

1945.

WESTERN AUSTRALIA.

DEPARTMENT OF MINES.

MINERAL RESOURCES OF WESTERN AUSTRALIA

BULLETIN No. 1.

**CENSUS OF WESTERN
AUSTRALIAN MINERALS**

BY

DOROTHY CARROLL, Ph.D. D.I.C.

GOVERNMENT CHEMICAL LABORATORIES.

*Issued under the authority of the Hon. A. H. Panton,
Minister for Mines.*

PERTH.

BY AUTHORITY: ROBERT H. MILLER, GOVERNMENT PRINTER.

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FOREWORD.

It gives me great pleasure to preface this Bulletin with a few remarks relative to the future policy of the Department of Mines, concerning publications dealing with the mineral deposits of the State of Western Australia.

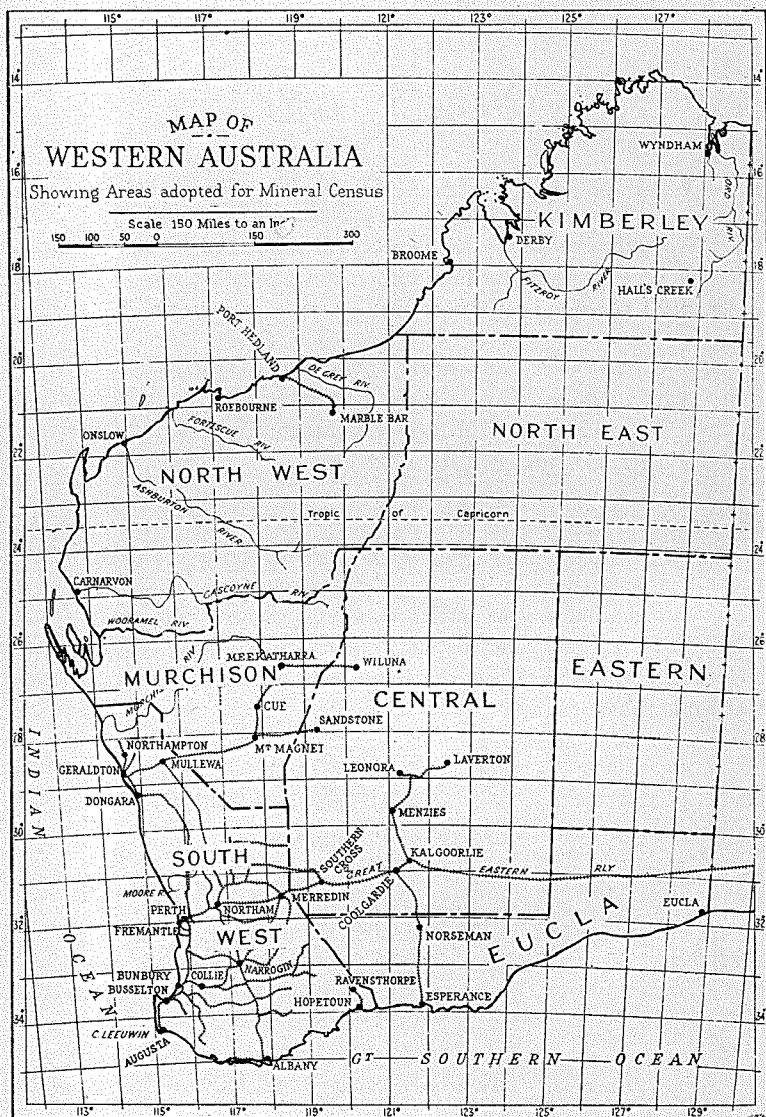
In the past, such publications, with the exception of the Department's Annual Report, have usually dealt with reports emanating from one Branch such as the Geological Survey Bulletins, the State Mining Engineer's Reports and other similar ones.

While these will still continue to issue where the subjects are such as are particularly applicable to one Branch, it is intended to also produce general Departmental bulletins dealing with subjects on which useful information can be contributed by several branches. These should be of special value to the public as being of a comprehensive nature, and will mainly concern minerals of present and future industrial value to our country.

In addition to providing geological information of known deposits, they will also contain mineralogical details, methods of mining and anything else of value to the mining fraternity.

As this Bulletin comprises a Census of State Minerals, it is peculiarly adapted to commence the series and is therefore numbered "Bulletin 1."

A. H. PANTON,
Minister for Mines.



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Census of Western Australian Minerals.

By DOROTHY CARROLL, Ph.D., D.I.C.

The following list of Western Australian minerals and the localities in which they occur has been compiled from records kept in the Government Chemical Laboratory, which undertakes the mineralogical work for this State, and from published work of the Geological Survey and the Geology Department of the University of Western Australia. The list may be considered to be fairly complete to the end of 1943. A previous census compiled by the late Dr. E. S. Simpson appeared in 1912 in the "Guide to the Western Australian Museum, Part VI, The Mineral Collections."

In this census the minerals are listed alphabetically, and the places at which each has been recorded are localised in the following areas into which the State has been divided as shown on the accompanying map (see frontispiece):—Kimberley, North East, North West, Murchison, South West, Central, Eucla, South East. Most of the localities will be found on the 1942 50-mile map of Western Australia issued by the Surveyor General.

Detailed lists of localities are not given for the common rock-forming minerals such as quartz, felspar, micas, amphiboles, etc., except where their occurrence is of economic or scientific interest. If a mineral is not listed at a certain locality, this does not necessarily mean that it does not occur there. This is true of the rock-forming minerals and such minerals as limonite and the clay minerals.

It is proposed to make supplementary lists of mineral records from time to time.

ACTINOLITE: (Ferruginous variety of tremolite.)

A common constituent of greenstones throughout the State. In some localities is asbestiform.

AGRICOLITE: $\text{Bi}_4(\text{SiO}_4)_3$

N.W.—Globe Hill.

Mur.—Melville.

Con.—Garratt.

ALBITE: $\text{NaAlSi}_3\text{O}_8$

- (1) *Finely granular constituent of granite, porphyry gneiss and greenstone.*

N.W.—Yule River.

Mur.—Cue, Meekatharra, Mulgine, Paynesville, Yaloginda.

S.W.—Bannister, Ravensthorpe, Swanview.

Cen.—Binduli, Bullabulling, Bulong, Coolgardie, Kalgoorlie, Kanowna, Lake Carey, Mt. Robinson, Niagara, Southern Cross.

Euc.—Buldanina, Mt. Ridley, Norseman, Russell Range.

- (2) *Finely granular constituent of altered (zoisitized) rocks.*

N.W.—Bamboo, Bangemall, Jimblebah, Mt. Fisher, Warrawoona, Yinnietharra.

Mur.—Cue, Meekatharra, Paynesville.

S.W.—Geraldine, Greenbushes, Kalyerup, Kojonup, Narembreen, Lower Chittering, Ravensthorpe, Wongong Brook, Wongan Hills, York.

Cen.—Edjudina, Hells Gates, Kalgoorlie, Leonora, Niagara, Ora Banda, Sir Samuel.

- (3) *In pegmatites.*

Kim.—Mt. Dockrell.

N.W.—Cooglegong, Globe Hill, McPhees Range, Pilgangoora, Moolyella, Mt. Francisco, Stannum, Strelley, Tappa, Wodgina, Yinnietharra.

Mur.—Coodardy, Gabyon, Melville, Payne's Find, Poona.

S.W.—Balingup, Denmark, Goyamin Pool, Greenbushes, Holleton, Jacob's Well, Kirup, Mahogany Creek, Mooliabeene, Mt. Gibson, Mullalyup, Ninghanboun Hills, Ravensthorpe, Smithfield, Toodyay, Yabberup.

Cen.—Davyhurst, Gibraltar, Kalgoorlie, Logan's Find, Londonderry, Marvel Loch, Mt. Marion, Mulline, Nevoria, Niagara, Palmer's Find, Southern Cross, Ubini, Sparrowville, Westonia.

Euc.—Dundas.

Also in some sediments, soils, etc.: Gingin, Yunderup (Murray River), Forrestfield, Tenterden.

ALEXANDROLITE: Chromiferous variety of halloysite. See under *Halloysite*.

ALEXANDRITE: Chromiferous chrysoberyl.

Mur.—Poona.

ALLANITE: $H(Ca,Fe)_2(Ce,Al)_3Si_3O_{13}$

(1) *In pegmatite.*

N.W.—Cooglegong, Stannum, Woodstock.

S.W.—Waddouring Rock.

Euc.—Fraser Range.

(2) *In granite and gneiss.*

S.W.—Albany, Denmark.

(3) *In amphibolite.*

Cen.—Kalgoorlie.

ALMANDINE: (Garnet) $Fe''_3Al_2(SiO_4)_3$

Kim.—King's Sound.

N.W.—Mt. Augustus, Yinnietharra.

S.W.—Beverley, Boddalin, Chittering (Lower), Dowerin, Geraldine, Geraldton, Moora, Narra Tarra, Ninghanboun Hills, Northampton, Nornalup, Port Gregory, Yabberup, York.

Cen.—Evanston, Marvel Loch, Nevoria, Southern Cross.

ALTAITE: $PbTe$

Cen.—Kalgoorlie, Laverton.

ALUNITE: $KAl_3(OH)_6(SO_4)_2$

(1) *Veins in weathered rock.*

N.W.—Alunite Gully, Millstream Station.

S.W.—Kalgan River, Northampton, Ravensthorpe.

Cen.—Edjudina, Fraser Range, Grant's Patch, Kalgoorlie, Kanowna, Mt. Walter Kalgoorlie.

(2) *In beds in salinas.*

S.W.—Burran Rock, Champion, Eaglestone Hill, Goomarin, Hines Hill, Kununoppin, Lake Wallambin, Warrahuppin.

Cen.—Baladgie-Bullfinch, Jilbadgi, L. Koorkoordinate, Marvel Loch.

(3) *Nodules in subsoil.*

S.W.—Champion, Goomarin, Kalgan River, Lake Wallambin, Welbungin.

Natroalunite: Na replaces K.

(1) *Veins in weathered rock.*

S.W.—Denmark.

Cen.—Kalgoorlie, Kanowna.

ALUNOGEN: $\text{Al}_2(\text{SO}_4)_3 \cdot 16\text{H}_2\text{O}$

Cen.—Parker's Range (?)

AMALGAM: Au_2Hg_3

Mur.—Mt. Magnet.

Cen.—Kalgoorlie.

AMBLYGONITE: LiAlFPO_4

S.W.—Ravensthorpe.

Cen.—Ubini.

AMESITE: $\text{H}_4\text{Mg}_2\text{Al}_2\text{SiO}_9$ (See under *Chlorite*).

AMETHYST: See under *Quartz*.

"AMOSITE": See under *Anthophyllite*.

AMPHIBOLE: See under *Hornblende*, *glaucothane*, *actinolite*, *tremolite*, *grunerite*; a common rock-forming mineral of wide distribution.

ANALCITE: $\text{NaAl}(\text{SiO}_3)_2 \cdot \text{H}_2\text{O}$

Cen.—Comet Vale.

ANAXITE: $2\text{H}_2\text{O} \cdot \text{Al}_2\text{O}_3 \cdot 3\text{SiO}_2$

S.W.—Ravensthorpe.

ANDALUSITE: $\text{Al}_2\text{O}_3 \cdot \text{SiO}_2$

Kim.: Devil's Pass, Little Whirlpool Pass, Lennard River
Margaret River, Mt. Rose.

N.W.—Black Hill, Warrawoona.

Mur.—Milly Milly, Quinns.

S.W.—Kununoppin, Ninghanboun Hills, Ravensthorpe,
Toodyay, Westonia, Yandanhoo Hills.

Cen.—Binduli, Boddalin, Bullfinch, Burbanks, Dunnsville, En-
nuin, Euro, Golden Valley, Horse Rocks, Kalgoorlie,
Leonora, Marvel Loch, Menzies, Mt. Walton, Mungari,
Nevoria, Olga, Parker's Range, Southern Cross, Yil-
mia.

Euc.—Mt. Ragged.

S.E.—Barnard Rocks.

ANDESINE: $\text{Ab}, \text{An}_2 - \text{Ab}_3\text{An}_1$

Occurs in some igneous rocks and basic pegmatites.

ANDRADITE: (garnet) $\text{Ca}_3\text{F}'''_2(\text{SiO}_4)_3$

N.W.—Cooglegong, Upper Gascoyne River.

Mur.—Melville.

S.W.—Rothsay, Needilup, Weelhamby Lake.

Cen.—Corinthian.

ANGLESITE: PbSO_4

Kim.—Dixon Range, Mt. Dockrell, Narlarla, Ord River, Pantan River, Richenda River, Alice Downs Station, Hall's Creek.

N.W.—Bamboo, Braeside, Coorara, Friendly Creek, Gorge Creek (Ashburton), Hardy River, Mt. Edgar, Mt. Isabella, Manutarra, Uaroo, Whim Creek, Wodgina, Yandicoogina.

S.W.—Geraldine, Moora, Mt. Narryer, Northampton, Northern Gully.

Cen.—Baumgarten's, Burbanks, Comet Vale.

ANHYDRITE: CaSO_4

Cen.—Kalgoorlie.

ANKERITE: See under *Dolomite*.ANORTHITE: $\text{An}-\text{An}_3\text{Ab}_3$

In some basic rocks.

ANORTHOCLASE: $(\text{Na},\text{K})\text{AlSi}_3\text{O}_8$

In some gneisses and granites.

ANTHOPHYLLITE: $\text{H}_2\text{Mg}_7(\text{SiO}_3)_8$ (1) *Fibrous and prismatic in serpentine and talc.*

N.W.—Fey's Hill

Mur.—Mt. Magnet, Yarra Yarra Creek.

S.W.—Balkuling, Bindj Bindj, Bolgart, Bremer Range, Calingiri, Culham, Goomalling, Kundip, Newlands, Piawanning, Toodyay, Wongan Hills.

Cen.—Coolgardie.

(2) *Prismatic and granular in crystalline metamorphics.*

S.W.—Bridgetown, Clackline, Dangan, Dowerin, Greenbushes, Wellington Mills, Westonia, York.

Cen.—Marvel Loch, Mt. Palmer, Southern Cross.

Euc.—Norseman (27 miles south of).

Gedrite.

S.W.—Bullsbrook (in basic pegmatite).

Amosite.

S.W.—Bindj Bindj (a variety of anthophyllite from here approximates in physical characteristics but not in chemical composition to the amosite in South Africa).

ANTIGORITE: $H_4Mg_3Si_2O_{10}$.

- (1)
- Derived mainly from forsterite or olivine.*

N.W.—Box Soak (Wallareenya Station), Mt. Francisco, Roebourne, Sherlock River, Soanesville, Warrawoona, Meilga Station.

Mur.—Currans, Field's Find, Garden Gully.

S.W.—Balkuling, Geraldine, Northam, Rothsay, Westonia, York.

Cen.—Bulong, Camilya, Coolgardie, Erlistoun, Golden Ridge, Kalgoorlie, Malcolm, Monger, Mt. Burges, Mt. Juglah, Murrin, Ora Banda, Waverley.

- (2)
- Derived mainly from enstatite or hypersthene.*

N.W.—Balla Balla, Jimblebah, Lionel, Mt. Gregory, Station Peak.

Mur.—Belele, Meekatharra.

S.W.—Desmond, Ninghanboun Hills, Round Hill, Toodyay, York.

Cen.—Comet Vale, Goongarrie, Paddington, Vetttersburg.

- (3)
- Original mineral unknown.*

N.W.—Bullock Well, Eginbah, Mt. Clere Station, Mt. Satirist Station, Nunyurrie Creek, Talga.

Mur.—Cue, Lennonville, Payne's Find.

S.W.—Bindi Bindi, Burngup, Goomalling, Meenaar, Wongan Hills, Namban (Round Hill).

Cen.—Bardoc, Celebration (Mt. Goddard), Gindalbie, Gordon, Jutson's Rock, Kanowna, Linden, Love's Find, Millar Hill, Mt. Celia, Mt. Howe, Mt. Perey, Paris, Pyke Hill, St. Ives, Yeedie Bulgar, Yundamindera.

Euc.—Mid Mt. Ironcap, Munglinup.

APATITE: $Ca_3F(PO_4)_2$.

- (1)
- As an accessory mineral in various rocks.*

Kim.—Noonkanbah, Hall's Creek.

Mur.—Cue, Poona.

S.W.—Dangin, Dilling, Gooseberry Hill, Mahogany Creek.

Rocks recorded as having over 1% Apatite are from:—

Kim.—Noonkanbah.

N.W.—Irregully Creek, Lockyer's Gap, Sherlock River.

S.W.—Dilling, Clackline, Ewington, Jitarning, Ravensthorpe, Wilga.

Cen.—Binduli, Hell's Gates, Kalgoorlie, Lake Cowan (east of) Mt. Monger, Mt. Holmes, Southern Cross, Coolgardie, Londonderry, Westonia.

Euc.—Fraser Range.

- (2) *In pegmatites.*
 N.W.—Mt. Francisco, Wodgina, Pilgangoora, Yinnietharra.
 Mur.—Coodardy (manganapatite).
 S.W.—Greenbushes, Holleton, Westonia.
- (3) *As a secondary concentration in rock adjacent to pegmatite Veins.*
 N.W.—Wodgina.
 Mur.—Melville.
 S.W.—Mullalyup.
 Euc.—Esperance.
- (4) *In sediments as detrital grains.*
- (5) *Concretionary nodules and impregnations in sediments:*
 Kim.—Texas Station.
 N.W.—Dead Finish, Wandagee Station.
 S.W.—Dandarragan, Gantheaume Bay, Gingin, Hill River (Emu Hill), Yathroo.
 Cen.—Mt. Russell.
- (6) *As a petrifying agent of fossil wood of Cambrian and Cretaceous Ages.*
 Kim.—Texas Station.
 S.W.—Dandarragan, Gantheaume Bay, Gingin.
- (7) *Phosphatised limestone of guano islands.*
 S.W.—Abrolhos Islands.
 Euc.—Recherche Archipelago.

APHROSIDERITE: See under *Chlorite*.

ARAGONITE: CaCO_3

- (1) *Metalliferous veins above water-level.*
 N.W.—Kumerina, Ilgarere, Yinnietharra.
- (2) *Nodules on edges of salt lakes.*
 Cen.—Lake Barlee (Lake Austin).
- (3) *Mud-like deposits in brackish lakes.*
 S.W.—Lake Clifton, Rockingham, Koojee Lake, ?Juree Station.

ARGENTITE: Ag_2S

- (1) *Argentiferous lead ores.*
 Kim.—Grant's Creek, Hall's Creek, Ord River Station, Pantou River, Upper Pentecost River.
 N.W.—Bamboo Creek, Cooglegong, Lennons, Lyndon, Marble Bar, Mt. Augustus, Mt. Edith, North Pole, Tambourah, Uaroo, Warrawagine, Whim Creek.
 Mur.—Horseshoe, Yalgoo.
 S.W.—Eyre Range.
 Cen.—Grosmont, Wilson's Patch.

(2) *Argentiferous Copper Ores.*

N.W.—Chiritta Station, North Shaw, Roebourne, Uaroo, Wodgina.

S.W.—Arrino, Northampton.

ARSENIC, NATIVE: As

Cen.—Kalgoorlie.

ARSENOPYRITE: FeAsS

(1) *Associated with tin and non-auriferous veins.*

Kim.—Clara Hill.

Mur.—Meekatharra.

S.W.—Greenbushes, South Bindoon.

Cen.—Coolgardie, Edward's Find, Kalgoorlie.

(2) *Associated with gold.*

Kim.—Mt. Dockrell, Ruby Creek, Hall's Creek.

N.W.—Bamboo Creek, Marble Bar, Middle Creek, Mt. De Courey, Pulleunah Hill, Station Peak, Tambourah, Wodgina.

