SAVANNAH MALLEE (Key, 1951) = Open mallee.

SAVANNAH SCRUB = Open scrub.

SCLEROPHYLL.—Hard-leaved, usually xeromorphic.

SCLEROPHYLL FOREST.—A closed community dominated by sclerophyllous meso- or megaphanerophytes characterized by flat-topped crowns which form a usually interlacing canopy, and by boles of which the length is equal to or greater than the depth of the crowns. Subforms: Dry Sclerophyll Forest; Wet Sclerophyll forest; Swamp Sclerophyll Forest.

Dry Sclerophyll Forest.—A sclerophyll forest community characterized by a usually interlacing dominant stratum, well developed but usually discontinuous strata of xeromorphic shrubs, and a usually discontinuous herbaceous stratum.

Wet Sclerophyll Forest.—A sclerophyll forest community characterized by a tall, densely interlacing dominant stratum below which a discontinuous stratum of smaller, shade-tolerant trees may sometimes develop, well developed continuous or discontinuous strata of mesomorphic shrubs, and a dense or sparse herbaceous stratum.

Swamp Sclerophyll Forest.—A sclerophyll forest community characterized by an herbaceous stratum of helophytes.

SCRUB.—A community dominated by single-stemmed microphanerophytes branching near ground level. Subforms: Dry Scrub; Wet Scrub; Mangrove Scrub.

Dry Scrub.—A xeromorphic scrub community characterized by a discontinuous or loosely interlacing dominant stratum, a discontinuous lower shrub stratum, and a sparsely continuous herbaceous stratum.

Wet Scrub.—A scrub community characterized by a densely interlacing dominant stratum, a continuous or discontinuous lower shrub stratum, and a continuous or discontinuous herbaceous stratum containing helophytes.

Mangrove Scrub.—A tidal scrub community characterized by a densely interlacing dominant stratum of species of mangrove with pneumatophores, a discontinuous lower shrub stratum usually of young mangroves, and a ground stratum of algae on the pneumatophores and mud.

SCRUB, LITTORAL = Mangrove scrub.

SCRUB, TIDAL = Mangrove scrub.

SCRUB, SAVANNAH = Shrub savannah.

SERAL.—Successional.

SERE.—Succession.

SHRUB.—A woody plant less than about 8 metres in height (the upper limit of the microphanerophyte life-form), frequently with many stems.

SOCIES.—The seral equivalent of the society.

SOCIETY.—A subordinate community contained within the structure of the association or subassociation.

STAGE.—A single clearly marked step in succession.

STAND.—A continuous piece of vegetation within which there is a definite degree of homogeneity (Pryor, 1951) (cf. sample).

STATUS (maturity).—The stage in development of a community relative to the climax, i.e., seral or climax.

STEPPE.—Shrub steppe (Prescott, 1931; Wood, 1937) = Saltbush. Tree steppe (Wood, 1937) = Open scrub.

STRATIFICATION.—The condition brought about by the occurrence of strata (layers) within a community.

STRATUM.—A layer in a community produced by the occurrence at approximately the same level of an aggregation of plants of the same habit; thus tree stratum, herbaceous stratum, etc.

STRATUM SOCIETY.—A society which is present throughout the whole year (see aspect society).

STRUCTURAL FORM.—The structural characteristics exhibited by a community which at present are classified according to the following well-defined types: grassland, savannah, alpine herbfield, fen, bog, feldmark, heath, saltbush, scrub, mallee, woodland, sclerophyll forest, rainforest. (See Table I in text and under the appropriate titles in Glossary.)

STRUCTURAL STAGE.—A stage in a succession identified by a community conforming to one of the defined structural forms (q.v.), e.g., shrub stage.

STRUCTURAL SUBFORM.—A division of a structural form identified by a minor variation in structure, e.g., savannah woodland is a subform of the woodland form.

STRUCTURAL UNIT.—A synthetic unit to which all communities of the same structure are referred, irrespective of their floristic composition (see formation, subformation).

STRUCTURE.—The spatial arrangement of plants within a community (see structural form, stratification).

