advantages of convenience and long use. Much of the lack of uniformity in its application has been due to misunderstanding its objectives. The early lack of consistency in the use of criteria in defining units was increasingly replaced in recent years by a policy of differentiating the smaller rock units (member, formation, and group) on the basis of lithologic criteria, whereas the larger units (series and system) were defined by time planes (isochronous surfaces) with little regard for lithologic composition. The Ashley code (Ashley et al., 1933) was intended to standardize the relatively simple system of stratigraphic classification. Many departures from the Ashley code and varying interpretations of it impaired its standing. The development of modern concepts in stratigraphic philosophy has made it inadequate.

Many difficulties in the use of a unified classification arise from the blending of age and lithology as the basis for differentiation of units. Much controversy over stratigraphic classification has been rooted in the desire of proponents of each of these bases to see their own particular philosophy predominate throughout the single classification. Arguments of both camps, considered individually, appear valid, and adoption of multiple classification offers the best promise for agreement and eventual standardization of classification.

The separation of criteria for rock and time differentiation increases the clarity of stratigraphic expression. In addition, the problem of overlapping units is removed because time-stratigraphic subdivision can be carried finer and finer as the data permit, and rock-stratigraphic classification can be carried to larger units, if needed.

To many stratigraphers a unified classification has seemed inadequate to contain the features they find. This has resulted in the introduction of special names showing form (lentil, tongue), or type of sequence (cyclothem), or other modifications of unit names applicable to limited parts of the column or local areas. We have concluded that such modifications are contrary to a major objective of classification - to provide a uniform basis for evaluating different sequences. Further, if the introduction of special modifications is not limited, a continuing conflict of interests would be inevitable. Therefore, uniform application of classification is accepted as a basic philosophy.

Each classification is designed in light of present knowledge of the range of the fundamental criteria on which it is based. Changes should be toward improvement in the over-all design of each classification.

In general, we follow the recommendations of the American Commission on Stratigraphic Nomenclature. However, the proposals by the Commission have

been simplified and modified in several ways where needed to fit the practical requirements of stratigraphic classification in Illinois.

We are grateful to many colleagues who have participated in discussions leading to the formulation of this policy. The comments of Elwood Atherton, Charles Collinson, George E. Ekblaw, Robert M. Kosanke, Jack A. Simon, M. L. Thompson, and Harold R. Wanless have been especially helpful.

## GENERAL STATEMENT OF POLICY

Stratigraphic classification is the systematic arrangement of the rocks of the earth's crust by units which are in general tabular and tend to parallel the stratification of the rocks. Many types of classification based on different types of criteria may be devised. Rock-stratigraphic and time-stratigraphic classifications of the entire sedimentary rock column are needed, together with the corresponding classification of geologic time which is implicit in time-stratigraphic classification. These systems of classification are designed so that they can be uniformly applied to the entire rock column.

Other systems of stratigraphic classification, such as biostratigraphic, soil-stratigraphic, facies, and cyclical classifications, are needed for particular uses or for particular parts of the column.

## I - ROCK-STRATIGRAPHIC CLASSIFICATION

Rock-stratigraphic units are defined and recognized on the basis of observable lithology without necessary regard to biological, time, or other types of criteria. They are sufficiently distinctive to be recognizable by common field and subsurface methods. A rock-stratigraphic unit may extend through lateral changes in lithology, as long as continuity is established and the original upper and lower planar boundaries can be traced. Lateral uniformity of lithology is not essential to geographic extension of a rock-stratigraphic unit. The unit may remain valid even where it becomes similar to overlying or underlying units, provided only that the boundaries are still physically recognizable.

The objective of rock-stratigraphic classification is the recognition of significant lithologic changes in the rock sequence that may be used to establish a framework for stratigraphic description, for geologic and structural mapping, and for various economic purposes. Any readily determined lithologic criterion or group of criteria may be used to differentiate rock-stratigraphic units. The particular ones used should be deliberately chosen to produce units that can be traced widely with boundaries as nearly parallel to bedding as possible.

In geologic situations common in other regions, but not in Illinois, lithic units are quite thick relative to their lateral extent, and many lateral changes in lithology are abrupt. Under such circumstances, many of the rock-stratigraphic units recognized are facies. On the other hand, in Illinois and surrounding states the lithic units tend to be thin relative to their lateral extent. Although vertical lithologic changes in the sequence are quite abrupt, the lateral changes are gradual. In this geologic framework, experience has shown that the most useful units are those whose lateral extent is emphasized. Attempts at narrow lateral limitation of formal rock-stratigraphic units have met with little success in this region, and an informal facies nomenclature has been more successful in describing the lateral differentiation.