Mur.—Abbotts, Coodardy, Cue, Field's Find, Garden Gully, Lennonville, Meekatharra, Mt. Maitland, Wadgin-garra, Warriedar.

S.W.—Kundip, Retaliation, Rothsay, Yalgoo.

Cen.—Binduli, Bonnievale, Carbine, Cave Rocks, Colreavy, Coolgardie, Day's Find, Edwards Find, Flynn's Find, Golden Ridge, Golden Valley, Goongarrie, Kalgoorlie, Kanowna, Kunanalling, Laverton, Lawlers, Logans, Marvel Loch, Marda, Menzies, Mt. Monger, Mt. Palmer, Niagara, Ora Banda, Paddington, Paris, Randedls, Sandstone, Southern Cross, Spargoville, Wiluna, Youanmi.

Euc.—Norseman.

ASBOLITE: Cobaltiferous *Psilomelane*, which see.ATACAMITE: $\text{Cu}_2(\text{OH})_3\text{Cl}$

Kim.—Elvire River, Water Point.

N.W.—Dalgety Downs, Ilgarere, Kumerina, Marble Bar, Mardiman Creek, Mt. Agnes, North Pole, Nullagine River, Uaroo, Whim Creek.

Mur.—Twin Peaks.

S.W.—Hamersley Gorge, Ravensthorpe.

Cen.—St. Ives.

Euc.—Norseman, Peninsula.

ATOPITE: $\text{Ca}_2\text{Sb}_2\text{O}_7$

Cen.—Wiluna.

AUGITE: $\text{CaMgSi}_2\text{O}_6 + \text{Fe}''\text{Al}_2\text{SiO}_6$

A major constituent of many basic types of rock.

AUTUNITE: $\text{Ca}(\text{UO}_2)_2(\text{PO}_4)_2 \cdot 8\text{H}_2\text{O}$

N.W.—Wodgina (very rare).

AXINITE: $\text{HFeCa}_2\text{Al}_2\text{B}(\text{SiO}_4)_4$

Kim.—Munja Station, Talbot Bay.

Mur.—Weld Range.

Cen.—Kalgoorlie.

AZURITE: $\text{Cu}_3(\text{OH})_2(\text{CO}_3)_2$

Kim.—Mt. Nellie, Panton, Pentecost River, Wyndham, Alice Downs Station.

N.W.—Braeside, Gorge Creek, Middle Creek, Mons Cupri, Mt. Stuart, North Pole, North Shaw, Uaroo, Warrawoona, Westons, Whim Creek, Yandicoogina, Dalgety Downs Stations, Ilgarere.

Mur.—Carlaminda, Cue, Gabanintha, Garden Gully, Payne's Find, Paynesville, Twin Peaks, Chunderloo (Meekatharra), Warriedar.

S.W.—Arrino, Carragarup, Geraldine, Hamersley Gorge, Hatter's Hill, Kojarena, Kundip, Mt. Desmond, Narrattarra, Northampton, Ravensthorpe, Rothsay, Wongan Hills.

Cen.—Bullfinch, Comet Vale, Coolgardie, Goongarrie, Higginsville, Kathleen Valley, Koolyanobbing, Leonora, Mulline, Murrin, Sir Samuel, Southern Cross, Waverley, Marda.

Euc.—Dundas, Norseman.

BARITE: BaSO_4

Kim.—Argyle Downs, Cockatoo Spring (Mt. Hensman), Mabel Downs, Mt. Amy, Turkey Creek, "Wyndham District," Yampi Sound.

N.E.—Throssel Range.

N.W.—Ashburton Downs Station, Cossack, Eastern Creek, Gorge Creek, Henry River, Kangan Station, Jimblebah, Manberry Station, Morton's Claypan, Mt. Edgar, Mt. James Station, Mt. Mortimer, North Pole, Nullagine, Pig Well, Roy Hill, Winning Pool, 23oz. Diggings, Woodlands Station, Mooloo Downs, Yinnie-tharra, Yandicoogina.

Mur.—Boogardie, Chesterfield, Holden's Find, Meekatharra, Wardawarra, Yallalong, Day Dawn.

S.W.—Armadale, Cardup, Collie, Cranbrook, Geraldine, Gosnells, Katanning, Mardella-Mundijong, Mokine, Mullewa, Northampton, Perth, Upper Murray.

Cen.—Baumgarten's Find, Buningonia, Golden Valley, Kalgoorlie, Richardson, Yellowdine.

BAUXITE: Gibbsite or gibbsite and diaspore; often ferruginous.
See under *Gibbsite*.

BENTONITE: See under *Montmorillonite*.

BERAUNITE: $2\text{Fe}'''_3(\text{OH})_3(\text{PO}_4)_2 \cdot 5\text{H}_2\text{O}$
S.W.—Yandan Hill (near Dandaragan).

BERYL: $\text{Be}_3\text{Al}_2(\text{SiO}_3)_6$

Common beryl.

N.W.—Mt. Francisco, Strelley, Tappa, Yinnietharra, Kangan Station, Wodgina (12 miles north-west of), Pilgan-
goora, McPhees Patch (Nullagine).

Mur.—Coodardy, Melville, Mordargo, Poona, "The Glen," via Cue.

S.W.—Balingup, Grass Valley, Greenbushes, Jimperding, Kirup, Mullalyup, Ravensthorpe, Sawyer's Valley, South Bindoon, Toodyay, Yabberup.

Cen.—Londonderry.

Euc.—Bellinger Lakes, Munglinup.

Emerald.

N.W.—Wodgina.

Mur.—Melville, Poona.

Rosterite.

N.W.—Wodgina, Yinnietharra.

Mur.—Melville.

BEUDANTITE and Plumbojarosite: $\text{PbSO}_4 \cdot \text{FeAsO}_4 \cdot 2\text{Fe}(\text{OH})_3$

N.W.—Mt. McGrath (on Mt. Stuart Station, 8 miles north-north-east of Mt. McGrath).

BINDHEIMITE: $2\text{HPbSbO}_4 \cdot 3\text{H}_2\text{O}$

N.W.—Gorge Creek, Mt. Amy.

BIOTITE: Black mica, includes several varieties. Occurs in granites, gneisses, mica schists, etc.

BISCHOFITE: $\text{MgCl}_2 \cdot 6\text{H}_2\text{O}$ (1) *In salt crusts.*

S.W.—Koorda, Rottneſt Island, Three Springs, Wubin Downs.

Cen.—Lake Deborah.

Euc.—Norſeman.

(2) *In earth from ſalinas.*

S.W.—Baandee.

(3) *In efflorescences.*

S.W.—Denmark.

Cen.—Mulline, Yellina Soak.

(4) *In salt-impregnated rocks.*

Mur.—Cue.

Cen.—Kanowna.

BISMITE: Bi_2O_3 or $\text{Bi}(\text{OH})_3$

Mur.—Melville.

Cen.—Ora Banda.

BISMUTH, NATIVE: Bi

(1) *In pegmatite.*

N.W.—Cooglegong, Mt. Franciſco, Wodgina, Yinnietharra.

Cen.—Holleton, Londonderry.

(2) *In auriferous quartz veins.*

N.W.—Salgaſh.

Mur.—Yalgoo, Montague G.M., Warriedar.

S.W.—Rothſay.

Cen.—Burbanks, Comet Vale, Leviathan, Widgiemooltha.

Euc.—Dundas.

BISMUTHINITE: Bi_2S_3

N.W.—Globe Hill, North Pole

Mur.—Melville, Payne's Find, Yalgoo (?)

S.W.—Ravenſthorpe.

Cen.—Niagara.

BISMUTOSPHERITE: $\text{Bi}_2\text{O}_3\text{CO}_3$

N.W.—Cooglegong, Moolyella, Mt. Franciſco, North Pole.
Wodgina, Yinnietharra, Kangan Station.

Mur.—Melville, Payne's Find.

S.W.—McGregor's Find.

Cen.—Niagara.

BLLENDE: (Sphalerite)ZnS

(1) *In lead and copper lodes.*

Kim.—Narlala.

N.W.—Andover, Braeside, Croydon, Marble Bar, Whim Creek.

S.W.—Ajana, Armadale, Cardup, Geraldine, Muncijong, Narra Tarra, Northampton, White Peak.

Cen.—Murrin.

(2) *In gold reefs and lodes.*

Kim.—Brockmans, Grant's Creek.

N.W.—Bangemall, Middle Creek, Wodgina, Yandicoogina.

Mur.—Cuddingwarra, Cue, Melville, Nannine, Payne's Find.

Cen.—Bonnievale, Burbanks, Comet Vale, Coolgardie, Golden Ridge, Jutson's Rocks, Kalgoorlie, Koolyanobbing, Laverton, Lawlers, Leonora, Marda, Menzies, Mulgabbie, Mulline, Nunngarra, Ora Banda, Sandstone, Thatcher's Soak, Wilson's Patch.

Euc.—Norseman.

(3) *Miscellaneous occurrences.*

Mur.—Mulgine.

S.W.—Hamersley River, Toodyay.

Cen.—Mayfield Group (north Yilgarn), Koolyanobbing, Kurrajong Tank.

BORNITE: Cu_5FeS_4

Kim.—Doubtful Bay.

N.W.—Kumerina, Roebourne, Uaroo, Ilgarere, Murchison River (? 10 mile pool).

Mur.—Gabanintha, Mikhaborra.

S.W.—Geraldine, Hamersley Gorge, Kundip, Northampton, Ravensthorpe, Yandanooka.

Cen.—Birrigrin, Bullfinch, Kalgoorlie, Kathleen Valley, Lake Maitland, Murrin.

BOURNONITE: CuPbSb_3

Cen.—Kalgoorlie, Wiluna.

BRENNERITE: Ferruginous variety of *magnesite*, which see.

BROCHANTITE: $\text{Cu}_2(\text{OH})_6\text{SO}_4$

Kim.—Water Point.

N.W.—Braeside, Stockyard Creek.

BROOKITE: TiO_2

N.W.—Wandagee (in sediments).

S.W.—Collie, Gingin.

Cen.—Holleton (in pegmatite).

BYTOWNITE: $\text{Ab}_3\text{An}_7\text{-Ab}_1\text{An}_9$

Occurs in some basic types of rock.

CACOXENITE: $\text{Fe}_2^{+++}(\text{OH})_2 \text{PO}_4 \cdot 4\text{H}_2\text{O}$

S.W.—Bowgada, Noongar, Walebing.

CALAVERITE: AuTe_2

Cen.—Kalgoorlie, Mulgabbie, Ora Banda.

Doubtfully recorded at Bardoc, Black Flag, Broad Arrow, Bulong, Laverton and Red Hill, Cen.

CALCIOSAMARSKITE: Calcareous variety of samarskite, $\text{Y}_2\text{Nb}_2\text{O}_7 + \text{Fe}^{++}\text{U}^{+}\text{Nb}_2\text{O}_7$

N.W.—Hillside Station (Upper Shaw River).

CALCITE: CaCO_3 Abundant in many parts of the State as:—

- A. Travertine coatings on igneous and other lime-bearing rocks.
- B. Calcareous powders, nodules and hardpans in soils.
- C. Marls in swamps and lakes.
- D. Calcareous dune sands and recent coastal limestones.
- E. Coral reefs.
- F. Shell beds.
- G. Chalk.
- H. Hard sedimentary limestones and marbles.
- I. Calcareous shales and sandstones.
- J. Cavern growths.
- K. Vein filling.
- L. Disseminations in carbonated metasomatic greenstones, etc., and auriferous shear zones.
- M. Amygdaloids.
- N. Numerous miscellaneous occurrences.

CARMINITE: $\text{Pb}_3\text{Fe}^{+++}_{10}(\text{AsO}_4)_{12}$

N.W.—Hardy River.

CARPHOSIDERITE: $3\text{Fe}_2\text{O}_3 \cdot 4\text{SO}_3 \cdot 10\text{H}_2\text{O}?$

S.W.—Nabawa (doubtful occurrence).

CASSITERITE: SnO_2

Kim.—Bow River, Federal Downs, Lennard River, Leopold Downs, Mt. Broome, Mt. Dockrell, Richenda River.

N.W.—Abydos, Cooglegong, Eleys, Friendly Creek, Globe Hill, McPhees Range, Moolyella, Mt. Florence, Mt. Francisco, Nullagine, Stannum, Strelley, Tabba Tabba, Thomas River, White Springs Station, Wodgina, Pilgangoora, Yanderra (Yule River), Marble Bar (16 miles east of).

Mur.—Coodardy, Poona, Weld Range.

S.W.—Chittering Valley, Greenbushes, Holleaton, North Dandalup, Smithfield, Nannup, Wagin, Ravensthorpe.

Cen.—Lake Nabberu, Kathleen Valley, Londonderry, Ubini, First Find (6 miles from Bullabulling), Youanmi.

Doubtful occurrences are reported from Doodlakine and Runnymede.

CELESTITE: SrSO_4

Cen.—Kalgoorlie.

CERARGYRITE: AgCl

Visible specimens: Cen.—Kalgoorlie, Menzies, Murrin.

Present in other specimens:

N.W.—Henry River, Karratha, Lenmons, North Pole, Stockyard Creek, Tambourah, Uaroo, Westons, Yandicoogina.

Mur.—Northampton.

Cen.—Comet Vale, Red Hill.

CERUSSITE: PbCO_3

(1) *In lodes of commercial importance as sources of lead ore.*

Kim.—Barker River, Dixon Range, Grant's Creek, Ivanhoe Station, Narlarla, Ord River, Pentecost River, Richenda River, Turkey Creek, Alice Downs.

N.W.—Andover, Bamboo Creek, Braeside, Coorara, Globe Hill, Gorge Creek, Green's Well, Hardy River, Karratha Station, Marble Bar, Mt. Augustus, Mt. De Courcey, Mt. Sholl, Mt. Stuart, Mundong, Nanutarra Station, Uaroo, Whim Creek, Wodgina, Yandicoogina, Towera, Kangan Station.

Mur.—Paynesville.

S.W.—Bremer Bay, Geraldine, Mundijong, Narra Tarra, Northampton, Northern Gully.

(2) *In auriferous quartz veins.*

Kim.—Panton River.

N.W.—Friendly Creek, Middle Creek, North Pole, North Shaw, Tambourah, Nullagine District.

Mur.—Field's Find.

S.W.—Jimperding.

Cen.—Baumgarten's Find, Burbanks, Comet Vale, Menzies, Southern Cross, Wilson's Patch, Mayfield Group.

CERVANTITE: Sb_2O_3

With stibiconite.

(1) *In gold veins.*

N.W.—Mallina, Middle Creek, Mt. Negri, Peeawah, Sherlock River.

Mur.—Mt. Magnet, Mt. Seabrook, Payne's Find, Weld Range.

Cen.—Leonora, Mulline, Nevoria, Wiluna.

(2) *In veins of other types.*

N.W.—Mt. Stuart, Whim Creek.

S.W.—Hamersley Gorge.

CEYLONITE: See *Spinel*.CHALCANTHITE: $\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$

N.W.—Whim Creek.

Mur.—Coodardy.

S.W.—Ravensthorpe.

Cen.—Marvel Loch, Mulline, Murrin, Southern Cross.

CHALCEDONY: Cryptocrystalline quartz and opal.

A common constituent of secondary veins, jasper bars, etc.

CHALCOCITE: Cu_2S

Kim.—Brecknock Harbour, Collier Bay, Denham Station, Doubtful Bay, Forrest River, Table Land Station, Yampi Sound, Alice Downs, Ord River Station.

N.W.—Ashburton Downs, Balfour Downs, Braeside, Chiritta Station, Croydon, Friendly Creek, Glenburgh Station, Glenroebourne, Globe Hill, Hongkong, Ilgarere, Kumerina, Meilga Station, Metawandy Creek, Mt. Palgrave, Nanutarra, North Shaw, Red Hill (Cane River), Red Hill (North), Uaroo, Westons, Whim Creek, Wodgina, Yaraloola Station.

Mur.—Gabanintha, Wadgingarra, Warriedar.

S.W.—Arrino, Geraldine-Ajana, Galena, Kundip, Mt. Misery, Narra Tarra, Northampton, Ravensthorpe, Rothsay, White Peak, Yandanooka.

Cen.—Kalgoorlie, Kathleen Valley, Murrin, Waverley, Marie's Find, Marda.

CHALCOPYRITE: CuFeS_2

(1) *As occasional grains in igneous rocks, with pegmatites (generally basic).*

N.W.—Roebourne, Whim Creek.

S.W.—Coate's Siding, Greenmount, Ravensthorpe, Darkan.

(2) *Minor accessory of auriferous or sometimes non-auriferous quartz reefs and impregnation lodes.*

Kim.—Cape Bougainville, Hall's Creek, Mt. Dockrell, Panton River, Ruby Creek.

N.W.—Fortescue River, Gorge Creek, Hongkong-Pilbara, Marble Bar, Middle Creek, Station Peak, Talga, Tambourah, Warrawoona, Western Shaw, Whim Creek, Yandicoogina, Yinnietharra.

Mur.—Coodardy, Cuddingwarra, Cue, Gabanintha, Garden Gully, Mikhaburra, Mt. Fraser, Mulga-mulga, Nyounda, Payne's Find, Quinns, Yalgoo-Carlaminda, Yaloginda.

S.W.—Armadale, Carrangarrup, Galena, Katanning, Ravenssthorpe, Rothsay, Serpentine, McDonald's Reward Claim.

Cen.—Barrambie, Bronzewing, Burbanks, Clampton, Comet Vale, Coolgardie, Corinthian, Darlot, Davyhurst, Deshon's Find, Diorite King, Edjudina-Yarri, Erlistoun, Feysville, Golden Valley, Jaurdie Hills, Kalgoorlie, Kanowna, Knutsford, Kunanalling, Lang's Rocks, Laverton, Leonora, Marvel Loch, Mt. Ida, Mt. Monger, Mulgabbie, Mulline, Parker's Range, Randall's, Sandstone, Siberia, Sir Samuel, Southern Cross Day's Find, Ennuin, Mayfield group, Riverina, Clampton, Spargoville, Marda.

(3) *Major constituents in pure copper lodes, copper-lead lodes, and copper-gold lodes.*

Kim.—Buonaparte Archipelago.

N.W.—Braeside, Cane River, Croydon, Egina, Kumerina, North Shaw, Roebourne, Uaroo, Whim Creek, Ilgarere.

Mur.—Gabanintha, Wadgingarra.

S.W.—Geraldine, Hamersley Gorge, Kundip-Mt. Desmond, Noraling, Narra Tarra, Northampton, Ravenssthorpe, West River, White Peak, Wongan Hills.

Cen.—Broad Arrow, Kathleen, Mt. Weld, Minnie Creek, Murrin.

CHLORITE: Group name including antigorite, amesite, daphnite, penninite, prochlorite, etc.

Occurs in greenstones, schists, etc.

Determined species.

- (1) *Amesite (clinochlore)*.
S.W.—Ninghanboun Hills.
Cen.—Kalgoorlie, Mt. Monger.
- (2) *Amesite (Corundophilite)*.
S.W.—Holleton.
- (3) *Daphnite*.
Cen.—Kalgoorlie, Mt. Monger.
- (4) *Penninite*.
N.W.—Lionel.
Cen.—Kalgoorlie.
S.E.—Cavenagh Range.
- (5) *Prochlorite*.
Cen.—Kalgoorlie.

CHLORITOID: $H_2Fe''Al_2SiO_7$

Kim.—Collier Bay (and another locality), Yampi Sound.

Mur.—Mt. Magnet.

Cen.—Kalgoorlie.

CHONDRODITE: $Mg_3(F,OH)_2(SiO_4)_2$

N.W.—Bilyarra Pool (Gascoyne River).

CHROMITE: $FeCr_2O_4$

Kim.—Ord River.