SUBALLIANCE.—A subdivision of an alliance obtained by arranging the component associations into groups of maximum affinity.

SUBALPINE.—Referring to elevated environments where the ground is snow covered continuously for at least one month and up to about six months of the year.

SUBASSOCIATION.—A subdivision of an association determined by a variation in the most important subordinate stratum of the association, without significant qualitative changes in the dominant stratum.

SUBASSOCIES.—The seral equivalent of the subassociation.

SUBCLIMAX.—The penultimate stage of a succession, resembling the climax in structure.

SUBFORMATION.—A subordinate synthetic structural unit within the general pattern of a formation, to which are referred all climax communities exhibiting the same structural subform, irrespective of floristic composition.

SUBGLACIAL.—Pertaining to (exposed) environments in close proximity to glaciers, ice sheets, or permanent snow.

SUBMERGED STAGE.—The stage in a hydrosere identified by the dominance of submerged aquatic plants.

SUBORDINATE SPECIES.—A species of a community which is not the dominant (or codominant).

SUBSERE.—Secondary succession.

SUCCESSION.—The process by which the same area is occupied by different plant communities when all factors except time remain constant.

Primary succession.—A succession which occurs on a naturally bare area, not previously occupied by vegetation.

Secondary succession.—A succession which occurs on a denuded area on which the original vegetation has been completely or partly destroyed by some external influence (e.g., fire, flood, grazing).

SUCCULENT-STEMMED PHANEROPHYTE.—A succulent-stemmed plant with renewal buds more than 25 cm. above soil level.

SWAMP.—A waterlogged area in which the level of the water table is above the soil surface for most of the year. (Also used loosely in reference to fen or marsh.)

SYNUSIUM = Stratum.

RAISED MOSS (Tansley, 1939) = Raised bog.

TERRESTRIAL STAGE.—A seral stage on land.

THEROPHYTE.—An annual plant surviving the unfavourable season only as seeds.

TOLERANCE (ecological).—The ranges of variation of factors of the environment within which an organism or community can function.

TEMPORAL CLIMAX.—A community limited by time. A stage in succession.

TREE.—A woody plant more than about 8 metres in height (the lower limit of the meso-phanerophyte life-form), usually with a single stem.

TYPE (Pryor, 1939) = Association.

VEGETATION.—The total aggregation of plant communities in an area (cf. flora).

VEGETATION TYPE (Pryor, 1939) = Association.

VERBAND (Du Rietz, 1936) = Alliance.

VERNAL.—Pertaining to spring, e.g., vernal society (q.v.).

VERSATILE SPECIES.—A species with a wide ecological tolerance.

WIND DESERT (Hamilton, 1926) = Feldmark.

WOODLAND.—A community dominated by meso-phanerophytes characterized by rounded crowns which form an open or loosely interlacing canopy, and by boles of which the length is usually less than the depth of the crowns. Subforms: Shrub Woodland; Savannah Woodland; Tall Woodland; Subalpine Woodland.

Shrub Woodland.—An open woodland community characterized by a discontinuous dominant stratum in which the crowns of the dominants are separated by a distance greater than the diameter of the crown, a discontinuous but well developed stratum of microphanerophytes, discontinuous smaller shrub strata of nanophanerophytes and chamaephytes, and a continuous or discontinuous herbaceous stratum.

Savannah Woodland.—A usually open woodland community characterized by a discontinuous dominant stratum in which the crowns are separated by a distance equal to or slightly greater than the diameter of the crown, and a usually continuous herbaceous stratum without well-developed strata of micro-phanerophytes and smaller shrubs.

Tall Woodland.—A closed woodland community characterized by a tall sparsely continuous dominant stratum in which the crown depth of the dominants equals or only slightly exceeds the length of the bole, and by the poor development or lack of subordinate strata of microphanerophytes, smaller shrubs and herbs.

Subalpine Woodland.—A closed subalpine woodland community (sometimes reduced to the dimensions of scrub) characterized by a usually continuous dominant stratum in which the crown depth of the dominants greatly exceeds the length of the bole, discontinuous but well-developed shrub strata of nanophanerophytes and chamaephytes but not microphanerophytes, and a dense, continuous herbaceous stratum.