Generally, different units will be recognized where the boundary surface can no longer be traced. These will normally require new names, although in some cases hyphenated combinations may be sufficient. However, minor vertical offsets in the planar boundary need not prevent lateral extension of a unit, provided the main body of the unit maintains its principal identifying characteristics.

In establishing as well as tracing rock-stratigraphic units, fossils may be treated as lithologic constituents. The abundance of corals, the common presence of a conspicuous brachiopod, or similar paleontological features that may be readily observed by field geologists, may be used in the same way as the presence of distinctive shale partings, or geodes, or sand grains. However, no rock-stratigraphic unit should be defined in such a manner as to require specific identification of a fossil.

Specific fossil identification by a specialist, or mineralogic or chemical analyses, or any other specialized laboratory criteria may be used to confirm identification of established units.

Because rock-stratigraphic units are differentiated on the basis of contrasts in lithology, superposed units that have similar lithologic character, such as successive cyclical sequences, should not be recognized as rock-stratigraphic units if any practical alternative can be found.

In areas where it is impractical to separate two or more units that have similar lithology, a hyphenated combination of the bounding units may be used (for example, Burlington-Keokuk Limestones). Where two or more unlike units are combined for convenience the names should not be hyphenated (for example, Glen Dean Limestone and Tar Springs Sandstone, or Glen Dean and Tar Springs Formations).

A unit may have different ranks in different areas (for example, Rosiclare Sandstone Formation and Rosiclare Sandstone Member), but this practice should be avoided within the State if possible.

The formation is the fundamental unit of rock-stratigraphic classification. All rocks belong to some formation. Complete sequences of either larger or smaller units are unnecessary.

The formation is the basic practical lithologic unit. Preferably it is of uniform distinctive lithology, it is sharply differentiated from adjacent formations, is laterally traceable for a considerable distance, and is thick enough for practical use in areal mapping and subsurface studies. In many situations these ideals are mutually inconsistent. In practice in Illinois, we tend to compromise first the lithologic uniformity, then the thickness, and last the lateral traceability.

In different situations, areas, and parts of the column, the concept of the proper-sized unit to bear formational rank will vary. At present in Illinois, we doubt the need to differentiate as formations units which are less than about 10 feet thick and 50 miles in lateral extent. In particular it would be unwise to recognize a number of such minimal units in sequence as formations.

A formation differentiated in Illinois or nearby areas will continue to be recognized as a formation in areas where it becomes thin, provided that it maintains adequate distinctiveness and continuity.

The recognition of adjacent formations which lack over-all lithologic differences purely on the basis of a boundary key-bed (or even key bedding-plane) violates the principal of lithologic distinction, but in certain situations it may be the only practical course.

A group consists of two or more formations and is recognized in order to show some lithologic (that is, rock-stratigraphic) similarity among the formations. A formation may be included in different groups in different areas.

A subgroup may be erected within a group when needed to express some lesser degree of lithologic similarity between formations.

A member is a division of a formation, based on the same type of criteria as used for a formation, but differentiated and named only when needed. A complete sequence of formal members in a formation is unnecessary. Informal members may be differentiated and lettered or numbered for purposes of description without giving formal geographic names.

When a member is divided because of minor changes in lithology, it is preferable to create two or more new members rather than to name the units as beds or submembers.

A bed is a special type of division of a formation or member. It commonly is a thin, widespread, exceptionally distinctive unit, and is named only if it is frequently referred to because of economic or stratigraphic importance. Indiscriminate or prolific formal naming of beds should be avoided.

Rock-stratigraphic names consist of a geographic place term and either a lithologic term or the rank term. The latter may be used where the rock character is variable or where it is essential to emphasize the rank. Variations of the lithologic term should be used where appropriate (for example, Cypress Shale, Cypress Sandstone, Cypress Formation).

The use of a lithologic term with categories other than formation involves a trinominal (Borden Siltstone Group, Rosiclare Sandstone Member, Tioga Bentonite Bed) which may be shortened by omitting the rank term only after the rank of the unit has been effectively established in each report. In most instances such units will carry only the rank term (Borden Group).