N.W.—Cooglegong, Eginbah, Jimblebah (Coobina), Lionel, Nullagine, Soanesville, Byro Station.

Mur.—Garden Gully, Meekatharra, Yalgoo, Murgoo Station.

S.W.—Dowerin, Ninghanboun Hills, Westonia, Bridgetown, York, Burracoppin, Newdegate.

Cen.—Broad Arrow, Buningonia, Comet Vale, Kalgoorlie, Kanowna, Marda, Marvel Loch, Mt. Palmer, Ora Banda.

CHRYSOBERYL: $BeAl_2O_4$

Mur.—Poona.

S.W.—Dowerin.

CHRYSOCOLLA: $CuSiO_3 \cdot 2H_2O$

Kim.—Black Elvire River, Alice Downs.

N.W.—Braeside, Bulla Downs, Cane River, Croydon, Ilgarere, Kumerina, Mons Cupri, Mt. Sholl, Nanutarra, Red Hill, Uaroo, Westons, Whim Creek, Wodgina, Bulloo Downs, Fortescue River.

Mur.—Abbotts, Cue, Dalgety Downs, Gabanintha, Melville, Mulgine, Paynesville, Quinns, Twin Peaks, Wadgingarra, Warriedar, Yaloginda, Meekatharra, Chunderloo.

S.W.—Narra Tarra.

Cen.—Black Range, Chapman's Find, Gum Creek, Kathleen Valley, Lawlers, Mt. Davis, Mt. Varden, Mt. Weld, Murrin, New England, Sir Samuel, Southern Cross, Westonia.

CHRYSOLE: See *Olivine*.

CHRYSOTILE: $H_4Mg_3Si_2O_{10}$

N.W.—Bullock Well, Eginbah, Lionel, Meilga Station, Mt. Satirist Station, Nunyerrie Creek, Roebourne, Sherlock, Soanesville, Strelley River.

S.W.—Balkuling, Ninghanboun Hills.

Cen.—Bulong, Murrin, Siberia.

CINNIBAR: HgS

N.W.—Marble Bar.

CLINOCLORE: Antigorite+amesite.

S.W.—Ninghanboun Hills, Toodyay.

Cen.—Kalgoorlie, Monger, Londonderry.

CLINOZOISITE: $HCa_2Al_3Si_3O_{13}$

N.W.—Jimblebah (?), Roebourne.

Mur.—Geraldine, Youanmi.

S.W.—Dinninup, Bunning's Mill.

Cen.—Kalgoorlie.

S.E.—Cavenagh Range.

COBALTITE: $CoAsS$

N.W.—Glenroebourne.

S.W.—Hamersley Gorge, Kundip, Ravensthorpe.

COHENITE: Fe_3C or $(Fe, Ni)_3C$

Found in several meteoritic irons.

COLLOPHANITE: $Ca_3(PO_4)_2 \cdot H_2O$

Euc.—Christmas Island (Recherche Archipelago).

COLORADOITE: $HgTe$.

Cen.—Kalgoorlie.

COLUMBITE: $(\text{Fe}, \text{Mn}) (\text{Nb}, \text{Ta})_2 \text{O}_6$ *Columbite (Ferrocolumbite).*

N.W.—Abydos, Carlindi, Cooglegong, Eastern Creek (not G.M. centre, branch of Yule River), Hillside, McPhees Range, Pinnacle Hill, Pippingarra, Stannum, Strelley, Tabba, Western Shaw, Wodgina, McPhee's Patch.

Mur.—Lake Monger.

S.W.—Balingup, Jimperding, Greenbushes, Smithfield.

Cen.—Spargoville.

Manganocolumbite.

Kim.—Mt. Dockrell.

N.W.—Cooglegong, Eastern Creek, Lalla Rookh, McPhees Range, Moolyella, Mt. Francisco, Tabba, Talga, Wodgina, Yinnietharra, Marble Bar (10 miles east of).

Mur.—Coodardy, Poona.

S.W.—Mt. Dale, Ravensthorpe, Jerramungup.

Cen.—Coolgardie, Gibraltar, Londonderry, Ubini, Bullabulling (26 miles west Coolgardie).

Euc.—Bellinger.

COPIAPITE: $\text{Fe}'''_4(\text{OH})_2(\text{SO}_4)_3 \cdot 16\text{H}_2\text{O}$

N.W.—Glen Ross.

S.W.—Mt. Erin, Yeetar Spring.

Cen.—Boulder, Corinthian G.M., Bullfinch (Copperhead Syn.).

COPPER, NATIVE: Cu

Kim.—Denham Station, Elvire River.

N.W.—Bulla Downs, Glenroebourne, Uaroo, Whim Creek.

Mur.—Wadgingarra.

S.W.—Geraldine, Greenmount, Northampton, Ravensthorpe, Rothsay, Yandanooka.

Cen.—Comet Vale, Coolgardie, Gum Creek, Linden, Mt. Ida, Murrin, Paris, Sir Samuel, Sandalwood Rock.

COQUIMBITE: $\text{Fe}'''_2(\text{SO}_4)_3 \cdot 9\text{H}_2\text{O}$

N.W.—Millstream Station, Wooramel Gorge.

Mur.—Coodardy.

S.W.—Kitchanning Brook, Northampton.

Cen.—Kalgoorlie, Bullfinch (Copperhead Syn.).

CORDIERITE: $Mg_2Al_4Si_2O_{18}$

- (1)
- In Pegmatites*
- (fresh and micaceous pseudomorphs).

Mur.—Melville.

S.W.—Cowaramup Bay, Imperding.

Cen.—Holleton, Westonia.

- (2)
- In gneiss*
- (fresh or micaceous pseudomorphs).

S.W.—Albany, Geraldine, Toodyay, Mingenew.

CORUNDOPHILITE: See *Chlorite*.CORUNDUM: Al_2O_3

- (1)
- Crystallised corundum*
- .

Kim.—Two doubtful localities.

N.W.—Abydos, Shaw River, White Springs.

Mur.—Melville, Mordargo.

S.W.—Balbarrup, Chittering, Cuballing, Cubbine, Dangin, Greenbushes, Jacob's Well, Moora, Tenterden, Toodyay, Walpole Inlet, Nannup.

Cen.—Burbanks, Burbidge, Gibraltar, Marvel Loch, Nevoria, Southern Cross, Ubini, Yelina District.

- (2)
- Emery*
- .

Kim.—Mt. Rose, Richenda River.

N.W.—Roebourne.

S.W.—Manjimup.

COVELLITE: CuS

N.W.—Braeside.

Mur.—Burnakura, Mikhaburra, Yaloginda.

S.W.—Arrino, Hamersley Gorge, Kundip, Mt. Desmond, Northampton, Ravensthorpe, Warriear.

Cen.—Barrambie, Bronzewing, Kalgoorlie, Kathleen Valley, Mt. Monger, Wombola, Yarri, North Yilgarn G.F. (Millar's Find, Koolyanobbing, Bullseye G.M., Bagdagleo G.M.).

CROCIDOLITE: Asbestiform variety of *Riebeckite*, which see.CROCOITE: $PbCrO_4$

S.W.—Westonia.

Cen.—Comet Vale, Cosmo Newberry, Larkinvile, Menzies, Mulgarrie.

CUBANITE: $CuFe_2S_4$

Cen.—Kalgoorlie (doubtful).

CUMMINGTONITE: $(\text{Fe,Mg})_7\text{Si}_8\text{O}_{22}(\text{OH})_2$

Mur.—Warriedar.

S.W.—Dowerin, Ninghanboun Hills.

CUPRITE: Cu_2O

Kim.—Elvire River, Lansdowne Station, Tarraji, Water Point, Wyndham, Alice Downs.

N.W.—Bulla Downs, Cane River, Croyden, Glenroebourne, Ilgarere, Jimblebah, Kumerina, Lennons, Metawandy Creek, North Pole, North Shaw, Station Peak, Tambourah, Uaroo, Warrawoona, Whim Creek, Yannery Hill, Yaraloola.

Mur.—Gabanintha, Twin Peaks, Wadgingarra, Weld Ranges, Yaloginda, Meekatharra (16 miles west of).

S.W.—Hamsley Gorge, Kundip, Mt. Desmond, Ravens-thorpe, Wongan Hills.

Cen.—Bellchambers, Coolgardie, Gum Creek, Kathleen Valley, Murrin.

DAPHNITE: See *Chlorite*.DAUBRÉEITE: $\text{Bi}_2\text{O}_3(\text{OH})_6\text{Cl}_3$

Mur.—Mulgine.

Cen.—Montague.

DELESSITE: See *Chlorite*.DESCLOIZITE: $\text{PbZn}(\text{OH})\text{VO}_4$

N.W.—Braeside.

DIALLAGES: See *Diopside*.

DIAMOND: C

N.W.—Nullagine.

DIASPORE: $\text{Al}(\text{OH})\text{O}$ (1) *In emery*.

Kim.—Mt. Rose, Richenda River.

S.W.—Dangin.

(2) *In laterites*.S.W.—Bakers Hill, Gooseberry Hill, Toodyay, Quairading, Dangin (for other possible localities, see under *Gibbsite*).DIATOMITE: See *Opal*.

DIHYDRITE: (*Pseudomalachite*) $\text{Cu}_2(\text{OH})_4(\text{PO}_4)_2$

Kim.—Collier Bay.

S.W.—Watheroo.

DIOPSIDE: $\text{CaMg}(\text{SiO}_3)_2$

- (1)
- Primary constituent of igneous rocks.*

Kim.—Mt. Cedric, Mt. North and other localities in the Fitzroy Valley.

Mur.—Barlowerie Peaks, Cue, Milgo.

S.W.—Bunker Bay, Cape Gosselin (pigeonite and diopside), Greenbushes.

Cen.—Kalgoorlie, Mungari, Nevoria, Niagara, Ora Banda, Paris (pigeonite and diopside), Parker's Range, Robinson Hill, Youanmi.

Euc.—Norseman (pigeonite and diopside).

S.E.—Blackstone Range, Cavenagh Range (pigeonite and diopside).

- (2)
- In pegmatoid veins and schlieren.*

Mur.—Coodardy, Wadgingarra.

S.W.—Baker's Hill, Lower Chittering, Westonia.

Cen.—Davyhurst, Larkinvile, Marvel Loch, Nevoria.

- (3)
- In highly metamorphosed dolomites and related rocks.*

N.W.—Yinnietharra.

S.W.—Toodyay.

Cen.—Edward's Find, Logans.

DOELTERITE: H_2TiO_3

S.W.—Baker's Hill, Churchmans Brook, Dangen, Greenbushes, Guppys, Kalamunda, Kojonup, Little Jumperdine Hill, Quindanning, Sawyers Valley, Toodyay, Walebing, Walliston, Wongan Hills, Wooroloo, Burra-coppin.

DOLOMITE: $\text{Ca,Mg}(\text{CO}_3)_2$

- (1)
- Dolomite in metasomatic greenstones.*

N.W.—Bamboo Creek, Brown Creek, Lalla Rookh, Warrawoona.

Mur.—Gabanintha, Meekatharra, Reedys.

Cen.—Bullfinch, Carbine, Coolgardie, Kalgoorlie, Kanowna, Leonora, Mt. Goddard, Mt. Hilda, Nevoria, Ora Banda, Parker's Range, Southern Cross, Wiluna 28 m.p., Westonia.

(2) *Dolomite in fissure veins.*

Kim.—Hall's Creek.

N.W.—Bamboo Creek, Bangemall, Lalla Rookh, Lionel, Soanesville.

Mur.—Gabanintha, Jasper Hill, Meekatharra, Mikhaburra, Mt. Magnet, No. 36 Well north of Meekatharra.

S.W.—Collie, Warriedar.

Cen.—Bullfinch, Carbine, Coolgardie, Kalgoorlie, Kanowna, Leonora, Mt. Goddard, Mt. Hilda, Nevoria, Ora Banda, Parker's Range, Southern Cross, Wiluna.

(3) *Dolomite in magnesian limestones.*

Kim.—Greenvale Station, Mt. Pierre Range.

N.W.—Bangemall, Barlee Ranges, Bilyarra Pool, Brown Creek, Cane River, Carawine Pool, Coorara Clay Pan (Mt. Edith), Dead Finish No. 2, Hamersley Range, Hardy River, Henry River, Irregully Creek, Kurabuka Creek, Manberry Station, Meilga, Mt. James Station, Mt. Price, Onslow, Red Hill North, Roebourne, Seeret (Wandarray) Creek, Top Camp, Thomas River (Yinnietharra Station), Uaroo, Wannery Creek, Warawoona, Westons, Yannarie River.

S.W.—Abrolhos Islands, Busselton, Claremont, County Peak, Dartmoor, Fitzgerald River, Hamersley Gorge, Highbury, Kojonup, Kokatea Creek, Kununoppin, Tingerup.

Cen.—Bulong, Kanowna, Kimberley Range, Weld Springs, West Creek.

Euc.—Dundas, Madura, Naretha, Norseman.

(4) *Dolomite concretions in soils, etc.*

Mur.—Maynards, Meekatharra.

S.W.—Gabbins, Nyabing.

Cen.—Broad Arrow, Kanowna, Mt. Burges.

Euc.—East Dowak.

(5) *Miscellaneous.*

Mur.—Meekatharra District.

DRAVITE: $\text{H}_3\text{NaMg}_4\text{Al}_3\text{B}_4\text{Si}_8\text{O}_{41}$

A variety of tourmaline. See under *Tourmaline*.

DUFRENITE: $2\text{FeO} \cdot 5\text{Fe}_2\text{O}_3 \cdot 2\text{P}_2\text{O}_5 \cdot 7\text{H}_2\text{O}$

N.W.—Brickhouse Station, Manberry Station, Mia Mia Station, Wogoola Station.

Mur.—Moonyoonooka.

S.W.—Dandarragan, Gingin, Hill River.

EASTONITE: See under *Biotite*.

ELBAITE: $\text{H}_2\text{NaLi}_2\text{Al}_{10}\text{B}_4\text{Si}_5\text{O}_{41}$

A variety of tourmaline. See under *Tourmaline*.

ELECTRUM: AuAg

S.W.—Donnybrook.

Cen.—Yundamindera.

EMMONSITE: $\text{Fe}_2\text{O}_3 \cdot 4\text{TeO}_2 \cdot \text{H}_2\text{O}$ (?)

Cen.—Kalgoorlie (doubtful).

EMERALD: See under *Beryl*.

ENARGITE: Cu_3AsS_4

Cen.—Kalgoorlie, Mulgabbie.

ENSTATITE: MgSiO_3

Occurs in some basic rocks.

EPIDOTE: $\text{HCa}_2(\text{Al,Fe})_3\text{Si}_3\text{O}_{13}$

Occurs in many different types of rocks.

EPSOMITE: $\text{MgSO}_4 \cdot 7\text{H}_2\text{O}$

Kim.—Palm Springs (near Ruby Creek).

N.W.—Alunite Gully (Chichester Range), Nullagine.

Mur.—Callytharra Spring, Meekatharra, Yalginda.

S.W.—Beverley, Collie River, Fields Find, Hamersley Ra., Hoffman Mill, Irwin, Kalgan River, Kondinin, Koor-da, Parkerville, Northampton, Ravensthorpe, Westonia, Wurrachuppin.

Cen.—Dunnsville, Goongarrie, Kalgoorlie, Kanowna, Marvel Loch, Mulline, Nevoria, Yelina Soak.

ERYTHRITE: $\text{Co}_3(\text{AsO}_4)_2 \cdot 8\text{H}_2\text{O}$

N.W.—Roebourne.

S.W.—Hamersley Gorge, Kundip, Ravensthorpe.

Cen.—Waverley (Siberia).

EUXENITE: $\text{YT}_2\text{NbO}_6 (+\text{CaTiNb}_2\text{O}_8)$

S.W.—Mt. Dale.

Euc.—Fraser Range.

EVANSITE: $\text{Al}_3(\text{OH})_6\text{PO}_4\cdot 6\text{H}_2\text{O}$ See *Variscite*.

Euc.—Salisbury Island (Recherche Archi.)

FAYLITE: Fe_2SiO_4

S.W.—Burgess Find.

FERBERITE: FeWO_4

Kim.—Clara Hill (Napier Downs).

N.W.—Friendly Creek, Roebourne, 20-mile Sandy Creek, Wodgina (?).

Mur.—Abbotts, Callie Soak, Coodardy, Melville, Nicholson Range, Northern Gully, Poona, 26 mi. west Cue.

S.W.—Boyagarra, Geraldine, Grass Valley, Jimperding, Mulgine, Warriedar, Westonia, Yandanhoo Hills.

Cen.—Mt. Malcolm, Ora Banda, Parker's Range.

FERGUSONITE: *Yttrotantalite*, which see.FERRIMOLYBDITE: $\text{Fe}_2\text{O}_3\cdot 3\text{MoO}_3\cdot 8\text{H}_2\text{O}$

N.W.—Mt. Francisco, West Wodgina.

Mur.—Mulgine.

S.W.—South Bindoon, Spencer's Brook, — Clackline.

FERRITUNGSTITE: $\text{Fe}_2\text{O}_3\cdot \text{WO}_3\cdot 6\text{H}_2\text{O}$

Kim.—Clara Hill (Napier Downs).

N.W.—Friendly Creek, Wodgina.

Mur.—Melville, Mulgine.

S.W.—West River.

Central.—Coolgardie, Ora Banda, Westonia.

FIBROFERRITE: $\text{Fe}'''(\text{OH})\text{SO}_4\cdot \text{SH}_2\text{O}$

S.W.—Yeetar Spring.

FLUORITE: CaF_2 (1) *In granite and related rocks.*

N.W.—Globe Hill,

Mur.—Mulgine, Poona.

S.W.—Waddouring.

Cen.—Mulwarrie, Youanmi.

Euc.—Mt. Norcote, Mt. Ridley.

S.E.—Barlee Springs.

(2) *In lead veins.*

Kim.—Argyle Downs Stn., Dixon Range, Mt. Amy, Speewah Stn., (Denham River), Turkey Creek, 100 miles south Wyndham.

N.W.—Cooglegong, Cooke's Creek, McPhees Range, Sandy Creek.

S.W.—Cardup, Mundijong, Jarrahdale.

(3) *Miscellaneous.*

Cen.—Kalgoorlie.

S.E.—Warburton Range.

FORSTERITE: Mg_2SiO_4

Kim.—Elvire-Panton Junction, Margaret River, Mt. Lyell.

N.W.—Bamboo Creek, Mt. Francisco, Sherlock River, Station Peak.

S.W.—Geraldine, Rothsay.

Cen.—Bulong, Gibraltar, Golden Ridge, Kalgoorlie, Laver-ton, Monger, Neckersgat Range, St. Ives, Southern Cross, Westonia.

Euc.—Lake Cowan.

S.E.—Bentley Hill, Blackstone Range, Cavenagh Range.

FUCHSITE: Chromiferous variety of *muscovite*.

Kim.—Fitzroy Crossing, Shoal Bay.

N.W.—Milly Milly, Mt. Francisco, Nicol River, Nullagine, Sherlock Station, Talga Talga, Warrawoona.

Mur.—Meekatharra, Melville, Mikhaburra (Holden's Find), Mt. Magnet, Mt. Singleton, Reedy.

S.W.—Grass Valley, Goomalling, Greenbushes, Hamersley River, Hester, Mt. Desmond, Mt. Gibson, Namban, Northam, Phillips River, Porongorups, Ravensthorpe, Rothsay, Toodyay, Jimperding, Newdegate District, Dangin.

Cen.—Barrambie, Binduli, Burbanks, Celebration, Coolgardie, Eristoun, Gibraltar, Gilgi, Kalgoorlie, Kanowna, Lark-inville, Leonora, Lennonville, Marvel Loch, Menzies, Middlesex, Mt. Caudan, Murrin, Parker's Range, Moorine Rock, Marda, Millar's Find.

