

TABLE 2. ANGLE TABLE FOR GAYLUSSITE

Monoclinic	$a:b:c = 1.4878:1:1, 4453$	$\beta = 102^\circ 00\frac{1}{2}'$
	$\rho_0 q_0:1 = 0.97413:1, 4137:1$	$\mu = 77^\circ 59\frac{1}{2}'$
	$r_2:q_2:1 = 0.70737:0.68716:1$	
	$\rho'_0 = 0.99316, q'_0 = 1.4453$	$x_0' = 0.21725$
Form	ϕ	ρ
<i>c</i> {001}	90°00'	12°00 $\frac{1}{2}$ '
<i>b</i> {010}	0 00	90 00
<i>a</i> {100}	90 00	90 00
<i>m</i> {110}	34 30	90 00
<i>e</i> {011}	8 22 $\frac{1}{2}$	55 36 $\frac{1}{2}$
<i>s</i> {101}	-90 00	38 01 $\frac{1}{2}$
<i>r</i> {112}	-21 30	37 50
	ϕ_2	
		77°59 $\frac{1}{2}$ '
	$\rho_2 = B$	
		90°00'
	<i>C</i>	
		0°00'
	<i>A</i>	
		77°59 $\frac{1}{2}$ '

REFERENCES

1. MURDOCH, J., Nuevite, a new rare-earth mineral from California (Abstr.): *Geol. Soc. Am., Bull.* **57**, 1219 (1946).
2. PHILLIPS, W., Observations on the crystalline form, etc., of the gaylussite: *Philosophical Magazine*, **1** (N. S.), 263-266 (1827).
3. PRATT, J. H., On northupite; pirssonite, a new mineral; gaylussite and hanksite from Borax Lake, San Bernardino County, California: *Am. Jour. Sci.*, (4), **2**, 123-135 (1896).

ON THE MINERALOGY OF ANTARCTICA

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Since 1895 ninety-six papers have been published relating to Antarctic mineralogy and petrography. Dr. Johannes Petersen (1895: 275-278) was the first to publish on Antarctic petrography. He described the basalt of Mount Christen Christensen (Christensen-Vulkan) of Robertson Island, West Antarctica.

The following is a list of the 167 mineral species, subspecies, and varieties, as well as those of questionable occurrence, that have been reported from Antarctica. A number of these have been determined only microscopically, and in the case of gold its presence has been determined only by chemical analysis.

Acmite	Andalusite	Aphrosiderite	Beryl
Actinolite	Andesine	Apophyllite	Biotite
Adularia	Andradite	Arfvedsonite	Bornite
Aegirine-augite	Anomite	Arsenopyrite	Bronzite
Allanite	Anorthite	Atacamite	Brookite
Almandite	Anorthoclase	Augite	Brucite
Analbite?	Anthophyllite	Azurite	Brushite?
Analcite	Antigorite	Barkevikite	Bytownite
Anatase	Apatite	Basaltic hornblende	Calcite

Cancrinite	Forsterite	Mesolite	Scapolite
Cassiterite	Galena	Microcline	Scolecite
Ceylonite	Glaucophane	Microperthite	Sericite
Chalcopyrite	Gold	Mirabilite	Serpentine
Chlor-apatite	Graphite	Mizzonite	Siderite
Chloritoid	Grossularite	Molybdenite	Sillimanite
Chondrodite	Gypsum	Muscovite	Sodalite
Christensenite	Hedenbergite	Natrolite	Soda-orthoclase
Chrome diopside	Hematite	Nephelite	Spessartite?
Chromite	Hercynite	Newberryite?	Sphalerite
Chrysolite	Heulandite	Nocean	Sphene
Chrysotile	Hornblende	Oligoclase	Stercorite
Clinochlore	Hypersthene	Olivine	Stibnite
Clinoenstatite	Iddingsite	Orthoclase	Stilbite
Clinohumite?	Ilmenite	Paragonite?	Talc
Cordierite	Kaersutite?	Pargasite	Tetrahedrite
Corundum	Kaolinite	Penninite	Thomsonite
Cossyrite	Katophorite?	Phlogopite	Titaniferous aegirine-augite
Cristobalite?	Kornerupine?	Picotite	Titaniferous augite
Cummingtonite	Kyanite	Piedmontite	Titanomagnetite
Damourite	Labradorite	Pigeonite	Topaz
Delessite	Laumontite	Pinite	Tourmaline
Diallage	Lawsonite	Pistacite	Tremolite
Diopside	Lepidolite	Prehnite	Tridymite
Dolomite	Lepidomelane	Prochlorite	Vermiculite?
Dumortierite	Leucite	Pyrite	Vesuvianite
Edenite	Leucoxene	Pyrrohotite	Woeblerite
Enstatite	Limonite	Quartz	Wollastonite
Enstatite-augite	Magnetite	Riebeckite	Xenotime
Fassaite?	Malachite	Rutile	Zircon
Fayalite	Malacolite	Salite	Zoisite
Ferrimolybdite	Meionite	Sanidine	
Fluorite		Sapphire	