The same formal geographic name should not be used for different rock-stratigraphic units. In particular, the same name can not be applied both to a formation and a member or bed within that formation.

The use of informal geographic names is undesirable because it introduces confusion and eliminates a name for formal use. Informal names are not part of the official classification and are placed in quotation marks.

The word zone, in addition to its formal biostratigraphic usage, is used informally (and therefore without capitalization) for several types of specialized rock-stratigraphic units such as heavy-mineral zones and ore zones. However, its most extensive use in our publications is for oil-producing (and gas-producing) zones.

An oil-producing zone is a lithologic unit - an informal rock-stratigraphic unit - which is distinguished by containing recoverable petroleum. It may be called a producing zone, an oil (or gas) pay zone, or, loosely, a pay, a pay-sand, a sand, or a lime. The colloquial "sand" and "lime" are preferred to "sandstone," "limestone," and "dolomite," which are used for formal rock-stratigraphic units. If words and phrases such as "formation," "producing formation," and "sandstone" are avoided in tables, illustrations, and text, it is possible to use without discrimination zone names derived from such varied sources as officially recognized rock-stratigraphic units (Cypress oil-producing zone, Cypress sand, Cypress pay zone), or time-stratigraphic units (Devonian), or abandoned stratigraphic units (Trenton), or farm names (McClosky), or recognized pool names (Siggins), or abandoned pool names (Oblong).

The preservation of descriptive labels such as "500-foot sand," "glass rock," "oil rock," "drab," "pink-crinoidal," and "corniferous" for specific rock-stratigraphic units, in lieu of names, should be avoided. Where their employment seems essential to show relation to older literature or current use in industry, they are enclosed in quotation marks.

The basic units for presenting local surface and subsurface geologic work are the rock-stratigraphic units. The formation is the principal map unit, but groups, members, and even beds may be used as cartographic units for specific needs. It may be appropriate to show on a map or cross-section other types of stratigraphic units (such as biostratigraphic, time-stratigraphic, cyclical, or facies), but the character of such units should be clearly indicated. Such terms as geologic cross-section, geologic map, areal geology, when used in a local report normally refer to rock-stratigraphic representation.

There are no formal time units corresponding to rock-stratigraphic units. In discussing geologic history, the time of origin of such units can be handled informally, as by the expressions "during Cedar Valley deposition," or "is the same age as the Cedar Valley." Time transgression of some units requires clarification as to whether the time span is that of deposition of (1) the type section, (2) the unit throughout its entire geographic extent, or (3) the unit in the area of the report. Probably the third use is the most common, and for consistency in our reports it is assumed that this practice is followed unless there is a clear contrary statement.

## II - TIME-STRATIGRAPHIC AND GEOLOGIC-TIME CLASSIFICATIONS

Time-stratigraphic units are units of rock bounded by time planes (isochronous surfaces). They are defined in their type areas by the beginning and ending of deposition of a specific sequence of rocks (the type section), and elsewhere by correlation to that type section, using those available criteria judged as best indicating time equivalence. Lithologic methods of determining time equivalence are useful in correlating over short distances, particularly within a single sedimentary basin, but fossils are generally the basis for interprovince and intercontinental correlation. Radioactivity dating is useful in the late Pleistocene, but such data are as yet too sparse for practical tracing of time planes through older rocks.

Lacking evidence to the contrary, time-stratigraphic boundaries are placed at the most acceptable rock-stratigraphic boundaries.

The system is the largest and is the fundamental time-stratigraphic unit. All rocks are placed in some system. As pronounced unconformities separate most systems in their type areas, and as deposition was essentially continuous in other areas, the system includes, in addition to the type and its equivalents, those other rocks that geologists generally have agreed to place in it. The use of a system in Illinois implies correlation to a generally accepted stratigraphic interval in a type area, commonly European, although in practice a North American regional type may be substituted.

A series is the subordinate time-stratigraphic unit next below a system. Its use in Illinois implies correlation to a generally accepted stratigraphic interval in a type area, generally in North America.

A stage is a subordinate time-stratigraphic unit next below a series. It serves principally for local time-stratigraphic division. When a stage is subdivided, it is normally preferable to create two or more new stages, rather than to introduce substages and sub-ages.