GADOLINITE: (A) $Be_2Fe''Y_2Si_2O_{10}$. (B) $Be_2Fe''Y_2Si_2O_{10}(+H_2O?)$.

N.W.—Abydos, Bullock Well, Cooglegong.

Mur.—Payne's Find.

GAHNITE: ZnAl_2O_4 (1) *In pegmatite or quartz.*

N.W.—Wodgina.

S.W.—Lower Chittering, Gillingarra, Greenbushes, Smithfield.

Cen.—Nevoria.

(2) *In metasediments.*

S.W.—Chittering (lower), Gillingarra.

(3) *In alluvium and eluvium.*

N.W.—Wodgina.

S.W.—Chittering (lower), Gillingarra, Greenbushes, Smithfield.

GALENA: PbS .(1) *Galena as a major constituent of lead lodes.*

Kim.—Argyle Downs Station, Barker River, Denham River (Speewah Station), Dixon Range, Fossil Downs Station, Mt. Amherst, Mt. Dowera, Mulla Mulla Station, Narlarla, Osmund Creek, Pentecost River, Speewah Station, Turkey Creek, Fitzroy Crossing, Hall's Creek (38 miles north of), Mt. Dockrell.

N.W.—Braeside, Andover, Balmoral Station (Eramurra Pool), Bangemall, Black Hill-Mt. Edith-Mt. MacGrath-Mt. de Courcy, Cane River, Cooglegong, Cook's Creek, Godfrey Range, Gorge Creek, Green's Well, Hardey River, Jimblebah, Kurabuka Creek, Lyndon Station, Mallina, Marble Bar, Maroona Station, Monte Carlo, Mt. Augustus (McCarthy's Find), Mt. de Courcy, Mt. Edith, Mt. Elizabeth, Mt. Enid (Walleen Station), Mt. McGrath, Mt. Palgrave, Mt. Price, Nanutarra, North Pole, Nullagine, Robe River, Sandy Creek, Sherlock River, Station Peak, Tabba, TOWERA Station, Turner Creek, Uaroo-Mt. Alexander, Warrawagine Station, Wodgina, Whim Creek, Woodstock Station, Wyloo Station, Yannarie River.

Mur.—Dalgety Downs Station, Yalgoo, Mt. Narryer.

S.W.—Ajana-Geraldine, Armadale, Blackwood River, Cardup-Mundijong, Culham, Eyre Range, Harvey, Jarradale, Narratarra, Northampton, Northern Gully, Serpentine.

Cen.—Koolyanobbing.

(2) *Galena as a minor constituent of gold ores.*

Kim.—Brockmans, Halls Creek, Mary River, Mt. Dockrell, Panton-Grant's Patch, Ruby Creek, Willy Willy, Forrest River, Wyndham (100 miles south of).

N.W.—Bamboo, Friendly Creek, Gorge Creek, Hardey River, Hongkong, Jimblebah, Lalla Rookh, Marble Bar, Middle Creek, Mt. Mortimer, North Shaw, Pulleunah Hill, Roebourne, Talga, Tambourah, Warrawoona, Western Shaw, Yandicoogina, Mellenbye Station.

Mur.—Burnakura, Coodardy, Cue, Cuddingwarra, Gnows Nest, Holden's Find (Mikhaburra), Horseshoe, Melville, Mt. Farmer, Mt. Fraser, Mt. Maitland, Nannine, Payne's Find, Yalgoo.

S.W.—Jimperding, Kundip, Williams.

Cen.—Barrambie, Bonnievale, Broadarrow, Bullfinch, Burbanks, Carbine, Comet Vale, Coolgardie, Diorite King (Mt. Stirling), Ennuin, Freeman's Find, Golden Ridge (Waterfall), Jutson's Rocks, Kalgoorlie, Kanowna, Kunanalling, Laverton, Lawlers, Leonora, Londonderry, Marda, Marvel Loch, Melita, Menzies, Monger, Mulline-Ularring, Mulwarrie, Ora Banda, Sandstone, Southern Cross, Teutonic Well, Ulrich Range, Wilson's Patch, Yerilla, Marie's Find, Koolyanobbing, Mayfield Group, Die Harty, Westonia.

Euc.—Norseman.

GARNET: See also *almandine*, *andradite*, *grossularite*, *spessartite*, *pyrope*, etc.

(1) *Garnet in metamorphic greenstones.*

Kim.—Cascade Bay.

N.W.—Mt. James Station, Tappa.

Mur.—Coodardy, Jasper Hill, Peak Hill, Poona, Yuin.

S.W.—Black Head, Chittering Valley (Lower), Chittering Valley (Middle), Frankland River, Greenbushes, Jimperding, Kununoppin, Nornalup, Pemberton, Ravenshorpe, Retaliation, Warren River, York, Toodyay, Clackline.

Cen.—Coolgardie, Doyle's Well, Goddard's Lake, Larkinsville, Londonderry-Burbanks, Mulline-Morley's Find, Southern Cross, Corinthian, Bullfinch.

Euc.—Munglinup, Young River.

(2) *Garnet in granitic gneiss.*

S.W.—Albany, Arrino, Augusta-Cape Leeuwin, Balkuling, Brown's Table Hill, Cape Naturaliste-Yallingup, Chittering Valley (Lower), Chittering Valley (Upper), Clackline, Collie, Dangin, Ellensbrook, Grass Valley, Jennapullen, Moora, Quairading, White Peak, Wongamine, Yandanooka, York.

Cen.—Buninginia, Fraser Range, Goddard's Creek (Panton River), Pingin, Newman's Rocks.

S.E.—Barrow Range, Cohn Hill, Mt. Aloysius, Mt. Gosse, Mt. Waugh, Scamp Hill.

(3) *Garnet in metasediments.*

Kim.—Devil's Pass, Hawkestone Creek.

N.W.—Uaroo.

S.W.—Gillingarra, Kendenup, Quairading.

Cen.—Horse Rocks, Larkinville, Parker's Range, Southern Cross, Toomeys Hills, Westonia.

(4) *Garnet in pegmatite.*

N.W.—Cooglegong, Eleys, Globe Hill, McPhees Range, Mt. Francisco, Western Shaw, Yinnietharra (andradite).

Mur.—Jasper Hill, Payne's Find, Poona, Yaloginda, Coordardy.

S.W.—Chittering (Lower), Greenbushes, Jimperding, Mulalyup, Narra Tarra.

Cen.—Bullabulling, Gibraltar, Holleton, Mt. Palmer, Niagara, Parker's Range, Nepean Rocks.

Euc.—Bremer Range.

(5) *Garnet in other or unknown matrices and in sands.*

Kim.—Turkey Creek.

N.W.—Mt. Satirist, Woodstock, Yinnietharra, Mt. Gascoyne.

Mur.—Wurarga.

S.W.—Brunswick, Bunbury, Denmark, Donnybrook, Fitzgerald River, Gabbin, Greenhills, Hatter's Hill, Katanning, Kirup, Lake Brown, Lake Kathleen, Lake King, Manjimup, Needling Hill, Northam, Ogilvie, Warren River, Wongan Hills, York, Greenbushes, Augusta, Coleman Inlet, Nannup, Boranup, Wilsons Inlet.

Cen.—Boddalin.

Euc.—Young River.

GEARKSUTITE: $\text{CaF}_2 \cdot \text{Al}(\text{F}, \text{OH})_3 \cdot \text{H}_2\text{O}$

S.W.—Gingin.

GEDRITE: $\text{H}_2\text{Mg}_2\text{Si}_8\text{O}_{24} + \text{H}_2\text{Mg}_4\text{Al}_6\text{Si}_2\text{O}_{24}$

See *Anthophyllite*.

GIBBSITE: (and *Bauxite*). $\text{Al}(\text{OH})_3$

- (1) A.
- In Bauxite duricrusts, total Al_2O_3 over 40%.*

S.W.—Boddington, Clackline, Dwellingup, Glen Forrest, Hoddy's Well, Kalamunda, Mahogany Creek, Quindanning, Sawyers' Valley, Toodyay, Wannamal, Wongan Hills, Wooroloo, Dinninup, Boyup Brook.

- (1) B.
- In Bauxite duricrusts, total Al_2O_3 under 40%.*

S.W.—Baker's Hill, Bickley, Bolganup, Bolgart, Churchman's Brook, Collie, Dangin, Donnybrook, Gooseberry Hill, Greenbushes, Greenmount, Kellerberrin (Minkadine Hills), Kojonup, Nornalup, Walebing, Kalamunda, Nungarin, Bowelling (15 miles south of), Boyup Brook.
Cen.—Comet Vale, Kalgoorlie, Nevoria, Ora Banda.

- (2)
- In loose concretionary nodules in soil.*

Mur.—Dartmoor.

S.W.—Clackline, Denmark, Gingin, Goomalling, Nornalup, and many other localities of which no detailed information is available.

- (3)
- With almost pure limonite and hematite*
- See under
- Limonite (Goethite)*
- and
- Hematite*
- .

- (4)
- Miscellaneous.*

S.W.—Chinganning Gully (S.W. of Mundaring).

GLADITE: $2\text{PbS} \cdot \text{Cu}_2\text{S} \cdot 5\text{Bi}_2\text{S}_3$

N.W.—Yinnietharra (?).

GLAUBERITE: $\text{Na}_2\text{Ca}(\text{SO}_4)_2$

Cen.—Kalgoorlie.

GLAUCONITE: $\text{KMgFe}'''_3(\text{SiO}_3)_6 \cdot 3\text{H}_2\text{O}$

- (1)
- In marine sediments.*

Kim.—Mt. Abbott (?).

N.W.—Cape Peron, Carnarvon, Davis River, Manberry Station, Marilla Station, Mia Mia Station, Spinifex Well, Winnigin Station.

S.W.—Billieutherra Well, Dandaragan, Donnybrook, Gantheaume Bay, Gingin, Hill River, Jarrahwod, Moora, Perth Quindalup.

Cen.—Lake Carnegie, Jimperley Range.

Euc.—Madura, Munglinup, Young River area.

- (2)
- In steam holes in lavas.*

Kim.—Prince Regent River.

GLAUCOPHANE: $\text{H}_2\text{Na}_2\text{Mg}_2\text{Al}_2(\text{SiO}_3)_8(+\text{H}_2\text{Fe}_7''\text{Si}_8\text{O}_{24})$

Kim.—Synnott Creek.

Mur.—Mt. Gould.

S.W.—Greenbushes.

Cen.—Ubini.

GOETHITE: $\text{Fe}'''(\text{OH})\text{O}$ (1) *Crystallised goethite.*

Kim.—Carr Boyd Range.

N.W.—Balfour Downs, Nullagine, Shark's Gully, Tambourah, Yilgolong Creek, Upper Yule River.

Mur.—Wilgie Mia.

S.W.—Dinninup, Jimperding, Ninghamboun Hills, Noggerup, Northampton, Waroona, Wongamine, Wongan Hills, Chinganning Gully (7 miles south Koojadda).

Cen.—Mt. Jackson.

(2) *Pseudomorphs after pyrite and marcasite.*

Kim.—Bertha Peak, Richenda River.

N.W.—Alunite Gully (Chichester Range), Balfour Downs Station, Coapooey Station, Harding River, Just in Time, Millstream Station, Mt. Augustus Station, Mt. Trew, Nullagine, Tableland, Warrawoona.

Mur.—Dalgety Downs, Poona, Quinns, Wandarri.

S.W.—Coppermine Creek, Gantheaume Bay, Mingenew.

Cen.—Black Flag, Bulong, Kanowna, Laverton, Menzies, Mt. Palmer, Siberia, Smithfield.

(3) *Limonitic lode outcrops—gossans.*

N.W.—Bangemall, Croydon, Ilgarere, Kumerina, Roebourne, Teano Range, Whim Creek, Wodgina.

Mur.—Gabanintha, Horseshoe, Meekatharra, Warriedar.

S.W.—Kundip, Ravensthorpe, Wongan Hills.

Cen.—Balagundi, Koolyanobbing, Marvel Loch, Mt. Clifford, Mt. Eureka, Mt. Jackson, Mt. Laurence Wells, Mulgabbie, Murrin, Nevoria, Parker's Range.

(4) *Concretionary limonite and limonitic laterite.*

Kim.—Duke's Dome, Grant's Range.

N.E.—Paterson Range.

N.W.—Balfour Downs Station, Box Bluff, Hamersley Range, Lofty Range, Nullagine, Roebourne, Whim Creek, Wodgina.

Mur.—Abbotts, Coodardy, Cuddingwarra, Cue, Melville, Milgoo, Mt. Hill, Mt. Magnet, Munara, Warriedar, Yowergabbie.

- S.W.—Baker's Hill-Coates Siding, Bremer Range, Clackline, Capel River, Carbarup, Corrigin, Dandaragan, Mahogany Creek, Minganew, Denmark, Gillingarra, Gingen, Greenbushes, Narrikup, Redmond, Tenindewa, Walpole, Wannamal, Waroona, Warriedar, Werribee, Wongan Hills, Worsley.
- Cen.—Bardoe, Birrigrin, Bulong, Burtville, Comet Vale, Coolgardie, Cosmo Newberry, Eucalyptus, Hampton Plains, Kalgoorlie, Kookynie-Tampa, Laverton, Lawlers, Leonora, Menzies, Morgans, Mulline, Niagara, Ora Banda, Paddington, Sandstone, Siberia (Waverley), Southern Cross, Ularring, Wangine Soak, Weld Spring, Wiluna, Yerilla.
- Euc.—Norseman.
- (5) *Bog Iron Ore.*
- S.W.—Denmark, Mundijong, Narra Tarra, Perth (Hersdman's Lake), Warbrook.
- Euc.—Esperance.
- (6) *Ochres (for red hematitic ochres see Hematite).*
- Kim.—Forrest River.
- N.W.—Braeside, Cossack, Millstream Station.
- Mur.—Garden Gully, Windamurra.
- S.W.—Balkuling, Busselton, Carbarup, Jarrahwood, Jimperding, Kauring, Kojonup, Kundip, Kweda, Namban, Nangetty, Northampton, Pithara, Swan View, Toodyay, Wikepin, Wilga, Wyola, York.
- Cen.—Bullabulling, Kalgoorlie, Kalpini, Kanowna, Kurnalpi, Paddington, Widgiemooltha, Mt. Monger.
- (7) *Miscellaneous occurrences.*
- N.W.—Gregory Gorge, Lionel.
- Mur.—Byro Station, Garden Gully, Meekatharra, Mt. No Name, Wilgie Mia.
- S.W.—Byford, Collie, Inglehope, Jacob's Well, Stirling Range, York.
- Cen.—Monger.
- S.E.—Gibson's Desert, Warburton Range.

GOLD: Au.

The principal localities at which gold occurs can be obtained from the Mining Statistics section of the Mines Department Annual Report for each year. There are over 270 localities from which gold has been produced in recent years and Simpson's earlier list (see p. 1) gives about 330 localities.

GOONGARRITE: $\text{Pb}_4\text{Bi}_2\text{S}_7$

N.W.—? Bamboo Creek.

Cen.—Comet Vale.

GRAPHITE: C

(1) *As a constituent of metamorphosed carbonaceous sediments.*

(a) Slates and mica schists.

N.W.—Egina, Millstream Station, Whim Creek.

S.W.—Gillingarra, Kelmscott, Kununoppin, Yandanhoo Hills, Kokerin, Frankland River.

Cen.—Binduli, Black Flag, Bullfinch, Bulong, Marvel Loch, Mungari, Southern Cross, Westonia.

(b) Quartzite.

S.W.—Balkuling, Chittering, Bullfinch.

(2) *In acid gneisses.*

Mur.—Ajana, Geraldine, Northampton, White Peak.

S.W.—Katanning, Kulin, Mt. Barker, Woolanganup Creek.

Cen.—Sandalwood Rock.

(3) *In pegmatites.*

Mur.—Geraldine, Northampton, White Peak.

S.W.—Chittering, Gillingarra.

(4) *In quartz veins.*

Mur.—Meekatharra.

S.W.—Corrigin, Katanning, Kondinin, New Noreia, Quairading, Woolanganup Creek.

Cen.—Toomeys Hills, Wiluna.

(5) *As impregnations of chlorite schists of uncertain origin.*

Mur.—Cue, Meekatharra.

Cen.—Coolgardie, Golden Ridge, Kalgoorlie, Morgans, Paddington, Sandstone, Southern Cross, Wiluna.

Euc.—Young River Area.

(6) *As segregations in ultra-basic rocks.*

Mur.—Meekatharra.

S.W.—Geraldine.

Euc.—Munglinup.

There are also a large number of localities in which the graphite is of unknown origin.

Kim.—Bow River, Brockmans, Mt. Broome, Ruby Creek.

N.W.—Jimblebah, Kennedy Range, Kumerina, Mooloo Downs, Wodgina.

Mur.—Dalgety Downs, Milly Milly Station, Mt. Magnet, Mt. Nairn, Peak Hill, Reedy, Weeramia Station, Wooleen Station.

S.W.—Armadale-Cardup, Bedford Harbour, Bodallin, Borden, Brookside, Carbarup, Chittering Valley, Corrigin, Denmark, Donnelly River, Gibb Rock, Greenhills, Hamersley River, Isseka, Jimperding, Kalgarin, Katanning, Kendenup, Kirup, Kondinin, Kulin, Kununoppin, Kweda, Laurier, Long Point, Manjimup, Martigallup, Mt. Barker, Muir's Bridge (Frankland River), Mullalyup, Napier Creek, Narratarra, New Norcia, Northern Gully, Palinup River, Pemberton, Pingelly East, Quairading, Ravensthorpe, Three Springs, Wagin, Wongamine, Yandanhoo Hills, Gillingarra District, Boyup Brook.

Cen.—Buningonia, Desdemona, Dunnsville, Ejudina, Euro, Golden Valley, Golden Ridge, Kanowna, Kunanalling, Larkinville, Laverton, Morgans, Nevoria, Olga Rocks, Parker's Range, St. Ives, Sandstone, Wombola, Bremer Range, Southern Cross, Westonia, Youanmi.

Euc.—Fanny Cove, Norseman.

S.E.—Barnard Rocks.

GROSSULARITE: $\text{Ca}_3\text{Al}_2(\text{SiO}_4)_3$

N.W.—Mt. Francisco, Marble Bar (4 miles east of).

Mur.—Melville.

S.W.—Toodyay.

Cen.—Mt. Palmer, Mayfield Group.

GRUNERITE: $(\text{OH})_2\text{Fe}(\text{Si}_4\text{O}_{11})_2$

In metamorphosed banded iron formations.

N.W.—Edmund River.

Mur.—Tuckanarra, Warriedar.

S.W.—Bolgart, Clackline, Toodyay.

Cen.—Meier's Find, Mt. Palmer, Mt. Windarra.

Kupfferite:

S.W.—Dowerin, Ninghanboun Hills.

GYPSUM: $\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$

(1) *Gypsum in salinas and swamps.*

N.E.—Gregory's Salt Sea, Lake Disappointment, Warriaddo.

N.W.—Bald Hill Station, Cape Cuvier, Carnarvon, Nalgi, Rocklea Station, Onslow (8 miles south-east of), Williamsbury Station.

Mur.—Lake Austin.

S.W.—Baandee, Bremer Ra., Burracoppin, Burran Rock (Nth. Baandee), Campion (Lake Brown), Cliff Head, Cookernup, Coomberdale, Cunderdin, Dooka, Danguin, Dukin (L. Coweowing), Erekin-Yarding-Eujinyu, Harvey, Hine's Hill, Hyden Rock, Karlgarin, King Rock, Koorda, Kuminin, Kununoppin, Lake Brown (Campion), Lake Grace, Lake Monger (Jibberding), Marne, Peel Estate, Perth, Quairading, Stirling Ra., Three Springs, Wagin, Wongan Hills, Woolundra, Wyola, Yarding, Yelbeni, Young's Siding, Dalwallinu, Baladgie (20 miles north west of).