Swamp Woodland.—A woodland community characterized by an herbaceous stratum of helophytes.

XEROMORPHIC.—Exhibiting the morphological characters supposedly induced by a scanty water supply, e.g., hard (small) leaves, thick cuticle, etc.

XEROSERE.—A succession which commences in a dry place (see lithosere, psammosere, pedosere).

Summary.

A scheme for the objective classification of plant communities is outlined.

Classification on a structural basis is discussed and structural forms and subforms suitable for the description of the known Australian plant communities are defined.

Units for the floristic classification of climax communities are defined and their usages discussed. These units are the *Association*, the *Alliance*, and the *Society*. Subunits are also proposed.

Structural units for the classification of the floristic units are proposed. These units are the *Subformation* and *Formation*.

Seral communities are dealt with in the same detail and suitable units are defined.

A glossary of ecological terms is included.

Acknowledgements.

For helpful criticism of the manuscript, and many discussions on principles, the writers are indebted to Professor Alan Burges (Univ. of Sydney), Dr. K. H. L. Key (C.S.I.R.O.), Mr. L. D. Pryor (Dept. of Interior), and Mr. R. W. Williams (C.S.I.R.O.). One of us (N.C.W.B.) has received assistance for field work from the Commonwealth Government Research Grants Committee, while the other (A.B.C.) has been working as a Thomas Lawrance Pawlett Scholar and subsequently as a Services Canteens Trust Fund Scholar; in both cases this financial assistance is gratefully acknowledged.

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A NOTE ON THE STRATIGRAPHY AND STRUCTURE OF THE WELLINGTON–MOLONG–ORANGE–CANOWINDRA REGION.

By Germaine Joplin, B.A., D.Sc., Ph.D., and Others.

(Plate i and two Text-figures.)

[Read 30th April, 1952.]

Synopsis.

Reconnaissance mapping has been carried out over an area of about 2,000 square miles, and it has been shown that Silurian strata have been folded into a great anticlinorium upon which later folding has been superimposed. The first movement is attributed to the Bowning Orogeny, and the second to the Kanimblan.

The Silurian strata have been mapped as the Gamboola, Nanima and Manildra Formations, and there is evidence that the first is of Lower Silurian age.

Ordovician, Devonian and Jurassic strata also occur in the area, as well as Tertiary lavas and related intrusions. Granites may be of Kanimbla age.

Introduction.

The region covered by the map (Plate i) has an area of about 2,000 square miles. Joplin and Culey (1938) published a reconnaissance map of a small part of the area, and subsequent, more detailed mapping has necessitated some modifications, which are incorporated in the present map. The map is a compilation of the work of sixteen people. Six of these workers—Misses E. M. Basnett, M. J. Colditz and E. M. Phillips and Messrs. R. Brewer, D. G. Moye and N. C. Stevens—mapped certain areas (see inset) as part of their honours course in the Department of Geology, University of Sydney, and their work has been carried out mainly by compass traverses on parish maps. The work of Basnett and Colditz (1946) and Stevens (1950) is published. Reconnaissance mapping between areas of more detailed mapping has been carried out by Misses M. Breckenridge, A. G. Culey, J. Johnston and G. A. Joplin, and Messrs. T. G. Vallance and K. Sharp, and a part of the work of L. J. Jones (1935), C. A. Sussmilch (1906) and C. A. Sussmilch and H. I. Jensen (1909) has been used to tie the area to already-published work.

Although parts of the map are published, it is presented for three reasons: (i) it indicates the regional structure which is not apparent in the maps of isolated areas; (ii) it incorporates work which may not otherwise be published and which may save much time for those undertaking more detailed work in the future; and (iii) the map shows the relation between the Silurian rocks of the Wellington–Molong area and the Ordovician strata to the south (Stevens, 1951).

As the general geology of the area is fairly well known from published work, it is proposed only to make amendments and additions to the stratigraphy and to indicate broadly the structure of the area.

Stratigraphy.

Ordovician.