Although geologic time is continuous, the preserved record of it is fragmentary, and our knowledge of the record is incomplete. There are many gaps and some overlaps in the time represented by deposits in the type sections of successive units of the time-stratigraphic sequence. From this imperfect time-stratigraphic sequence we derive a second sequence of segments of geologic time that meet each other perfectly with neither gap nor overlap. These segments are the units of the geologic-time classification. Though the time-stratigraphic and geologic-time units do not in theory correspond precisely to each other, for practical purposes we consider that within the limited area of Illinois they do correspond, and the time-stratigraphic unit defines the unit of geologic time.

Because it is impractical to have a type section for units larger than system, there is no time-stratigraphic term comparable to the largest geologic-time unit, era, which contains several periods.

A period is the geologic-time unit derived from a system. It approximates the time during which the rocks of a system were deposited but is adjusted to meet adjacent periods with neither hiatus nor overlap.

An epoch is a geologic-time unit, a division of a period, derived from a series.

An age is a geologic-time unit, a division of an epoch, derived from a stage. The use of the term age in both the common and restricted sense causes confusion. It should perhaps be replaced by subepoch, chron, or another name. However, a similar but lesser degree of confusion applies to many other unit names, and the introduction of capitalization to unit names partially relieves the situation. Therefore, use of "age" is continued pending more general acceptance of an alternative.

Although the categories of geologic-time classification bear rank names differing from those of time-stratigraphic classification, identical geographic designations are given to the corresponding individual units of both classifications. If the type section of a time-stratigraphic unit is the same as the type section of a rock-stratigraphic unit, the same name may be used in all three classifications.

Most of our names for time-stratigraphic and geologic-time units have the adjectival ending (Cincinnatian). All such names introduced in the future will have the adjectival ending, but names long established (Chester Series) need not be changed.

## III - BIOSTRATIGRAPHIC CLASSIFICATION

Biostratigraphic units are bodies of rock separated and defined on the basis of their contained fossils as biologic (not lithologic) constituents. There can be no biostratigraphic classification of unfossiliferous rocks, but numerous overlapping classifications of fossiliferous rocks are possible.

Biostratigraphic units are called zones. The type of zone is indicated by a descriptive prefix, and the specific zone is given a taxonomic name. Biostratigraphic zonation may be based on (1) the presence of a single taxon (that is, a single species, genus, family, etc.), (2) the abundance of a taxon, or (3) an assemblage (flora or fauna).

The range-zone (for example, Platycrinites penicillus Range-zone) is the first type of zone - that based on a single biologic entity or taxon. It includes the span of rocks containing both the oldest and youngest specimens of the

taxon. The local range-zone includes the rocks that contain a single species or other taxon in a particular rock section or local area.

Another type of zone is based on the greatest development or abundance of a taxon, rather than its mere presence. Most classifications of biostratigraphic zones have stressed the acme of development of a form, whereas reports on pollen, spores, and other microfossils have shown many exceptions to the simple succession of development, climax, and decline, (epacme, acme, and paracme). The common type of history of a species or genus includes several peaks or maxima with intervening valleys or minima. Because zonation based on the abundant microforms has increasing importance in stratigraphy, it seems essential to provide for designating the rocks characterized by more than one period of maximum development or abundance of a given taxon. Terms such as acme, hemera, and epibole are therefore not accepted for formal classification.

The term peak-zone (for example, Sulcatopinna missouriense Peak-zone), therefore, is proposed for the unit of rocks deposited during the episode, or during one of several episodes, of maximum development of a species or other taxon. The name is self-explanatory in English, and is thus comparable to the companion terms "range-zone" and "assemblage-zone." Successive peak-zones of the same taxon can be designated by such terms as lower and upper, or first (oldest), second, third, and fourth. If only one peak-zone is indicated, it would be essentially comparable to the concept of the acme-zone or epibole. Such zones, to be most useful, should be restricted to a limited sequence embracing maximum development and not extended to cover the entire range from minimum to minimum.

The assemblage-zone (for example, Platymerella manniensis Assemblage-zone) includes those rocks characterized by the presence of a certain flora or fauna. Assemblage-zones may be based on the entire assemblage or only on certain divisions of it (such as conodonts, molluscs, spores, or grass seeds). Assemblage-zones are named after one or more of the most characteristic, diagnostic, or conspicuous fossils of the assemblage, but the assemblage and the zone may be recognized where the name-fossil is missing and conversely the name-fossil may range beyond the zone limits. Assemblage-zones may be designated by numbering or lettering systems, but such schemes are considered informal and provisional.