Cen.—Baladgie, Binduli-Kurrawang, Bullfinch, Bulong, Comet Vale, Feysville, Kalgoorlie, Kanowna, Karalee, Kurrawang, L. Barlee, L. Lefroy, L. Seabrook, L. Wells, L. Yeo, Morgans, Mt. Palmer, Mulgarrie, Ora Banda, Parker's Range, Red Hill, St. Ives, Sir Samuel, Southern Cross, Widgiemooltha, Goddard's Creek, L. Cowan.

Euc.—Dundas, Stennet's Rock, Norseman.

(2) *Gypsum in older sedimentary series.*

Kim.—Napier Downs, Ord River.

N.W.—Alunite Gully (Chichester Ra.), Brumby Creek, Kumerina, Minilya River, Nullagine.

Mur.—Byro Plains, Carrandibby Gorge, Gantheaume Bay, Irwin River, Mt. Madeline.

(3) *Gypsum in metalliferous veins.*

Kim.—Hall's Creek.

N.W.—Ilgarere, Yandeyarra.

Mur.—Gabanintha, Paynesville.

Cen.—Comet Vale-Goongarrie, Coolgardie, Kalgoorlie, Mulline, Murrin, Westonia.

Euc.—Higginsville (13 miles north of).

(4) *Miscellaneous occurrences of gypsum.*

N.E.—Rudall River.

Mur.—Garden Gully, Poona.

S.W.—Armadales, Parkerville, Cliff Head, Hoffman Mill, Minginew.

Cen.—Darlot, Duketon, Paddington, Sandstone.

S.E.—Elder Creek.

HAEMATITE: Fe_2O_3 **(1) *In jaspilites.***

Kim.—Mt. Deception, Turkey Creek.

N.W.—Andover (Mt. Gregory), Bamboo, Cape Lambert, Cooke's Bluff Hill, Coppin's Gap, Dolphin Island, Duffer's Creek, Ethel Gorge, Ettrick Station, Friendly Creek, Gorge Creek, Hongkong, Jimblebah, Kallona Creek, Kitty's Gap, Lalla Rookh, Marble Bar, Mt. Edith, Mt. Gascoyne, Mt. Goldsworthy (Ellarine Hills), Mt. Stuart, North Pole, Nullagine, Point Sampson, Poonthanna Pool, Roebourne, Stannum, Strelley Gorge, Tabba Tabba, Talga Talga, Tambourah, Wodgina, Womerina Pool, Cossack.

Mur.—Boogardie-Mt. Magnet, Bulgabardoo Well, Carey Downs Station, Carlamina, Culculli, Currans, Field's Find, Horseshoe, Jasper Hill, Jack Hills, Lake Austin, Mardoonganna Hill, Meekatharra, Mt. Gould, Mt. Hall, Mt. Lulworth (Wilgie Mia), Mt. Maitland, Mt. Matthew, Mt. Narryer, Mt. Taylor, Munara Hills, Nanine, Paynesville, Peak Hill, Quinns (Nowthanna), Stake Well, Tallering, Tuckanarra, Warriedar, Weld Range (Wilgie Mia), Yaloginda, Mt. Gould, Colga Downs Station.

S.W.—Bejoording, Bolgart, Blackboy Hill, Grass Valley, Kundip, Mt. Gibson, Ninghanboun Hills, Pinyalling, Pavensthorpe, Mayballing, Toodyay.

Cen.—Bardoc, Barlows, Barnett's Find, Birrigrin, Black Range (Nunngarra, Sandstone), Boolygoon Range (Depot Hills), Brooking Range, Bullfinch, Bulong, Bungalbin Range, Burtville, Callion, Corinthian, Comedy King, Comet Vale, Diemels, Die Hearty Range, Dulcie, Edjudina, Ennuin, Eristoun, Feysville, Frere Range, Golden Ridge, Golden Valley, Hogan's, Ida H., Jackson, Kalgoorlie, Kennyville, Koolyanobbing, Kurrawang, Lake Barlee, Lake Nabberu (Frere Range), Lake Rebecca (Yilgangi), Laverton, Leonora, Maitland Peak, Manxman, Maninga Marley, Morda, Marvel Loch, Maynard Hills, Metzke's Find, Monday Rocks, Montague Range, Mt. Eureka, Mt. Flora, Mt. Ida, Mt. Jackson, Mt. Laurence Wells, Mt. Marion, Mt. Mason, Mt. Millicent, Mt. Rankin, Mt. Shenton, Mt. Townsend, Mt. Varden, Mulgabbie, Mulgarrie, Nunngarra, Nevoria, Olga, Parker's Range, Pigeon Rock, St. Ives, Sandstone, Southern Cross, Tobin Hill, Toomey's Hills, Wallangie, Yeedie Bulgar, Youanmi.

Euc.—Bremer Ra., Mt. Holland, Mt. Ironcap, Norseman-Dundas.

(2) *In sedimentary beds (metamorphosed).*

Kim.—Richenda River, Yampi Sound.

N.W.—Hamersley Range, Metawandy Creek, Punda Spring, Uaroo, Weelumerina Spring, Yampire Gorge.

Mur.—Rosskeem, Irrida Hill, Belele Station.

S.W.—Greenhills, Jacob's Well, Jennapullen, Jimperding, Mogumber, Moora, Quindanning, Tenterden, Toodyay, Wiekpin, Woodside, York, Hamersley Range.

Cen.—Lake Nabberu, Paddington (Broad Arrow), Princess Range.

(3) *Hematite in quartz veins and pegmatites.*

Kim.—Bertha Peak, Camden Sound, Charnley River, Graveyard, Hall's Creek, Humbert Creek (Secure Bay), Junction Station, Mt. House Station, Ord River Station, Ruby Creek, Sunday Island, Yampi Sound.

N.E.—Throssell Range.

N.W.—Durlacker Creek, Eleys, Fraser Creek, Mt. Minnar, Uaroo.

Mur.—Errols, Mt. Deverall, Northampton, Quinns, Melville.

S.W.—Meekering, Ravensthorpe, Rothsay, Stirling Range, Wongan Hills.

Cen.—Barrambie, Edjudina, Kalgoorlie, Wiluna.

(4) *Martite pseudomorphs after magnetite.*

N.E.—Throssell Range.

N.W.—Corunna Downs, Tabba Tabba, Two Sisters Hills, White Springs Station, Yinnietharra.

Mur.—Meeberrie Station, Melville, Warrambie.

S.W.—Buntine, Corrigin, Kendenup, Kirup, Kununoppin, Kundip, Naremben, Quongup.

Cen.—Monger.

(5) *Miscellaneous occurrences of hematite.*

Kim.—Bream Creek, Wyndham.

N.W.—Bangemall, Marillana Station, Mooloo Downs Station, Mt. McRae, Red Hill, Soanesville, White Springs Station, Western Shaw, Woodstock, Mt. Egerton, Uaroo Station, Murgoo, Henry River.

Mur.—Gabanintha, Horseshoe, Paynesville, Yuinreath G.M., Wooleen Station.

S.W.—Baker's Hill, Collie, Cooligan, Culham, Denmark, Gutha, Inglehope, Katanning, Narrogin, Northam, Wannamal, Yalgoo.

(6) *Ochre (Red).*

N.W.—Day Hill, Ophthalmia Range, Yandicoogina.

S.W.—Busselton District, Wilgie Hill.

Euc.—Norseman, 80-100 miles east of Norseman.

HALITE: NaCl

Kim.—Anna Plains, Negri River (and Negri Junction), Palm Springs (near Ruby Creek).

N.E.—Lake Disappointment.

N.W.—Cossack, Middalya Station, Port Hedland.

Mur.—Cue, Denham, Yaloginda.

S.W.—Baandee, Babakin, Bencubbin, Bowgada, Bruce Rock, Carnamah, Coweowing (Koorda), Cunderdin, Dambouring, Dandaragan, Dangan, Dowerin, Goomalling, Greenough River, Kellerberrin, Kurrenkutten (south), Lake Brown, Lake Chinocup, Lake Preston, Lynton, Moora, Morawa, Northampton, Nungarin, Ongerup, Perenjori, Pingrup, Pinyalling, Pootenup, Quairading, Rottneest, South Kulin, Tammin, Tenterden, Three Springs (Yarra Yarra Lake), Upper Irwin River, West River (Kundip), Wansbrough, Westonia, Wongan Hills, Wubin Downs Station, Hamersley Range, Ravensthorpe, Hoffman Mill, Mingenev.

Cen.—Bullfinch (L. Deborah), Brockman Creek (L. Carnegie), Comet Vale, Goongarrie, Kalgoorlie, Kanowna, Kurrawang, L. Carnegie, L. Lefroy, L. Deborah, L. Polaris, Leonora, Mulgarrie, Paris, Ponton River, Southern Cross, Widgiemooltha (L. Lefroy), Wongawall (L. Carnegie), Yelma Soak, Baladgie.

Euc.—Bellenger Island, Bremer Range, Esperance (Pink Lake), Middle Island, Norseman (Lake Cowan).

HALLOYSITE: $H_4Al_2Si_2O_9 \cdot 2H_2O$ *Normal Halloysite.*

Mur.—Cue, Meekatharra, Poona.

S.W.—Borden, Byford, Lower Chittering Valley, Collie, Cookernup, Harvey, Kalamunda, Noggerup, Pemberton, Ravensthorpe, Warriedar, L. Chandler, Middle Swan, Watheroo, Chidlow's, Forrestfield, Moora, Mayballing, York.

Cen.—Bardoe, Garratt, Gibraltar, Higginsville, Kalgoorlie, Mulline, Kanowna, 30 miles south of Moorine Rock on Edward's Find Road.

Euc.—Dundas, Norseman, Munglinup, Young River Area.

Alexandrolite.

Mur.—Meekatharra, Poona, Wardawarra.

S.W.—Pemberton, Rothsay.

Cen.—Higginsville, Kalgoorlie, Lawlers, Southern Cross, Westonia.

Lithomarge, Ferruginous and impure halloysite.

S.W.—Drakesbrook, Kalamunda, Mundaring, Noggerup, Northampton, Parkerville, Waroona, Wellington Mill.

Cen.—Duketon.

HARMOTOME: $\text{KBa}_5\text{Al}_{11}\text{Si}_{20}\text{O}_{80}\cdot 25\text{H}_2\text{O}$

Kim.—Mt. Cedrie.

HAUSMANNITE: Mn_3O_4

Cen.—Broad Arrow.

HEDENBERGITE: $\text{CaFe}(\text{SiO}_3)_2$

Cen.—Burgess' Find, Mayfield Group.

HELVITE: $\text{Mn}^{++}\text{Be}_2\text{S}(\text{SiO}_4)_2$

N.W.—Mt. Francisco.

Mur.—Melville.

HEMIMORPHITE: $\text{Zn}_2\text{SiO}_4\cdot\text{H}_2\text{O}$

N.W.—Braeside, Marble Bar, Mt. Edgar, West Wodgina.

HERCYNITE: FeAl_2O_4 (*Spinel*).

Mur.—Field's Find.

HESSITE: Ag_2Te

Cen.—Kalgoorlie, Mulgabbie.

HEXAHYDRITE: $\text{MgSO}_4\cdot 6\text{H}_2\text{O}$

S.W.—Parkerville.

HISINGERITE: $\text{H}_4\text{Fe}^{+++}\text{Si}_2\text{O}_9\cdot 2\text{H}_2\text{O}$

S.W.—Westonia.

HORNBLENDE:

General formula, $\text{H}_2\text{Ca}_2(\text{Mg},\text{Fe})_5\text{Si}_8\text{O}_{24} + \text{H}_2(\text{Mg},\text{Fe})_6\text{Al}_2\text{Si}_2\text{O}_{24}$

Occurs in many types of basic igneous and metamorphic rocks.

HUEBNERITE: MnWO_4

N.W.—Eleys.

HYDROALLANITE: See under *Allanite*.

HYDROBIOTITE and VERMICULITE: Hydrothermally altered biotite or hornblende, composition variable.

Hydrobiotite.

Kim.—Hall's Creek.

N.W.—Lockier Range (Yinnietharra).

Mur.—Poona.

S.W.—Quairading, Young's Siding, Kunjin, Bunning's Mill, Danging, L. Grace, Collie, Wagin, L. Cowcowing, Kataning, Goomalling, L. Chittering.

Cen.—Comet Vale, Mt. Palmer, Westonia.

Euc.—Young River Area.

Brown Vermiculite.

Mur.—Melville.

S.W.—Bejoording, Bridgetown, Collie, Goomalling, Mulalyup, Nungarin, Wellington Mills.

Cen.—Comet Vale, Coolgardie, Gibraltar, Holleton, Marvel Loch.

Euc.—Young River.

Green Vermiculite.

Cen.—Bulong.

HYDROGADOLINITE: See *Gadolinite*.

HYDROMAGNESITE: $\text{Mg}_4(\text{OH})_2(\text{CO}_3)_3 \cdot 3\text{H}_2\text{O}$

S.W.—Bruce Rock, Country Peak, Cranbrook, Highbury, Kojonup, Kwolyin, Rockingham, Toojelup, Welbungin, Weria.

HYDROTHORITE: $\text{ThSiO}_4 \cdot 4\text{H}_2\text{O}$

N.W.—Wodgina, Mt. Franeisco.

HYDROZINCITE: $\text{Zn}_5(\text{OH})_6(\text{CO}_3)_2$

Kim.—Narlarla.

N.W.—Braeside.

HYPERSTHENE: Ferruginous variety of Enstatite. See under *Enstatite*.

ILMENITE: $\text{FeTiO}_3 (+\text{Fe}_2\text{O}_3)$ Occurs in nearly all basic igneous and metamorphic rocks; sometimes in pegmatites and with massive iron ores; often concentrated in beach and river sands, and in soils.

ILMENORUTILE: $\text{FeNb}_2\text{O}_6 + \text{Ti}_2\text{O}_3$

N.W.—Globe Hill.

Mur.—Dalgety Downs, Melville, Poona, South Yalgoo.

S.W.—Mt. Dale (12 miles S.W. Sawyer's Valley).

IXIOLITE: MnTa_2O_6

N.W.—Wodgina.

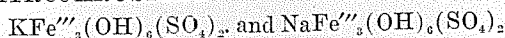
Cen.—Londonderry.

JAMESONITE: $\text{Pb}_4\text{FeSb}_6\text{S}_{14}$

N.W.—Mt. de Courcey.

Cen.—Kalgoorlie.

JAROSITE and NATROJAROSITE:

*Jarosite.*

- (1)
- In weathered portions of pyrite, marcasite or pyrrhotite lodes.*

Kim.—Panton.

N.W.—Middle Creek. Mt. McGrath, Nullagine, Whim Creek.

Mur.—Gullewa, Meekatharra, Mulgine.

S.W.—Chittering Valley, Little Wongan Hills, Newearnie, Northampton, Ravensthorpe, Yandanhoo Hills.

Cen.—Baumgarten's Find, Clampton, Love's Find, Marvel Loch, Pingin, Southern Cross.

Euc.—Young River Area.

- (2)
- In outcrops of marcasite or pyrite-bearing sediments.*

N.W.—Alunite Gully, Millstream.

S.W.—Kalgan River, Irwin River (north and south branches).

Natrojarosite.

- (1)
- As for Jarosite.*

S.W.—Kundip, Mt. Gibson, Northampton, Ravensthorpe.

Cen.—Comet Vale, Coolgardie, Mulline.

- (2)
- As for Jarosite.*

Mur.—Callytharra Spring.

S.W.—Bremer Bay, Gantheaume Bay, Narra Tarra.

JASPER: Chalcedony, commonly found in jasper bars.

KAMACITE: $\text{Fe}_{12}(\text{Ni}, \text{Co})$ to $\text{Fe}_{21}(\text{Ni}, \text{Co})$. Occurs in all meteoritic irons found in this State.KAINITE: $\text{KMgClSO}_4 \cdot 3\text{H}_2\text{O}$

S.W.: Rottnest Island.

KAOLINITE: $\text{H}_4\text{Al}_2\text{Si}_2\text{O}_9$

Deposits of clay occur in many parts of the State, either as the result of decomposition in situ of the underlying rocks or in sedimentary beds.

KRENNERITE: AuTe_2

Cen.—Kalgoorlie, Mulgabbie.

KUPFFERITE.—See *Grunerite*.

KYANITE.— Al_2SiO_5 (1) *Kyanite in metasediments.*

Kim.—Margaret River, Mondooma, Mt. Rose, Richenda River, Little Whirlpool Pass.

N.W.—Uaroo.

Mur.—Milly Milly, Quinn's.

S.W.—Chittering Valley (Upper), Chittering Valley (Middle), Clackline, Cullalla, Fly Brook, Jimperding, Mt. Barren, Mt. Kenneth, Wannamal, York, Hamersley Beach, Smithfield, Nannup.

Cen.—Burbanks, Camel Humps, Leonora.

(2) *Kyanite in stream and beach sands and gravels.*

Kim.—Broome.

N.W.—Fortescue River (lower).

Mur.—Jasper Hill.

S.W.—Augusta, Balbarrup, Bunbury, Byford, Cheynes Bay, Denmark, Dinninup, Donnelly River, Donnybrook, Flinders Bay, Gabbin, Greenbushes, Manjimup, Nannup, Nornalup, Palgarup, Pemberton-Balbarrup, Perth, Quindalup, Smithfield, Wongan Hills, Yallingup, Safety Bay, Coleman Inlet.

Cen.—Bulong, Kanowna, Southern Cross.

LABRADORITE: $\text{Ab}_2\text{An}_5\text{--Ab}_3\text{An}_7$

Occurs in many types of basic and intermediate rocks both igneous and metamorphic.

LAUMONTITE: $\text{Ca}_7\text{Al}_{14}\text{Si}_{26}\text{O}_{80} \cdot 25\text{H}_2\text{O} + \text{Na}_2\text{Ca}_3\text{Al}_{12}\text{Si}_{25}\text{O}_{80} \cdot 25\text{H}_2\text{O}$

Cen.—Comet Vale.

LECHATÉLIERITE: SiO_2

Kim.—Moolamen Hill (?)

S.W.—Popanyinning, west.

LEPIDOLITE: $\text{Li}_4\text{K}_2\text{Al}_4\text{F}_4\text{Si}_8\text{O}_{22}$

N.W.—McPhees Range, Mt. Francisco, Stannum, Tabbra, Tambourah, Wodgina.

Mur.—Melville, Poona, Yalgoo.

S.W.—Cocanarup, Mt. Day, Mt. Singleton, Ravensthorpe.

Cen.—Barrambie, Bullfinch, Davyhurst, Logans, Londonderry, Menzies, Mulline, Sir Samuel, Ubini, Widgiemooltha, Yandil Pool (Mt. Russell), Bullabulling, Kathleen Valley.

Euc.—Norseman.

LEUCITE: $\text{KAl}(\text{SiO}_3)_2$

In volcanic intrusions in the Fitzroy Valley, West Kimberley. (Often altered to a mixture of orthoclase and a clay mineral.)

LEUCOXENE: Approximates in composition to anatase, rutile, titanite or doelterite. Occurs in many types of rocks, principally in intermediate to basic metamorphosed rocks such as greenstones.

LEUCOPHOSPHITE: $\text{K}_2(\text{Fe,Al})_7(\text{OH})_{11}(\text{PO}_4)_4 \cdot 6\text{H}_2\text{O}$

S.W.—Ninghanboun Hills.

LIMONITE: Massive form of goethite. Abundant throughout the State. See also *Goethite*.