BIBLIOGRAPHY

- BAECKSTRÖM, OLOF (1915), Petrographische Beschreibung einiger Basalte von Patagonien, Westantarktika und den Süd-Sandwich-Inseln. *Bull. Geol. Inst. Upsala*, **13**, 115–182.
- BARTH, T. F. W., AND PER HOLMSEN (1939), Rocks from the Antarctica and the Southern Antilles. Being a description of rock samples collected by Olaf Holtedahl 1927–1928, and a discussion of their mode of origin. *Sci. Res. Norwegian Antarctic Exped., 1927–1928 et sqq.* 18. *Norske Videnskaps-Akademie i Oslo*, 1–64.
- (1940), Notes on igneous and palingenic rocks from the Antarctic Archipelago. A contribution to the petrology of circum-Pacific rock types. *Proc. Sixth Pacific Sci Cong.*, **1939**, 2, 747–754.
- , AND ÅSLAK KVALHEIM (1944), Christensenite, a solid solution of nepheline in tridymite. *Sci. Res. Norwegian Antarctic Exped. 1927–1928 et sqq.* 22. *Norske Videnskaps-Akademie i Oslo*, 1–9.
- BENSON, W. N. (1916), Report on the petrology of the dolerites collected by the British Antarctic Expedition, 1907–1909. *British Antarctic Exped. 1907–9. Repts. Sci. Investigations. Geol.*, **2**, pt. 9, 153–160.

- BERTHOIS, LÉOPOLD (1935), Diorite quartzifère de la Terre Adélie (Antarctique française). *Soc. Géol. et Minéral. Bretagne, C.R. Séances. An. 1*, 1, 5.
- BODMAN, GÖSTA (1916), Petrographische studien über einige antarktische gesteine. *Wissenschaftliche Ergebnisse der Schwedischen Südpolar-Exped. 1901–03. Geologie und Paläontologie*, 3, pt. 15, 1–100.
- BROCH, O. A. (1927), Gesteine von dem Peter I-Insel, West-Antarktis. *Avhandlinger utgitt av Norske Videnskaps-Akademiet i Oslo. Mat.-Naturv. Kl.*, 9, 1–41.
- (1946), Two contributions to Antarctic petrography. II. Rocks from Ingrid Christensen's Land, Antarctica. *Sci. Res. Norwegian Antarctic Exped. 1927–1928 et seqq.* 25. *Norske Videnskaps-Akademiet i Oslo*, 27–32.
- BROWNE, W. R. (1923), The dolerites of King George Land and Adelie Land. *Australasian Antarctic Exped. 1911–14. Sci. Repts.*, ser. A, 3, *Geol.* pt. 3, 245–258.
- BURRI, C. R. (1926), Chemismus und provinziale Verhältnisse der jung-eruptiven Gesteine der pazifischen Ozeans und seiner Umrandung. *Schweizerische Mineral. Petrograp. Mitteil.*, 6, 1, 115–199.
- COHEN, F. (1916), Aegirine-augite crystals from a microsanidinite out of the trachyte from Mount Cis, Ross Island. *British Antarctic Exped. 1907–9. Repts. Sci. Investigations, Geol.* 2, Appendix pt. 8, 149–151.
- COTTON, L. A. (1916), Petrographical notes on some rocks retrieved from the cache at Depot Island, Antarctic. *Ibid.* Appendix pt. 13, 235–237.
- COULSON, A. L. (1925), Magnetite garnet rocks from the moraines, Cape Denison, Adelie Land. *Australasian Antarctic Exped. 1911–14. Sci. Repts. Ser. A*, 3, *Geol.* pt. 5, 281–305.
- DAVID, T. W. E., SMEETH, W. F., AND SCHOFIELD, J. A. (1896), Notes on Antarctic rocks collected by Mr. C. E. Borchgrevink. *Jour. and Proc. Roy. Soc. New South Wales 1895*, 29, 461–492.
- FENNER, C. N. (1938), Olivine fourchites from Raymond Fosdick Mountains, Antarctica. *Bull. Geol. Soc. America*, 49, 367–400.
- GEIKIE, ARCHIBALD (1898), Notes on some specimens of rocks from Antarctic regions. With petrographical notes by J. J. H. Teall. *Proc. Roy. Soc. Edinburgh*, 22, 66–77.
- GLASTONBURY, J. O. G. (1940a), Petrological notes on further rock specimens collected from *in situ* occurrences, Commonwealth Bay region. *Australasian Antarctic Exped. 1911–14. Sci. Repts.*, ser. A, 3, *Geol.* pt. 6, 309–330.
- (1940b), Acid effusive and hypabyssal rocks (from the moraines). *Ibid.*, 4, *Geol.* pt. 4, 115–134.
- (1940c), Basic igneous rocks and metamorphic equivalents from Commonwealth Bay. *Ibid.*, pt. 5, 137–180.
- (1940d), Certain epidotic rocks from the moraines, Commonwealth Bay. *Ibid.* pt. 6, 183–196.
- (1940e), Metamorphosed limestones and other calcareous sediments from the moraines. A further collection. *Ibid.*, pt. 8, 295–322.
- (1940f), Some hybrid gneisses from the moraines, Cape Denison. *Ibid.*, pt. 9, 325–333.
- GOURDON, E. (1905), Les roches éruptives grenues de la Terre de Graham recueillies par l'expédition antarctique du Dr. Charcot. *Comptes Rendus des séances de l'Académie des Sciences*, 141, 1036–1038.
- (1906), Les roches microlithiques de la Terre de Graham recueillies par l'expédition antarctique du Dr. Charcot. *Ibid.*, 143, 178–180.
- (1907), Sur un microgranite alcalin recueilli sur la Terre de Graham par l'expédition antarctique du Dr. Charcot. *Ibid.*, 144, 1224–1226.