Although some zones are recognized by the lack or rarity of an otherwise common element (such as spruce-free zone of Quaternary pollen profiles), it does not seem necessary to provide a formal niche for such negative units.

Formal names for time-units corresponding to biostratigraphic units seem unnecessary.

## IV - CYCLICAL CLASSIFICATION

Cyclical rock units are defined and recognized on the basis of repetitive cyclical sequences of sediments. Within the upper Paleozoic, particularly the Pennsylvanian System, the fundamental unit is a distinctive sequence of rocks called a cyclothem. Several other types of cyclical sedimentary units occur but have not been formally named. The interval of geologic time corresponding to a cyclical rock unit is a cycle.

The cyclical sequence would be time-stratigraphic if the rock boundary could be made to correspond to a moment of time. However, as the rock

boundary corresponds to an event, such as the passage of a strand line, which migrates through time and space during an advancing or retreating hemicycle, the cyclical unit is not time-stratigraphic.

Successive cyclical units are recognized because of their similarity to each other; they lack internal homogeneity. In this they differ fundamentally from normal rock-stratigraphic units which are distinguished from adjacent units by lithologic differences, but possess some degree of internal homogeneity.

Division of a cyclical sequence into portions deposited during advancing and retreating (warming and cooling, shoaling and deepening) hemicycles tends to be similar to time-stratigraphic subdivision. On the other hand, division into marine and nonmarine, glacial and nonglacial, clastic and carbonate, produces units closely comparable to rock-stratigraphic units.

Although cyclical units may have elements in common with rock-stratigraphic and time-stratigraphic units, they constitute a separate classification and may be separately applied to a sequence of rocks also classified in rock-stratigraphic and time-stratigraphic units.

Relieving cyclical units from the restrictions imposed by the practical requirements of rock-stratigraphic classification, will permit more consistency in the development and application of cyclical classification to theoretical studies.

Cyclothems are given geographic names. They may be given the same name as a prominent rock-stratigraphic unit in the cyclothem (St. David Cyclothem for St. David Limestone Member), or they may be given another rame. As the word cyclothem or cycle will always be used with the geographic name, the duplicate use should not cause confusion.

## V - FACIES CLASSIFICATION

Facies classifications are numerous, but those of greatest concern in stratigraphic nomenclature involve rock facies of different lithology but of the same approximate age. Because our interpretation of rock-stratigraphic units emphasizes continuity of strata at the expense of narrowly conceived lithic units, considerable geographic variation in lithology is present in our rock-stratigraphic as well as our time-stratigraphic units. Such variation permits division of the rocks into gross or fine facies units.

Facies can usually be best described by a statement of the criteria involved (limestone and dolomite facies of the Galena Formation, crinoidal and fine-grained facies of the Keokuk Limestone, oolitic facies, garnet-epidote facies, pelecypod facies, shallow-water facies, etc.), or by common "lower case" geographic location (northern and southern, basin and shelf). To avoid confusion with rock-stratigraphic or time-stratigraphic nomenclature, formal geographic place names will not be used for facies.

Numerous facies differentiations of the same stratigraphic unit can coexist. Thus, in several of our formations there are red (or part-red) and gray facies whose boundary cuts across the boundary between carbonate and clastic facies and also that between dolomite and limestone facies. A sand-bearing facies of the Kankakee Formation is northeastern Illinois includes parts of both the limestone and dolomite facies of the formation. The division of the New Albany Shale into black and gray facies does not correspond to the division into sand-bearing and sand-free facies.

Indiscriminate use of the word "facies" as a synonym for "lithology" or "fauna" should be avoided.

## VI - SOIL-STRATIGRAPHIC CLASSIFICATION

A soil is a weathered layer formed in a surface or near-surface environment. It differs from a rock-stratigraphic unit in that, for the most part, it is derived by the alteration of rocks in situ, rather than by deposition of transported material. As thus used, the name soil applies to the entire profile of weathering. Its base, usually gradational, is the top of the unaltered parent material.

A single soil may develop across rocks belonging to many rock-stratigraphic and time-stratigraphic units. Although a single soil may develop during a certain interval of time, the interval of time involved may not be the same throughout the traceable extent of the soil. Furthermore, the soil is not a deposit and should not be considered a time-stratigraphic unit.

The pedologic classification of "modern" or "living" soils presents a facies differentiation of the Recent Soil, but otherwise rarely impinges upon stratigraphic classification. However, soils become buried by younger deposits and thus enter the geologic column.