LITHIOPHILITE: LiMnPO_4

N.W.—Mt. Francisco, Wodgina (also *purpurite*).

Triphylite.

Kim.—Mt. Dockrell.

N.W.—Yinnietharra.

LOELLINGITE: FeAs_2

Cen.—Menzies (doubtful, and probably arsenopyrite).

MAGNESITE: MgCO_3 (1) *Magnesite in metasomatic rocks and veins.*

N.W.—Braeside, Bamboo, Jimblebah, Lionel, Warrawoona.

Mur.—Meekatharra, Northern Gully, Yaloginda.

Cen.—Comet Vale, Feysville, Golden Ridge, Kalgoorlie, Kanowna, Monger, Murrin, Vetersburg, Paddington, Radio G.M., Bullfinch.

(2) *Surface Magnesite associated with weathered serpentine.*

Mur.—Gabanintha, Geraldine, Meekatharra, Mt. Taylor, Yalgoo.

S.W.—Ardath, Baandee, Bandalup, Boodarockin, Bremer Range, Burracoppin, Corrigin, Dangin, Doodlakine, Dowerin, Goomalling, Hamersley Range, Kondinin, Kulin, Kuminin, Merredin, Mt. Singleton, Mulermurra, Namban, Ninghanboun Hills, Northam, Nungarin, Pal-linup River, Ravensthorpe, Kundip, Rothsay, Stirling Range, Tammin, York, Berkshire Valley.

Cen.—Bardoc, Broad Arrow, Bullabulling, Bullfinch, Bulong, Chadwin, Comet Vale, Coolgardie, Eucalyptus, Gibraltar, Golden Valley, Goongarrie, Holleton, Hopbush Soak, Kalgoorlie, Kurrawang, Larkinvile, Laverton, Menzies, Moorine Rock, Mt. Burges, Eulaminna, Nepean, Ora Banda, Paddington, Sandstone, Southern Cross, Waverley (Siberia), Westonia.

Euc.—East Dowak, Munglinup, Norseman, Young River.

Mesitite.

Cen.—Kanowna, Marda.

MAGNETITE: Fe_3O_4

Occurs in many igneous and metamorphic rocks and in some iron deposits, sediments and soils.

MAGNOLITE: Hg_2TeO_4

Cen.—Kalgoorlie. (See under *Emmonsite.*)

MAITLANDITE: $(\text{Pb,Ca})_2\text{Th}_3\text{U}_4\text{Si}_5\text{O}_{22}\cdot 23\text{H}_2\text{O}$

N.W.—Wodgina.

MALACHITE: $\text{Cu}_2(\text{OH})_2\text{CO}_3$

Kim.—Argyle Downs, Augustus Island, Collier Bay, Camden Sound, Denham Station, Devil's Gap (Napier Range), Doubtful Bay, Forrest River, Geikie Range, Fitzroy Crossing, Glenelg River, Hall's Creek, Ivanhoe Station, Little Tarragee (Mt. Nellie), Margaret River, Mt. Pierre, Narlarla, Ord's Gap (King Leopold Range), Oscar Range, Panton River, Pentecost River, Ruby Creek, Water Point, Alice Downs Station, Ord River Station.

N.W.—Braeside, Brown Creek, Bulla Downs, Cave River, Coorara, Croydon, Egina-Station Peak, Friendly Creek, Glenroebourne, Globe Hill Station, Goldfields Creek, Gorge Creek, Green's Well, Ilgarere, Kallona Creek, Kooline Station, Kumerina, Lalla Rookh, Lennon's Find, Limestone-Ashburton Junction, Lower Nichol, Monkey Creek, Marble Bar, Meilga Station, Middle Creek, Mooloo Downs, Mons Cupri, McPhees Range, McPhees Creek, Mt. Elizabeth, Mt. Amy, Mt. Agnes, Mt. de Courey, Mt. Gascoyne, Mt. Edgar Station, Mt. McGrath, Mt. Stuart, Nullagine, North Pole, North Shaw, Peake Station (Metawandy Creek), Pilbara, Roebourne, Red Hill North, Robe River, Copper Mine, Sandy Creek, Station Peak, Talga, Tambourah, Balfour Downs, Dalgety Downs, 10-Mile Pool Murchison River, Marble Bar, Mt. Mortimer, Yinnietharra, Turramunda, Uaroo, Warrawoona, Weerianna, Westons, West Wodgina, Wyloo (Peak Station), Whim Creek, Whim Well, Woodstock, Wymans, Yandicoogina, Yannerie Hill, Yaraloola.

Mur.—Cuddingwarra, Cue, Carlaminda, Dalgety Downs, Field's Find, Gabanintha, Horseshoe, Meekatharra, Melville, Mikhaburra, Mugga Mugga, Munara, Mt. Fraser, Mt. Gould, Narra Tarra, Paynesville, Twin Peaks, Wadgingarra, Yaloginda, Yuin, Booloo Downs, Mt. Narryer, Warriedar.

S.W.—Annie Peak, Arrino, Bremer Bay, Carragarup, Hamersley Gorge, Geraldine, Jerramungup, Kundip, Mid. Mt. Barren, Mt. Gibson, Mt. Muggawa, Mt. Scratch, Mt. Desmond, Northampton, Oakagee, Rothsay, Ravensthorpe, Wongan Hills, West River, Yandanooka, McDonald's Reward, Delaney's Well.

Cen.—Bellehambers, Birrigrin, Boorara, Broad Arrow, Bronzewing, Burbanks, Burtville, Bullfinch, Camel Humps, Comet Vale, Coolgardie, Corsair, Diemel's Find, Erlistoun, Goongarrie, Jackson, Kalgoorlie, Kathleen Valley, Koolyanobbing, Knutsford, Lawlers, Leonora, Maduna Hill, Malcolm, Marvel Loch, Mulline, Murrine, Mt. Davis, Mt. Ida, Mt. Margaret, Mt. Monger, Nunnagarra, Paddington, Pennyweight Point, Riverina, Siberia, Sir Samuel, Southern Cross, St. Ives, Swincer's Find, Ulrich Range, Wiluna, Mayfield Group, Malloch's Well, Marda, Parkers Range, Higginsville (13 miles north of), Youanmi.

Enc.—Dundas, Hatter's Hill, Norseman, Lake Cowan.

Eas.—Mt. Waugh (Warburton Range).

MANGANITE: $\text{Mn}^{+++}(\text{OH})\text{O}$

Kim.—Elephant Hill, Alice Downs Station.

N.W.—Braeside, Bonnie Downs, Cooglegong, Cossack, Mangaroon Station, Millstream Station, Mt. Elizabeth (Boolaloo Station), Mt. Stuart, Weelumerina Spring, Warrawoona, Roebourne (8 miles west of).

Mur.—Horseshoe.

S.W.—Coppermine Creek, Tenindewa, Indarra, Fitzgerald River.

Cen.—Kalgoorlie.

MANGANOCOLUMBITE: $(\text{Mn}, \text{Fe})(\text{Nb}, \text{Ta})_2\text{O}_6$

Kim.—Mt. Dockrell.

N.W.—Cooglegong, Eastern Creek, Lalla Rookh, McPhees Range, Moolyella, Mt. Francisco, Tappa, Talga, Wodgina, Yandeyarra Station, Yinnietharra.

Mur.—Coodardy, Poona.

S.W.—Mt. Dale, Ravensthorpe.

Cen.—Coolgardie, Gibraltar, Londonderry, Ubini (26 miles west of Coolgardie).

Enc.—Bellinger.

MANGANOMOSSITE: MnNb_2O_6

N.W.—Yinnietharra.

MANGANOTANTALITE: $(\text{Mn}, \text{Fe})(\text{Ta}, \text{Nb})_2\text{O}_6$

Kim.—Mt. Dockrell.

N.W.—Cooglegong, Eleys, Lalla Rookh, Mt. Francisco, McPhees Range (Mt. York, Green's Well, Pilgangoora), Stannum, Strelley, Tabba Tabba, Western Shaw (Tambourah), Wodgina.

Mur.—Melville, Poona.

S.W.—Carnamah, Mundijong (both doubtful).

Cen.—Gibraltar, Londonderry, Ubini, Victoria Rocks, 26 miles west of Coolgardie.

Euc.—Bellinger.

MAGNOPHORITE: Amphibole near kataphorite.

Kim.—Fitzroy Valley (volcanic rocks).

MARCASITE: FeS_2

Occurs in some peaty soils, sulphide lodes and as concretions in shales and other sedimentary rocks.

MARGARITE: $\text{H}_2\text{CaAl}_4\text{Si}_2\text{O}_{12}$

N.W.—White Springs.

Cen.—Gibraltar, Nevorina.

MARTITE: Haematite pseudomorphous after magnetite. Occurs where magnetite has been altered by weathering.

MELANTERITE: $\text{FeSO}_4 \cdot 7\text{H}_2\text{O}$

Occurs as a result of oxidation of marcasite in swampy and peaty soils and in some sulphide lodes.

MELONITE: Ni_2Te_3

Cen.—Kalgoorlie.

MENDOZITE: $\text{NaAl}(\text{SO}_4)_2 \cdot 12\text{H}_2\text{O}$

S.W.—Bremer Bay, Denmark.

MERCURY: Hg. See under *Amalgam*.MESITITE: $\text{MgFe}''(\text{CO}_3)_2$. See *Magnesite*.METACHLORITE: See *Chlorite*.

METAGADOLINITE: $\text{Be}_2\text{Fe}'''\text{Y}_2(\text{OH})_2(\text{SiO}_4)_2$

N.W.—Abydos, Bullock Well, Coongong.

See under *Gadolinite*.MICROCLINE: KAlSi_3O_8

Occurs in granites, gneisses, porphyries, sedimentary rocks, sands, soils, etc. In pegmatites microcline is often a prominent constituent.

In Pegmatite.

Kim.—Mt. Dockrell.

N.W.—Abydos, Coongong, Lower Clifton Downs, McPhees Range, Mt. Francisco, Tabba Tabba, Wodgina, Yinnie-tharra.

Mur.—Coodardy, Meekatharra, Melville, Poona, Quinns, Warda Warra, Yandanooka, Callie Soak.

S.W.—Albany, Balingup, Bolgart, Boya, Canning Dam, Dangan, Dowerin, Gilgering, Greenbushes, Holleton, Jacob's Well, Kalamunda, Kirup, Lower Chittering, Mahogany Creek, Mooliabene, Mulgine, Mullalyup, Nangeenan, Narra Tarra, Ninghanboun Hills, Northampton, Payne's Find, Pingelly, Pithara, Quarralling Well, Ravensthorpe, Roleystone, Rothsay, Spencer's Brook, Statham's Quarry, Tallering Station, Toodyay, Wongan Hills, Woodside, Yulgering, Tammin, Piawaning, York.

Cen.—Burbanks, Cheriton's Gibraltar, Grosmont, Hogan's, Lake Lefroy, Larkinvile, Logan's Find, Londonderry, Marvel Loch, Mt. Alexander, Mt. Marcia, Nulline, Niagara, Parker's Range, Simon's Hill, Spargoville, Ubini, Wiluna, Radio Group (Bullfinch), Marie's Find, Westonia.

Euc.—Cape Pasley, Dundas, Fraser's Range, Mt. Ney.

MICROLITE: $\text{NaCaF}(\text{TaO}_3)_2$

Kim.—Mt. Dockrell.

N.W.—Green's Well and Pilgangoora, McPhees Range, Hillside, Kangan Station, Moolyella, Strelley, Tabba Tabba, Western Shaw, Wodgina.

MILOSCHITE: Chromiferous variety of *Kaolinite*.

Mur.—Meekatharra, Melville, Poona.

S.W.—Berakin, Beverley (east), Champion, Clackline, Dangan, Jimperding, Kundip, Mawson, Newdegate, Northam (Grass Valley), Rothsay, Walebing.

Cen.—Broad Arrow, Comet Vale, Duketon, Gibraltar, Kalgoorlie, Marvel Loch, Menzies, Mt. Abednego, Westonia.

MIMETITE: $\text{Pb}_2\text{Cl}(\text{AsO}_4)_3$

N.W.—Cooke's Creek, Eastern Creek, North Pole.

Cen.—Baumgarten's (L. Nabberu), Leonora.

MINYULITE: $\text{KAl}_2(\text{OH},\text{F})(\text{PO}_4)_2 \cdot 3\frac{1}{2}\text{H}_2\text{O}$

S.W.—Dandarragan.

MIRABILITE: $\text{Na}_2\text{SO}_4 \cdot 10\text{H}_2\text{O}$

Euc.—Nullarbor Plain (?Forrest).

MOLYBDENITE: MoS_2

N.W.—Eleys, Globe Hill, Mt. Francisco, West Wodgina.

Mur.—Callie Soak, Coodardy, Gullewa, Melville, Big Bell, Warriedar.

S.W.—Bedford Haven, Blackboy Hill, Bolgart, Bremer Bay, Brookton, Buntine, Clackline, Dinninup, Frankland River, Greenmount, Jimperding, Mahogany Creek, Mokine, Mulgine, Mt. Singleton, North Dandalup, Pingelly, Quairading, Ravensthorpe, Rothsay, South Bindoon, Statham's Quarry, Spencer's Brook, Swan View, Toodyay, Waddouring, Wagin.

Cen.—Bullabulling, Coolgardie, Kanowna, Lawlers, Leonora, Linger and Die, Mulwarrie, Mt. Hilda, Niagara, Parker's Range, Pioneer, Southern Cross, Terraces (and Dodger's), Thatcher's Soak, Yarri, Yerilla, Radio G.M., Corinthian, Westonia.

Euc.—Buldanian, Hatter's Hill, Kumarl.

MOLYBDITE: Ferrimolybdite, Fe_2O_3 , 3 or 4 MoO_3 . 8 or 10 H_2O (See also *Ferrimolybdite*.)

S.W.—Clackline.

MONAZITE: $(\text{Ce},\text{La})\text{PO}_4$

N.W.—Abydos, Cooglegong, Eleys, Friendly Creek, Globe Hill, Hillside, Moolyella, Mt. Francisco, Nullagine, Pilgangoora, Split Rock Station, Tambourah, Tabba Tabba, Wandagee, Wodgina.

Mur.—Poona.

S.W.—Bunbury, Deep River, Donnelly River, Donnybrook, Greenbushes, Gingin, Irwin River, Jasper Lake, Manjimup, Perth, Torbay Inlet.

Cen.—Eucalyptus, Kookynie, Sheep Rock, Southern Cross.

MONTANITE: $\text{Bi}_2(\text{OH})_4\text{TeO}_4$ See *Emmonsite*.MONTEBRASITE: $\text{LiAl}(\text{OH})\text{PO}_4$ See *Amblygonite*.

MONTMORILLONITE: $\text{MgAl}_2\text{Si}_5\text{O}_{14} \cdot 6\text{H}_2\text{O}$

S.W.—Bassendean, Beermullah, Collic, Jennacubbine, Marchagee, Mooliabene, Mumballup, Pemberton, Watheroo (Marchagee).

Cen.—Bardoe, Londonderry, Ubini.

Euc.—Young River area.

MOTTRAMITE: $2\text{PbCu}(\text{OH})\text{VO}_4 \cdot \text{H}_2\text{O}$

N.W.—Braeside.

MUSCOVITE: $\text{H}_2\text{KAl}_3(\text{SiO}_4)_3$ Occurs in pegmatites, granites, schists, detrital deposits, soils, etc. It is only of commercial importance in pegmatites.

Muscovite in pegmatites.

Kim.—Barker Gorge (Gussey's Find), Cone Bay, Napier Downs, Sunday Island.

N.W.—Globe Hill, Indee Station, McPhees Range, Moolyella, Mt. Alexander, Mt. Franciseo, Stannum, Tambourah, Wodgina, Yinnietharra, Pilgangoora.

Mur.—Jasper Hill, Lockier Range, Mt. Farmer, Paynesville, Poona, Big Bell, Melville.

S.W.—Ajana, Balingup, Beverley, Bowgada, Bullsbrook, Bussel's Brook (Collie River), Cagy Cagy, Cocanarup, Collie, Goyamin Pool, Greenbushes, Hamel, Jacob's Well, Jimperding, Kirup, Mt. Erin, Mullalyup, Mumballup, Narra Tarra, Pingelly, Quairading, Ravenshorpe, Rothsay, Roleystone, Smithfield, Toodyay, Three Springs, Bolgart, Tammin, York, Denmark.

Cen.—Cheriton's, Coo'gardie, Gibraltar, Logan's Find, Londonderry, Marvel Loch, Nevoria, McDonough's Lookout, Mulline, Mt. Alexander, Niagara, Parker's Range, Simon's Hill, Southern Cross, Ubini, Wiluna, Spargo's G.M., Mt. Palmer, Edward's Find, Radio G.M., Marie's Find.

Euc.—Cape Pasley (and Bellinger Sand Patch), Mica Hill, Norseman, 8 miles south east Norseman.

NAGYAGITE: $\text{Au}_2\text{Pb}_{10}\text{Sb}_2\text{Te}_6\text{S}_{16}$?

Cen.—Binduli (doubtful), Kalgoorlie.

NATROALUNITE: See *Alunite*.

NATROJAROSITE: See *Jarosite*.

NATRONITRITE: NaNO_3

Mur.—Meekatharra.

S.W.—Arrino, Kuerin, Northampton, Yungarloo Spring.

Cen.—Dunnsville, Goldfields Water Line, Kalgoorlie, Kurrawang, Youanmi.

NAUMANNITE: Ag_2PbSe_2

Cen.—Kalgoorlie.

NICCOLITE: NiAs

Cen.—Kunanalling.

NICOLAYITE: $(\text{Pb,Ca})_2\text{Th}_3\text{U}_4\text{Si}_5\text{O}_{36}\cdot 21\text{H}_2\text{O}$

N.W.—Wodgina.

NITRE: KNO_3

Euc.—Mt. Ridley.

NONTRONITE: $\text{H}_4\text{Fe}'''\text{Si}_2\text{O}_9$

Kim.—Oke's Find, Negri River, Fitzroy Valley (as an alteration product of olivine in the volcanic rocks).

N.W.—Wodgina, Weerianna C.M.

Mur.—Coodardy, Jasper Hill, Meekatharra, Mooletar (Paynesville), Payne's Find, Warda Warra, Warriardar, Yuin.

S.W.—Kendenup, Ninghan, Northam, Denmark.

Cen.—Bardoc, Burges's Find, Burtville, Celebration, Comet Vale, Ennuin, Erlistoun, Gibraltar, Kalgoorlie, Leonora, Marda, Marvel Loch, Menzies, Sandstone, Southern Cross, Westonia.

Euc.—Munglinup.

OCHRE: Oxides of iron with various impurities.

(1) *Limonitic ochres.*

Kim.—Forrest River.

N.W.—Braeside, Cossack, Millstream Station.

Mur.—Garden Gully, Windamurra, between Payne's Find and Mt. Magnet.

S.W.—Balkuling, Busselton, Carbarup, Jarrahwood, Jimperding, Kauring, Kojonup, Kundip, Kweda, Namban, Nangetty, New Norcia, Northampton, Pithara, Swan View, Toodyay, Wickepin, Wilga, Wyola, York, Perenjori, Northam, Narrogin.

Cen.—Bullabulling, Kalgoorlie, Kalpini, Kanowna, Kurnalpi, Paddington, Widgiemooltha.

(2) *Hematitic ochres.*

Kim.—Wyndham.

N.W.—Marellana Station (near Willi Willi Spring), Elleringine Hills.

Mur.—Wilgie Mia (Mt. Lulworth), Paynesville.

S.W.—Jimperding.

OCTAHEDRITE: (*Anatase*) TiO_2

In heavy residues of sedimentary materials.

N.W.—Wandagee.

S.W.—Donnybrook, Gingin, Kunjin, Wongan Hills.