Basnett and Colditz (1946) recorded graptolite-bearing slates surrounded by Silurian andesites at Wellington and at Apsley, and suggested that the Silurian strata were deposited around Ordovician islands. Later Moye found graptolites in slates near Borenore, not far from Lower Silurian limestones (Fletcher, 1950), and recently G. H. Packham* has found Ordovician graptolites near the Nandillyan limestone. Stevens found graptolite slates associated with limestones and andesites faulted against Upper Devonian strata near Cargo and has more recently found Ordovician limestones interbedded with andesite on the Belubula River (Stevens, 1951). This discovery raises the question of the age of the andesites and limestones within the area of the present map.

* Personal communication.

Section A–B (Text-fig. 2) indicates a possible relation between Lower Silurian and Ordovician strata near Amaroo and Borenore, though it must be emphasized that much work remains to be done in this part of the area, which at present is the subject only of rough reconnaissance.

Although the possibility of an Ordovician age of some of the andesites adjacent to black slates in the Wellington District cannot be overlooked, there is reason to believe that the Silurian strata were deposited on an uneven basement of Ordovician rocks, and the explanation offered by Basnett and Colditz (1946) seems to be the most likely one.

Silurian.

There appears to be a threefold division of the Silurian in this region, but until further palaeontological work is undertaken, it is impossible to say what part of the succession is represented.

Gamboola Formation.

Basnett and Colditz (1946) mapped a Lower Sedimentary Series, underlying andesites, in the Wellington District, and these rocks, which consist mainly of low-grade slates, tuffaceous slates, cherts and limestones, have been traced south to the main road between Molong and Orange in the Parish of Gamboola. *Halysites* from this area was described by Etheridge (1904). On the present map the Borenore limestone, from which Fletcher (1951) has recently described Lower Silurian trilobites, is shown to be continuous with this formation, though this interpolation may not be correct, because, as indicated above, much detailed work remains to be done in the Borenore–Amaroo area. Etheridge (1909) recorded trilobites in a limestone near Borenore, but the relation of this limestone to the Lower Silurian limestone is not clear.

This Formation unconformably overlies the Ordovician and is conformably overlain by andesites and related pyroclastic rocks. Unfortunately it is not possible to measure the thickness as it occupies the core of an anticlinorium which is pitching to the north, and the base is possibly covered by the volcanic pile of the Canoblas. In section A–B only the apparent base is exposed on an uneven Ordovician surface.

Limestone members within this Formation possibly include the Borenore and Spring Creek Limestones, the Nandillyan Limestone and the Narragal Limestone. The Molong Limestone (see C–D, Text-fig. 2) may be regarded as a member at the top of this Formation or as one at the base of the Nanima Formation. Rhyolites occur on Spring and Oakey Creeks, but these may be (?) Lower Devonian.

It is proposed to name this unit the Gamboola Formation and to include the above lenses of limestone as members.

The Molong and Narragal Limestones are invaded by porphyrites which are possibly feeders to the overlying flows in the Nanima Formation.

Nanima Formation.

Basnett and Colditz (1946) described a Volcanic Series between a Lower and Upper Sedimentary Series in the Wellington District, and Colditz (1948) showed that it consisted of hornblende and pyroxene andesites, trachyandesites, trachybasalts, basalts, tuffs and agglomerates associated with sills of hornblende lamprophyre. Basnett (1942) described a lamprophyre sill on Poggy Creek that had suffered serpentinization in a fault-zone.

Basnett and Colditz also recorded lenses of limestone interbedded with the lavas and tuffs. Work further south has indicated that the Molong Limestone may be a member low in this Formation, and it is obvious from section C–D (Text-fig. 2) that the limestone in the basin south of the Molong Dome is on a higher horizon in this Formation. Stevens (1951) has correlated the Cargo Limestone with that of Molong. Basnett and Colditz consider that the limestone at Wellington Caves is possibly Devonian, but the present writer considers that a fault, visible in the Cathedral Cave, which brings rhythmically banded limestones against massive limestone, is possibly a fault bringing the Devonian against the Silurian. Thus, there is reason to believe that the limestone exposed east of the river on the Caves Reserve is a member of this Formation.