Buried soils should be given formal status as soil-stratigraphic units distinct from both rock-stratigraphic and time-stratigraphic classification units. If a soil has a well established name (Sangamon Soil), its use should be continued, even though the name is used in another stratigraphic classification (Sangamon Stage). New soil units should be given geographic names and a type section described. Informal designations based on relations to other stratigraphic units may be used (post-Illinoian soil, preglacial soil).

Soil profiles may be described by either the pedalogic classification of A, B, and C zones, or by the system of zones I, II, III, and IV, as used in the upper Mississippi River basin. Parts of profiles may be informally named (Illinoian gumbotil, approximately equal to zone II or B zone) but these are descriptive terms and neither rock-, time-, nor soil-stratigraphic classification.

## COMBINATION OF CLASSIFICATIONS

For description of stratigraphic sequences the various classifications may be combined according to the needs of any given report. The headings system and formation are always used; other headings are added if needed. No confusion should result from the use in sequence of era (geologic time term), system and series (time-stratigraphic terms), group, formation, member, and bed (rock-stratigraphic terms), cyclothem (cyclical term), and zone (biostratigraphic term). In such a combination usage, it should not be disturbing if a group or a formation contains within it a series or system boundary. Likewise, the boundaries of zones, formations, and cyclothems need not correspond.

## DEFINING STRATIGRAPHIC UNITS

The definition of stratigraphic units should include (1) general lithologic description and distinguishing features, (2) stratigraphic position in relation to overlying and underlying beds, (3) description and location of type section or type well, (4) derivation of name, and (5) recommendation as to the use of a lithologic or unit term as part of the name (. . . Limestone, or . . . Formation).

If a change in classification is involved, reasons for the change are to be stated.

Stratigraphic names are to be introduced only in publications in which adequate definition can be given - not on maps or tables and generally not in economic reports or guidebooks.

## NAMING STRATIGRAPHIC UNITS

The selection of suitable geographic names for formal stratigraphic units becomes increasingly difficult and time-consuming. The ideal practice - selection of a geographic name not previously used for a stratigraphic unit, preferably the name of a town or natural feature shown on a published map - should be followed if at all feasible.

In the past, names previously used for Pleistocene, Precambrian, or igneous rock units in other regions have not been considered preempted as names for Paleozoic units in Illinois, although they generally have been avoided. Further liberalization seems necessary, and the possible reuse of some names will be considered in special cases, as follows: (1) If the name has had only informal usage in another region, such as names for coals, subsurface sands, and commercial limestone and clay deposits; (2) if the name has been abandoned for 15 years, as shown by replacement with another name and by checking with informed local sources; (3) if the name has been used for a minor or local unit in both a different era and a different region, so that the two units have essentially no chance of occurring in the same sequence or of being mentioned in the same report. The previous use should be mentioned.

If a name already in use in Illinois is found to be preempted, it will not be replaced with a new name if the preempting usage (1) has been abandoned for 10 years, as shown by replacement with another name and by checking with informed local sources, or (2) applies to a unit in both a different system and a different region, so that the two units have slight chance of occurring in the same sequence or of being mentioned in the same report.

Widely used and long established names need not be replaced, on the assumption that changing them would cause more confusion than retaining them.

## STYLING

Capitalizing the initial letter of each stratigraphic term when it is used formally with a geographic name (Devonian System, Cypress Sandstone, Menard and Palestine Formations) has been recommended by the American Commission for Stratigraphic Nomenclature. As this practice has long seemed desirable in order to differentiate common and technical uses of such words as "group", "system", and "age", we adopt it. When unit names are used without the geographic name, the lower case is used (for example, this formation extends . . .).

The expression Renault shale may be correctly interpreted to mean shale in the Renault Limestone or Formation, because of the lower case "s" of shale, which would be capitalized if it were a formal unit name. However, usages which depend entirely on capitalization for interpretation should be avoided. It is better to refer to Renault Formation shale or shale in the Renault Formation.

## REFERENCES

American Commission on Stratigraphic Nomenclature, 1947-1957, Reports, Notes, and Discussions, Am. Assoc. Petr. Geol. Bull., v. 31-41.

Ashley, G. H., et al., 1933, Classification and nomenclature of rock units: Geol. Soc. Am. Bull., v. 44, p. 423-459; Am. Assoc. Petr. Geol. Bull., v. 17, p. 843-868; 1939, ibid., v. 23, p. 1068-1099.

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