Cen.—Monger, Southern Cross.

OLIGOCLASE: Ab_2An — Ab, An_2

Occurs in granites and gneisses in many parts of the State.

OLIVENITE: cf. *Tyrolite*, $\text{Cu}_2(\text{OH})\text{AsO}_4$

N.W.—Mt. McGrath.

S.W.—Kundip, Ravensthorpe.

Cen.—Kalgoorlie.

OLIVINE: Ferruginous variety of Forsterite. See *Fayalite*.ONOFRITE: Seleniferous variety of *Cinnabar* or *metacinnabarite*.

Cen.—Kalgoorlie.

OPAL: $\text{nSiO}_2 \cdot \text{H}_2\text{O}$

Common opal is of wide spread occurrence in the State. The other varieties of opal recorded are:—

(1) *Precious opal.*

Cen.—Coolgardie.

(2) *Hyalite.*

N.W.—Gaseoyne River, Horseshoe.

Mur.—Cue.

S.W.—Bremer Bay, Northam.

Cen.—Bullfinch, Koolyanobbing.

(3) *Opal in diatomite and spongolite.*

N.W.—Point Cloates.

S.W.—Allanooka, Chapman Valley (Mt. Erin and Narra Tarra), Isseka, Albany, Arrino, Arrowsmith Valley, Beermullah, Bremer Bay, Cape Riche (Cheyne Bay), Dandaragan, Fitzgerald River, Gingin, Gasmere, Irwin Valley, Lake Brown, Lake King, Lower Palinup River, Mandogolup, Minginew, Moora, Perth, Ravensthorpe, Strawberry, Tambellup, Upper Kalgan River, Wanneroo, Yatheroo, Muchea, Moora.

Cen.—Paris (St. Ives).

Euc.—Cape Arid, Dowak, Dundas, Esperance, Norseman (and Princess Royal), Peak Charles.

ORPIMENT: As_2S_3

Cen.—Kalgoorlie.

ORTHOCLASE: KAlSi_3O_8

A common constituent of granites, and also in some pegmatites.

OSMIRIDIUM: Os_nIr

Cen.—Mt. Ida.

PALYGORSKITE: $\text{H}_4\text{Al}_2\text{Si}_2\text{O}_9 \cdot 2\text{H}_2\text{O} + \text{H}_4\text{MgSi}_3\text{O}_9 \cdot 2\text{H}_2\text{O}$

Palygorskite.

Mur.—Dartmoor.

Pilotite.

N.E.—Wadara Hills.

PENNINITE: See *Chlorite*.

PEROVSKITE: CaTiO_3

Kim.—Fitzroy Valley (volcanic rocks).

PETALITE: $\text{LiAlSi}_4\text{O}_{10}$

Cen.—Londonderry.

PETZITE: Ag_3AuTe_2

Cen.—Kalgoorlie, Mulgabbie.

PHARMACOSIDERITE: $\text{KFe}'''_{10}(\text{OH})_{10}(\text{AsO}_4)_7 \cdot 15\text{H}_2\text{O}$

Cen.—Coolgardie, Marda, Evanston.

PHLOGOPITE: $\text{H}_2\text{KMg}_3\text{Al}(\text{SiO}_4)_3$

Kim.—Fitzroy Valley (volcanic rocks).

PICKERINGITE: $\text{MgAl}_2(\text{SO}_4)_4 \cdot 22\text{H}_2\text{O}$

N.W.—Glen Ross, Lyons River, Nullagine, Upper Gascoyne.

S.W.—South Irwin River, Minginew (19 miles north east of).

Cen.—Mulline.

PIGEONITE: Calcareous variety clinoenstatite. See *Enstatite*.

PILBARITE: $\text{PbThU}^6 \cdot \text{Si}_2\text{O}_{10} \cdot 4\text{H}_2\text{O}$

N.W.—Wodgina.

PILOLITE: $n\text{H}_4\text{MgSi}_3\text{O}_9 \cdot 2\text{H}_2\text{O} + \text{H}_4\text{Al}_2\text{Si}_2\text{O}_9 \cdot 2\text{H}_2\text{O}$

N.E.—Wadara Hills. (See under *Palygorskite*.)

PISANITE: $\text{FeCu}(\text{SO}_4)_2 \cdot 14\text{H}_2\text{O}$ See *Chalcanthite*.

PLEONASTE: See *Spinel*.

PLAGIOCLASE: Common in intermediate and basic rocks in the State. See *albite*, *oligoclase*, *labradorite*, *bytownite*, *anorthite*.

PLUMBOJAROSITE: $\text{PbFe}'''_6(\text{OH})_{12}(\text{SO}_4)_4$
See *Beaudantite*.

POLIANITE: MnO_2

Kim.—Hall's Creek.

N.W.—Oakover River.

Mur.—Horseshoe, Mt. Magnet, Mt. Palgrave, Pindar, Robinson Ranges.

S.W.—Coppermine Creek, Eyre Range.

Cen.—Mt. Walton (near Wallangie).

POWELLITE: CaMoO_4

Mur.—Gullewa, Mulgine.

S.W.—Mahogany Creek, Spencer's Brook.

Cen.—Dodgers.

PREHNITE: $\text{H}_2\text{Ca}_2\text{Al}_2(\text{SiO}_4)_3$

Kim.—Denham River, Ord River, Texas Station, Turkey Creek.

Cen.—Comet Vale, Coolgardie, Mt. Palmer, Londonderry.

PROCHLORITE: See *Chlorite*.

PROUSTITE: Ag_3AsS_3

N.W.—North Shaw.

Cen.—Kalgoorlie.

PSEUDOBROOKITE: Fe_2TiO_5

S.W.—Coate's Siding (?) in titaniferous iron ore.

PSEUDOMALACHITE: See *Dihydrite*.

PSILOMELANE: $\text{H}_2\text{O}(\text{H,K})_2\text{O.MnO.6MnO}_2$

(1) *Psilomelane as a prominent constituent of manganese ores.*

Kim.—Brockman's, Hall's Creek, Narlarla, Alice Downs.

N.W.—Braeside, Christmas Creek, Corunna Downs, Hamersley Range, Milgun, Mt. Stuart, Mt. Weld, Mooloo Downs, Murra Munda, Nullagine, Foebourne, Roy Hill Station (Alunite Gully, Chichester Range), Tambourah, Teano Range, Tower Station, Warrawoona, Warrawagine, Yinnietharra, Mooloogool Station, Rocklea Station, Nullagine, Marble Bar District.

Mur.—Horseshoe, Mt. Fraser, Peak Hill, Pinyalling, Robinson Ranges, Balfour Downs Station.

S.W.—Coppermine Creek, Eyre Range, Fitzgerald River, Geraldine, Gutha, Hamersley Gorge, Kundip, Mundijong, Mt. Desmond, Ravensthorpe, Stirling Range, Villier's Find, between Cranbrook and Tenterden, Res. 20510 Phillips River, Tenindewa.

Cen.—Broad Arrow, Golden Ridge, Gwalia, Kalgoorlie, Mt. Walton (Reid's Find, Wallangie), Parker's Ra. (Mt. Caudan), Laverton, Bremer Range.

Euc.—Balladonia, Norseman (3 miles east of).

(2) *Psilomelane in dendritic forms; encrusting or replacing other Minerals.*

N.W.—Mt. Francisco, Wodgina, Whim Creek.

Mur.—Koolanooka, Meekatharra, Mulgine, Nannine, Payne's Find, Poona.

S.W.—Burges' Find, Byford, Kendenup.

Cen.—Comet Vale, Coolgardie, Goongarrie, Kalgoorlie, Laverton, Murrin, Niagara, Pindinnie, Sudden Jerk.

(3) *Psilomelane in laterite, as a cement or in alluvial material.*

Kim.—May River.

S.W.—Barrabup, Dangin, Greenbushes, Greenmount, Mt. Barker, Perth, Quindalup, Waterloo.

(4) *Psilomelane in lodes accompanying other minerals.*

N.W.—Bamboo, Roebourne (8 miles west of), Ilgarere.

Mur.—Abbott's, Burnakura, Cue, Mt. Magnet, Quinn's, Meekatharra, Warriedar.

S.W.—Kundip, Oakabella.

Cen.—Binduli, Darlot, Davyhurst, Gibraltar, Kalgoorlie, Mulgarrie, Parker's Range (Mt. Caudan), Siberia, Southern Cross, Yerilla, Pike's Hollow.

(5) *Asbolite (cobaltiferous psilomelane).*

N.W.—Braeside, Warrawoona.

S.W.—Clackline, Greenbushes, Mt. Barker.

Cen.—Burbanks, Kalgoorlie, Kanowna, Kurnalpi, Leonora, Murrin, Niagara, Westonia.

Euc.—Norseman.

(6) *Romanéchite (bariferous psilomelane).*

Kim.—Christmas Creek.

N.W.—Gorge Creek.

Mur.—Geraldine.

PUCHERITE: BiVO_4

S.W.—Westonia.

Cen.—Belchambers, Holleton, Londonderry, Niagara.

PURPURITE: $2\text{Mn}^{++}\text{PO}_4 \cdot \text{H}_2\text{O}$

N.W.—Wodgina.

PYRITE: FeS_2

- (1) In lodes with gold and/or copper minerals, or as the principal mineral in lodes.

Kim.—Brockman's, Hall's Creek, Mt. Dockrell, Narlarla, Pantton, Ruby Creek.

N.W.—Bamboo, Bangemall, Croydon, Eastern Creek, Friendly Creek, Glenroebourne, Hong Kong, Jimblebah, Mons Cupri, Nullagine, Station Peak, Tambourah, Talga Talga, Uaroo, Warrawoona, Whim Creek, Yandicoogina, Marble Bar, Yinnietharra, Weerianna C.M.

Mur.—Carlaminda, Coodardy (Big Bell), Cue, Eelya, Erroll's, Garden Gully, Island-Mainland, Jasper Hill, Meekatharra, Mikhaburra (Holden's Find), Mt. Magnet, Nannine, Paynesville, Peak Hill, Quinn's, Reedy's, Stake Well, Tuckanarra, Yalgoo, Yaloginda, Malloch's Well.

S.W.—Bindoon, Carragarrup, Galena, Geraldine, Kundip, Mt. Desmond, Mulgine, Nabawa, Northampton, North Dandalup, Oakagee, Ravensthorpe, McDonald's Reward C. (Mt. Gibson), Manjimup, Northam, Wilthorpe, White Peak.

Cen.—Bardoe, Barrambie, Birrigrin, Broad Arrow, Bullfinch, Burtville, Burbidge (Gt. Victoria), Carbine, Carnage, Coolgardie, Comet Vale, Darlot, Davyhurst, Edjudina, Erlistoun, Feysville, Golden Ridge, Golden Valley, Kathleen Valley, Kalgoorlie, Kanowna, Kookynie, Koolyanobbing, Kurnalpi, Laverton, Lawlers, Linden, Love's Find, Marda, Marvel Loch, Menzies, Morgan's, Mulgabbie, Mulline, Mulwarrie, Murrin, Mt. Clifford, Mt. Ida, Niagara, Ora Banda, Parker's Range (Mt. Caudan), Red Hill, Sandstone, Siberia, Sir Samuel, Southern Cross, Spargoville, St. Ives, Tampa, Windanya, Wiluna, Yarri, Yerilla, Yundamindera, Lancefield, Mt. Palmer, Corinthinian, Clampton, Pailland's Find, Pyke's Hollow, Riverina, Youanmi, Westonia.

Euc.—Bremer Range, Norseman.

(2) *Pyrite in small grains in rocks.*

N.W.—Hamersley Range, Arthur River (Coondoo).

Mur.—Meekatharra, Noralling District, Big Bell, Wongoondy (via Mullewa).

S.W.—Bunbury, Greenmount, Moora, Mulgine, Statham's, Swan View, Toodyay, York, Dinninup, Stirling Range, Waddington, Phillips River G.F., Dambouring, Hamersley Range, Mt. Helena, Berakin, Darkan.

Cen.—Binduli, Celebration, Golden Ridge, Kalgoorlie, Kanoona, Lake Bryde, Marvel Loch, Ora Banda, Sandstone.

(3) *Pyrite in sedimentary rocks, soils or unconsolidated sediments.*

Kim.—Broome, Derby, Derby-Lennard Road, Mt. Wynne.

N.W.—Binthalya Station, Bulla Downs, Dairie Creek, Millstream Station, Mt. Florence Station, Mulga Downs, Tambrey, Yalleen (Mt. Enid Station).

Mur.—Gladstone.

S.W.—Busselton, Collie, Dardanup, Donnybrook, Gantheaume Bay, Geraldton, Gosnells, Guildford, Jarrahwood, Kokatea Creek, Minginew, Moora, Mt. Erin, Nannup, Nornalup, Perth, Rosa Glen, Yardarine, Albany-Denmark Road (89-mile post).

Cen.—Kalgoorlie.

Euc.—Norseman.

(4) *Miscellaneous.*

N.W.—Myroodah Station.

Mur.—Cue.

PYROCHLORE: $\text{NaCaFNb}_2\text{O}_6(+\text{NaCeFTiNbO}_6)$

N.W.—Moolyella (?).

S.W.—Greenbushes.

PYROLUSITE: MnO_2

Kim.—Hall's Creek, Thompson Creek (off Mary River).

N.W.—Ashburton Downs, Bangemall, Braeside, Bulla Downs, Corunna Station, Cullandie, Gialong, Hale's Well, Hamersley Station, Mt. Agnes, Mt. Edith, Mt. Stuart, Nicol River, O'Grady's Creek, Roy Hill (Alunite Gully, Chichester Range), Towera Station, Uaroo, Wyloo Station, Yandicoogina, Balfour Downs, Nullagine.

Mur.—Horseshoe, Mt. Magnet.

S.W.—Coppermine Creek, Desmond, Eyre Range, Fitzgerald River, Tenindewa.

Euc.—Esperance.

PYROMORPHITE: $\text{Pb}_3\text{Cl}(\text{PO}_4)_2$

Kim.—Hall's Creek.

N.W.—Braeside (Gregory Ranges), Eastern Creek, Mosquito Creek, Mt. Alexander, Mt. Amy, Uaroo, Western Shaw, Whim Creek (and Mons Cupri).

Mur.—Cue, Geraldine, Nabawa, Narra Tarra, Northampton.

S.W.—Geraldton, Galena.

Cen.—Leonora, Wilson's Patch, Westonia.

Euc.—Norseman.

PYRRHOTITE: Fe_7S_8

N.W.—McPhees Range, Wodgina, Nullagine.

Mur.—Cue, Coodardy (Big Bell), Day Dawn, Gullewa, Mt. Magnet, Reedys.

S.W.—Gosnells, Kundip, Mt. Desmond, Perth, Ravensthorpe, Yericoin, York, Zigzag.

Cen.—Broad Arrow, Bullfinch, Burbanks, Burbridge, Comet Vale, Coolgardie, Corinthian, Davyhurst, Golden Valley, Goongarrie, Hampton Plains, Holleton, Kalgoorlie, Laverton, Lawlers, Logan's Find, Marvel Loch, Menzies, Mulgabbie, Mulwarrie, Mulline, Nevoria, Ora Banda, Parker's Range (Mt. Caudan), Red Hill, Southern Cross, Spargoville, St. Ives, Radio Group (Bullfinch), Colreavy, Ennuin, Bullseye G.M. (N. Yilgarn), Yellowdine District, Westonia.

Euc.—Norseman.

QUARTZ: SiO_2

Abundant throughout the State in the form of:—

(1) Crystalline quartz in reefs; quartz crystals; siliceous replacement of other minerals.

(2) Chalcedony, as in jasper bars; chrysoprase, flint, chert, etc.

(3) Sandstones and quartzites and other siliceous sedimentary rocks.

(4) Beach, dune, desert, residua, sand-plain soils. (Some sands in the vicinity of Perth are pure enough to be used as glass sands.)

Quartz crystals have been recorded from the following localities:—

Kim.—Argyle Downs Station, Federal Downs.

N.W.—Ashburton River, Coobina (Sylvania Station), Coongong, Cooyapooya Station, Lyons River, Nullagine, Nungarrie Gorge, Peake Station, Roebourne District, Day Dawn, Upper Gascoyne River.

Mur.—Mt. Magnet, Paynesville, Poona.

S.W.—Baker's Hill, Balkuling, Balingup, Beverley, Buntine, Corrigin, Dajoin, Dargin, East Doodenanning, Flinders Bay, Koorda, Korrelocking, Kwolyin, Lower Chittering, Manmanning, Meckering, Merredin, Mingenew, Moodiarrup, Mukinbudin, Narra Tarra, Northam, North Mollerin, Payne's Find, Pinjarra, Pithara, Quairading, Quindalup, Toodyay, Walpole, West Popanyinning, West Wubin, West Yoting, Wongan Hills, Yalgoo, Yorkrakine.

Cen.—Bullfinch, Comet Vale, Coolgardie, Davyhurst, Golden Ridge, Kalgoorlie, Kanowna, Moorine Rock.

Euc.—Fraser Range.

REALGAR: AsS

Cen.—Kalgoorlie.

RHODONITE: MnSiO_3

S.W.—Hamersley River.

RIEBECKITE: $\text{H}_2\text{Na}_2\text{Fe}_2''\text{Fe}'''_2(\text{SiO}_3)_8$

N.W.—Duck Creek, Hamersley Range, Mt. McRae, Mt. Margaret, Willi Willi Spring, Yampire Gorge.

Cen.—Bardoc, Gilgarna Rock.

ROMANÉCHITE: Cobaltiferous variety of *Psilomelane*, which see.

Kim.—Christmas Creek.

N.W.—Gorge Creek.

S.W.—Geraldine.

ROSCOELITE: $\text{H}_2\text{KAl}_2\text{V}(\text{SiO}_4)_3$

See *Muscovite*.

ROSTERITE: See *Beryl*.

RUTILE: TiO_2

(1) Commonly occurs as an accessory mineral in various kinds of rocks and in soils and sediments.

(2) Occurs in large crystals or crystalline masses at the following localities:—

N.W.—Edmund River.

Mur.—Coodardy (Big Bell).

S.W.—Yulgering.

SALAMMONITE: NH_4Cl

Mur.—Irwin.

S.W.—Mandogolup.

SALT: NaCl See *Halite*.

SAPPHIRINE: $\text{Mg}_3(\text{Al}, \text{B})_{12}\text{Si}_2\text{O}_{27}$

S.W.—Dangin.

SCHEELITE: CaWO_4

N.W.—Friendly Creek, Marble Bar, Mosquito Creek, Station Peak, Western Shaw River, Wodgina.

Mur.—Callie Soak, Coodardy, Big Bell, Cue, Melville, Mt. Magnet, Poona, Tuckanarra, Weld Range.

S.W.—Carracarrup (Kundip), Corrigin, Greenbushes, Hatter's Hill, Jimperding.

Cen.—Birrigrin, Clampton, Comet Vale, Coolgardie, Davyhurst, Doyle's Well, Higginsville, Hollow's Find, Kalgoorlie, Kanowna, Laverton, Marvel Loch, Mulwarrie, Mungari, Ora Banda, Parker's Range, Pingin, Southern Cross, Ennuin, Mt. Monger, Westonia.

Euc.—Norseman.

SCHORL: A variety of *Tourmaline*.

SCHREIBERSITE: Fe_3P A constituent of meteoric iron.

SCORODITE: $\text{FeAsO}_4 \cdot 2\text{H}_2\text{O}$

Kim.—Clara Hill (Napier Downs), Hall's Creek, Richenda River.

N.W.—Hardy River, Marble Bar.

Mur.—Abbotts, Field's Find, Garden Gully, 10 miles north of Yalgoo, Warriedar, Yalgoo.

Cen.—Coolgardie, Evanston, Marda, Randall's, Southern Cross.

SELIGMANNITE: CuPbAsS_2

Cen.—Kalgoorlie.

SENARMONTITE: Sb_2O_3

N.W.—Peewah, Whim Creek District.

SERPENTINE: Antigorite, $\text{H}_4\text{Mg}_3\text{Si}_2\text{O}_{10}$, (but variable).

(1) *Derived mainly from forsterite or olivine.*

N.W.—Box Soak (Wallareenya Station), Meilga Station, Mt. Francisco, Roebourne, Sherlock River, Soanesville, Warrawoona.

Mur.—Currans, Field's Find, Garden Gully.

S.W.—Balkuling, Geraldine, Northam, Rothsay, York.

Cen.—Bulong, Carnilya, Coolgardie, Erlistoun, Golden Ridge, Kalgoorlie, Malcolm, Monger, Mt. Burges, Mt. Juglah, Murrin, Ora Banda, Waverley, Westonia.

(2) *Derived mainly from enstatite or hypersthene.*

N.W.—Balla Balla, Jimblebah, Lionel, Mt. Gregory, Station Peak.

Mur.—Belele, Meekatharra.

S.W.—Dcsmond, Ninghanboun Hills, Round Hill, Toodyay.

Cen.—Comet Vale, Goongarrie, Paddington, Vetersburg.

(3) *Original mineral unknown.*

N.W.—Bullock Well, Eginbah, Mt. Clere Station, Mt. Satirist Station, Nunyarrie Creek, Talga Talga.

Mur.—Cue, Lennonville, Payne's Find.

S.W.—Bindi Bindi, Burngup, Goomalling, Meenaar, Mid Mt. Ironcap, Munglinup, Wongan Hills.

Cen.—Bardoc, Celebration (Mt. Goddard), Gindalbie, Gordon, Juston's Rock, Kanowna, Linden, Lore's Find, Millar Hill, Mt. Celia, Mt. Howe, Mt. Percy, Paris, Pyke Hill, St. Ives, Yeedie Bulgar, Yundamindera.

Euc.—Young River Area.

SIDERITE: FeCO_3

Kim.—Narlarla.

N.W.—Bamboo, Bangemall, Bidgemia, Braeside, Talga Talga, Warrawoona, Wyloo.

Mur.—Coodardy, Jasper Hill, Meekatharra, Wadgingarra, Yalgoo.

S.W.—Collie, Fitzgerald River, Goodingnow (Payne's Find), Greenbushes, Gunyidi, Hamersley Gorge, Margaret River, Moora, Northampton, Perth, Quindalup, Rothsay.

Cen.—Burbanks, Coolgardie, Edjudina, Kalgoorlie, Menzies, Paddington, Parker's Range (Mt. Caudan), Southern Cross, Westonia.

Euc.—Norseman.

SIDEROPHYLLITE: See *Biotite*.SILLIMANITE: $\text{Al}_2\text{O}_3 \cdot \text{SiO}_2$

Kim.—Granite Hills, Margaret River.

N.W.—Station Peak, Yinnietharra.

S.W.—Chittering (Middle), Chittering (Lower) and Goyamin Pool, Clackline, Danberrin, Denmark, Donnybrook, Din-ninup, Field's Find, Geraldine, Gabbin, Geraldton, Greenbushes, Imperding Valley, Kununoppin, Lake Brown, Margaret River and Ellensbrook, Manjimup, Ninghanboun Hills, Northam, Pingelly, Toodyay, Wogramine, Wongan Hills.

Cen.—Sandalwood Rock, Leonora, Westonia.

SILVER, NATIVE: Ag

Kim.—Pentecost River (Speewah Station).

N.W.—North Shaw.

Mur.—Nannine.

Cen.—Bullfinch, Murrin.

SIMPSONITE: $2\text{H}_2\text{O} \cdot \text{CaO} \cdot 5\text{Al}_2\text{O}_3 \cdot 4\text{Ta}_2\text{O}_5$

N.W.—Tabba Tabba.

SMITHSONITE: ZnCO_3

Kim.—Narlara.

N.W.—Andover, Braeside, Croydon, Glenroebourne, Marble Bar, Middle Creek, Mt. Augustus, West Wodgina, Yandicoogina.

S.W.—Geraldine, Northampton.

Cen.—Burbanks, Mayfield Group (North Yilgarn).

SPESSARTITE: $\text{Mn}''_3\text{Al}_2(\text{SiO}_4)_3$

N.W.—Abydos, McPhees Range, Moolyella, Stannum, Tabba Tabba, Western Shaw River, Wodgina.

Mur.—Melville.

S.W.—Coppermine Creek, Hamersley Gorge, Mullalyup.

Cen.—Londonderry, Mulline.

Euc.—Dundas.

SPHENE: $\text{CaO} \cdot \text{TiO}_2 \cdot \text{SiO}_2$ (1) *Sphene in igneous and metamorphic rocks.*

N.W.—Bangemall, Roebourne.

Mur.—Cue, Jasper Hill, Meekatharra.

S.W.—Donnybrook, Denmark, Greenbushes, Jimperding, Lower Palinup River, Ninghanboun Hills, Payne's Find, Ravensthorpe, Upper Swan, Westonia, Bussel Brook area.

Cen.—Binduli, Brooking Range, Bulong, Coolgardie, Diemels, Ennuin, Gilgarna Rock, Hell's Gates, Kalgoorlie, Kookynie, Lawlers, Logan's Find, Londonderry, Marvel Loch, Monger, Mungari, Nevoria, Niagara, Ora Banda, Point Salvation, Sandstone, Southern Cross, Yeedie Bulgar Ranges, Youanmi.

Euc.—Bremer Range, Lower Goddard Creek.

S.E.—Cavenagh Range.

(2) *Sphene in soils, sediments and sedimentary rocks.*

N.W.—Wandagee.

S.W.—Alexander Bridge, Bunbury, Denmark, Donnybrook, Gingin, Irwin River, Lake Brown, Lake Kathleen, Lake King, Margaret River, Nornalup.

Cen.—Comet Vale, Goongarrie, Kanowna, Kalgoorlie, Kookynie, Leonora, Southern Cross, Yerrilla.

SPINEL: MgAl_2O_4

N.W.—Mt. Francisco (Yandeyarra Station), Pilgangoora.

S.W.—Ajana, Albany, Augusta, Culham, Denmark, Geraldine, Goomalling, Greenhills, Holleton, Miling, Mornington, Namhan, Naorang, Nornalup, Pemberton, Toodyay, Greenbushes, Nannup, Harold Bay.

Cen.—Gibraltar, Kalgoorlie.

SPODUMENE: $\text{LiAl}(\text{SiO}_3)_2$

N.W.—McPhees Range, Tappa Tappa, Wodgina.

S.W.—Ravensthorpe.

Cen.—Davyhurst, Ubini.

STAUROLITE: $\text{HFe}''\text{Al}_5\text{Si}_2\text{O}_{15}$

Kim.—Devil's Gorge (Napier Range), Fairfield Station, Lenard River (Mt. Broome), Hawkestone Creek, Mary River, Moondoon, Mt. House Station, Richenda River.

N.W.—Mt. James, Yinnietharra.

S.W.—Balingup, Bridgetown, Cape Leeuwin, Caversham, Cheyne's Bay, Chittering (Upper, Middle and Lower), Denmark, Gillingarra (and Mogumber), Gingin, Greenbushes, Lake Brown, Manjimup, Nornalup, Ninghanboun Hills, Pemberton, Perth, Ravensthorpe Range, Smithfield, West Mt. Barren, Torbay Inlet, Hamersley Beach, Coleman Inlet, Nannup, Hamelin Bay.

Cen.—Bulong, Marvel Loch, Southern Cross, Mallee Creek (6 miles south Mt. Varden).

STIBICONITE: $\text{Sb}_2\text{O}_4 \cdot \text{H}_2\text{O}$ (1) *In gold veins.*

N.W.—Mallina, Middle Creek, Mt. Negri.

Mur.—Magnet, Mt. Seabrook, Payne's Find, Weld Range.

Cen.—Leonora, Mulline, Nevoria, Wiluna.

(2) *In veins of other types.*

N.W.—Mt. Stuart.

S.W.—Hamersley Gorge.

STIBIOTANTALITE: $\text{Sb}_2(\text{Ta}, \text{Nb})_2\text{O}_8$

S.W.—Greenbushes.

STIBNITE: Sb_2S_3 N.W.—Bamboo Creek, Mallina, Middle Creek, Mt. Negri,
Peewah, Sherlock Crossing, Whim Creek.

Mur.—Coodardy (Big Bell), Mulga Mulga, Mt. Magnet.

Cen.—Clampton, Golden Valley, Kalgoorlie, Wiluna, Bulls-
eye G.M. (North Yilgarn), Youanmi.STILBITE: $\text{CaAl}_2\text{Si}_6\text{O}_{16} \cdot 6\text{H}_2\text{O} (+\text{NaAlSi}_3\text{O}_{10} \cdot 6\text{H}_2\text{O})$

S.W.—Parkerville, Westonia, Zigzag and Gooseberry Hill.

Cen.—Comet Vale, Speakman's (Callion), Mt. Palmer.

STRUVERITE: $\text{FeTa}_2\text{O}_6 + \text{Ti}_2\text{O}_3$

N.W.—Globe Hill.

S.W.—Smithfield.

Ilmenorutile.

N.W.—Globe Hill.

Mur.—Dalgety Downs, Melville, Poona.

S.W.—Mt. Dale, South Yalgoo.

SULPHUR: S

Mur.—Peak Hill.

S.W.—Baandee, Bluff River, Cannington, Cliff Head (Dooka),
Coal Creek, Denmark, Dongarra, Geraldton, Kalamunda,
Lake Pinjar, Northampton, Rockingham, Toodyay.

Cen.—Yarri.

SYLVANITE: $(\text{Au}, \text{Ag})\text{Te}_2$

Cen.—Kalgoorlie-Boulder.

SYMPLESITE: $\text{Fe}''_3(\text{AsO}_4)_2 \cdot 8\text{H}_2\text{O}$

S.W.—Kundip, Ravensthorpe.

Cen.—Evanston.

TAENITE: FeNi to Fe_3Ni . Occurs in meteoritic irons.TAGILITE: $\text{Cu}_2(\text{OH})\text{PO}_4 \cdot \text{H}_2\text{O}$

S.W.—Watheroo.

TALC: $\text{H}_2\text{Mg}_2(\text{SiO}_3)_4$

N.W.—Bamboo, Henry River, Marble Bar, McPhees Range, Mooloo Downs, Mt. Francisco, Nimingarra Station, Peake Station, Soanesville, Station Peak, Warrawoona, Yarra Yarra Creek, Dalgety Downs.

Mur.—Boogardie, Cue, Jasper Hill, Meekatharra, Mt. Gould, Mt. Magnet, Mt. Taylor, Poona, Quinn's, Yaloginda, Yoweragabbie, Warriedar.

S.W.—Balingup, Balkuling, Beverley, Bremer Bay, Collie, Coondle, Culham, Donnelly River, Donnybrook, Glen Lynn (and Bridgetown), Goomalling, Hamersley, Kirup, Kundip, Kwolyin, Moora, Manjimup, Mulalalyup, Ninghanboun Hills, Ravensthorpe, St. John's Brook, Toodyay, Three Springs, Wagerup, Wellington Mills, Wilgarrup, Wongamine, York, Dangin, Dininup, Cranbrook, Bolgart, Toodyay, Greenbushes.

Cen.—Bullfinch, Bulong, Burbanks, Comet Vale, Coolgardie, Corboy's, Darlot, Davyhurst, Feysville, Golden Ridge, Kalgoorlie, Kanowna, Koolyanobbing, Lake Ballard, Lawlers, Laverton, Leonora, Linden, Menzies, Monger, Mulgarrie, Mt. Juglah, Nunngarra, Ora Banda, Paddington, Parker's Range, Pyke's Hollow, Red Hill, Sandstone, Siberia, Southern Cross, Vetttersburg, Windanya, 60 miles north-west Coolgardie, 50 miles north-west Coolgardie.

TAMARUGITE: $\text{NaAl}(\text{SO}_4)_2 \cdot 6\text{H}_2\text{O}$

Kim.—Texas Station.

N.W.—Upper Gascoyne.

Mur.—Callytharra Spring.

S.W.—Denmark, South Irwin River.

TANTALITE: $(\text{Fe}, \text{Mn})(\text{Ta}, \text{Nb})_2\text{O}_6$ See also *Manganotantalite*.

Kim.—Mt. Dockrell.

N.W.—Lalla Rookh (Tabba), Mt. York (Green's Well and McPhees Range), Nullagine, Western Shaw, Yinnietarra.

S.W.—Balingup, Greenbushes.

Cen.—Holleton, Logan's Find.

Euc.—Bellinger, Dundas, Israelite Bay.

TANTALOPOLYCRASE: YTaNi_2O_6

N.W.—Abydos, Cooglegong, Eleys, Mt. Francisco, Tambourah, White Springs Station, Wodgina. Woodstock.

TANTEUXENITE: $\text{YTi}_2\text{TaO}_8 (+\text{CaTiTa}_2\text{O}_8)$

N.W.—Abydos, Cooglegong, Eleys, Mt. Francisco, Tambourah, White Springs Station, Wodgina, Woodstock.

TAPIOLITE: FeTa_2O_6

N.W.—McPhees Range and Green's Well, Tabba Tabba and Strelley, Western Shaw River, Wodgina.

S.W.—Greenbushes, Jimperding.

TENNANTITE (FAHL-ORE): Cu_3AsS_3 or $\text{Cu}'_{10}\text{Cu}''\text{As}_4\text{S}_{13}$ (1) *Tennantite*.

Mur.—Meekatharra, Quinns.

Cen.—Broad Arrow, Kalgoorlie, Mulgabbie, Ora Banda, Palmer's Find.

(2) *Tetrahedrite*.

S.W.—Hamersley Gorge, Kundip.

Cen.—Kalgoorlie, Ora Banda, Wiluna.

TENORITE: CuO

Kim.—Hall's Creek.

N.W.—Glenroebourne, Red Hill, Uaroo, Whim Creek, Ilgarere.

S.W.—Kundip, Narra Tarra, Northampton, Ravensthorpe, Rothsay.

TETRADYMIT: $\text{Bi}_2\text{Te}_2\text{S}$

N.W.—Weston's.

S.W.—Ravensthorpe, Rothsay.

Cen.—Coolgardie, Kalgoorlie, Lawlers, Niagara.

TETRAHEDRITE (FAHL-ORE): See *Tennantite*.THENARDITE: Na_2SO_4

N.W.—Callytharra Spring, Hillside Station.

S.W.—Nabawa.

Cen.—Kalgoorlie.

THOROGUMMITE: = *Nicolayite*.THURINGITE: Daphnite, see *Chlorite*.TIN, NATIVE: Sn

S.W.—Greenbushes (artificially produced), Nannup.

TITANITE: See *Sphene*.

TOPAZ: $\text{Al}_2(\text{F,OH})_2\text{SiO}_4$

N.W.—Globe Hill, Stannum, Wodgina.

Mur.—Melville, Poona, Callie Soak.

S.W.—Greenbushes.

Cen.—Londonderry.

Euc.—Fraser Range.

TOURMALINE: A complex silicate of boron and aluminium with magnesium, iron, or the alkali metals. *Dravite*, *Elbaite*, *Schorl* and *Tourmaline* of undetermined species occur in many different kinds of rocks, igneous, metamorphic and sedimentary, throughout the State.

TREMOLITE: $\text{H}_2\text{Ca}_2\text{Mg}_3(\text{SiO}_3)_8$

Occurs in greenstones in a number of localities throughout the State and may be asbestiform.

TRIPHYLITE: LiFe''PO_4

Kim.—Mt. Dockrell.

N.W.—Yinnietharra.

TROILITE: FeS

Occurs in meteoritic iron.

TRONA: $\text{HNa}_3(\text{CO}_3)_2 \cdot 2\text{H}_2\text{O}$

N.W.—Hillside.

TURGITE: $2\text{Fe}_2\text{O}_3 \cdot \text{H}_2\text{O}$?

Possibly a mixture of hematite and goethite. See *Hematite* and *goethite*.

TYROLITE: $\text{Cu}_5(\text{OH})_4(\text{AsO}_4)_2 \cdot 7\text{H}_2\text{O}$

See *Olivenite*.

VALENTINITE: Sb_2O_3

N.W.—Mallina, Peewah.

Mur.—Mt. Magnet.

en.—Youanmi.

VANADINITE: $\text{Pb}_5\text{Cl}(\text{VO}_4)_3$

Kim.—Mt. Dockrell.

N.W.—Duck Creek, Gregory Range (Braeside), Talga Talga, Western Shaw.

Mur.—Field's Find, Melville, Paynesville, Yalgoo.

S.W.—Pinyalling.

Cen.—Baumgarten's Find, Burbanks, Burbidge, Carmen's Find, Coolgardie, Ennuin, Holleton, Menzies, Mulline, Nevoria, Parker's Range.

VARISCITE: $\text{AlPO}_4 \cdot 2\text{H}_2\text{O}$

- Kim.—White Island, Yampi.
Mur.—Belele Station.
S.W.—Collie, Ninghanboun Hills, Ravensthorpe.
Cen.—Ubini.
Euc.—Recherche Archipelago.

VERMICULITE: Hydrated silicates related to chlorites.

(1) *Brown Vermiculite.*

- Mur.—Melville.
S.W.—Bejoording, Bridgetown, Collie, Young River, Goomalling, Mullalyup, Nungarin, Wellington Mills, York, Dangin.
Cen.—Comet Vale, Coolgardie, Gibraltar, Holleton, Marvel Loch.
Euc.—Young River area.

(2) *Green Vermiculite.*

- Cen.—Bulong.

VESUVIANTE: $\text{Ca}_{12}\text{Al}_6(\text{OH})_4\text{Si}_6\text{O}_{30}$

- N.W.—Mt. Francisco, Tambourah, Wodgina.
S.W.—Goomalling.

VIVIANITE: $\text{Fe}^{++}_3(\text{PO}_4)_2 \cdot 8\text{H}_2\text{O}$

- S.W.—Dandaragan.

WADEITE: Potassium zirconium silicate.

- Kim.—Wolgidee Hills.

WAVELLITE: $\text{Al}_3(\text{OH},\text{F})_3(\text{PO}_4)_2 \cdot 5\text{H}_2\text{O}$

- S.W.—Dandaragan.

WEISSITE: Cu_3Te_3

- Cen.—Kalgoorlie.

WITHERITE: BaCO_3

- Kim.—Golden Gate.

WOLFRAM: See *Ferberite* and *Huebnerite*.WULFENITE: PbMoO_4

- N.W.—Uaroo, Whim Creek.
Mur.—Melville.
S.W.—Westonia.
Cen.—Comet Vale, St. Ives, Southern Cross.

XENOTIME: $(Y,Er)PO_4$

N.W.—Abydos, Nullagine, Yinnietharra.

S.W.—Donnybrook, Greenbushes, Lowden, Ninghan, Smithfield, Wongan.

Cen.—Holleton, Niagara, Westonia.

YTTROTANTALITE: $YTaO_4$

N.W.—Cooglegong, Split Rock Station.

ZINNWALDITE: $H_5K_2Li_4Al_2Si_6O_{22} + H_4K_2Fe''_3Al_4Si_5O_{22}$

S.W.—Ravensthorpe (12 miles south west of).

Cen.—Londonderry, Ubini.

ZIRCON: $ZrSiO_4$. Occurs as an accessory mineral in granites and gneisses and in some sedimentary rocks, beach sands, river sands, etc., etc.

ZOISITE: $HCa_2Al_2Si_3O_{13}$ (and *Clinzoisite*).

Occurs in altered greenstones in many parts of the State.