- (1908), Géographie physique—Glaciologie—Pétrographie des régions visitées par l'Expédition Antarctique Française commandée par le Dr. Charcot (1903–1905). Paris.
- (1910), Sur deux gisements de zéolites dans l'Antarctique. *Comptes Rendus des séances de l'Académie des Sciences*, **151**, 153–154.
- (1914a), Sur la constitution minéralogique des Shetlands su Sud (île Déception). *Ibid.*, **158**, 583–586.
- (1914b), Sur la constitution minéralogique des Shetlands du Sud. *Ibid.*, **158**, 1905–1907.
- (1914c), Sur la constitution minéralogique de l'île Jenny (Antarctique). *Ibid.*, **159**, 369–371.
- (1917), Minéralogie—Géologie: Deuxième Expédition Antarctique Française (1908–1910) commandée par le Dr. Jean Charcot. Paris.
- HOLTEDAHL, OLAF (1929), On the geology and physiography of some Antarctic and sub-Antarctic islands. *Sci. Res. Norwegian Antarctic Exped. 1927–1928 and 1928–1929*. 3. *Norske Videnskaps-Akademis i Oslo*, 1–172.
- JENSEN, H. I. (1916), Report on the petrology of the alkaline rocks of Mount Erebus Antarctica. *British Antarctic Exped. 1907–9. Repts. Sci. Investigations. Geol.* 2, pt. 7, 93–128.
- KLEEMAN, A. W. (1940), Schists and gneisses from the moraines, Cape Denison, Adelie Land. *Australasian Antarctic Exped. 1911–14. Sci. Repts. ser. A*, 4, *Geol.* pt. 7, 197–292.
- KNOWLES, P. H. (1945), Geology of Southern Palmer Land Peninsula, Antarctica. *Proc. Amer. Philos. Soc.*, **89**, 132–145.
- MACLEOD, W. A., AND WHITE, O. E. (1902), Supplementary notes on some Antarctic rocks and minerals. *Papers and Proc. Royal Soc. Tasmania 1900–1901*, 38–41.
- MAWSON, DOUGLAS (1916), Petrology of rock collections from the mainland of South Victoria Land. *British Antarctic Exped. 1907–9. Repts. Sci. Investigations. Geol.* 2, pt. 13, 201–234.
- (1940a), Sedimentary rocks. *Australasian Antarctic Exped. 1911–14. Sci. Repts. ser. A*, 4, *Geol.* pt. 11, 347–367.
- (1940b), Record of minerals of King George Land, Adelie Land and Queen Mary Land. *Ibid.*, pt. 12, 371–404.
- (1940c), Catalogue of rocks and minerals collected in Antarctic lands. *Ibid.*, pt. 13, 405–432.
- MOUNTAIN, E. D. (1925), Potash-oligoclase from Mt. Erebus, Antarctic, and anorthoclase from Mt. Kenya, East Africa. *Mineral. Mag.*, **20**(109), 331–345.
- NOCKOLDS, S. R. (1940), Petrology of rocks from Queen Mary Land. *Australasian Antarctic Exped. 1911–14. Sci. Repts. ser. A*, 4, *Geol.* pt. 2, 15–86.
- NORDENSKJÖLD, OTTO (1905), Petrographische Untersuchung aus dem westantarktischen Gebiete. *Bull. Geol. Inst. Upsala*, **6**, 1902–1903, 234–246.
- PASSEL, C. F. (1945), Sedimentary rocks of the southern Edsel Ford Ranges, Marie Byrd Land, Antarctica. *Proc. Amer. Philos. Soc.*, **89**, 123–131.
- PELIKAN, A. (1909), Géologie. Petrographische Untersuchung der Gesteinsproben. Expédition Antarctique Belge. Résultats du Voyage du S.Y. Belgica en 1897–1898–1899 sous le commandement de A. de Gerlache de Gomery. *Rapports Scientifiques*. I, 1–49.
- PETERSEN, JOHANNES (1895), Die Reisen des 'Jason' und der 'Hertha' in das antarktische Meer 1893–1894 und die wissenschaftlichen Ergebnisse dieser Reisen. *Mitt. Geogr. Ges. Hamburg.*, **10**, 1891–92, 245–298.
- PRIOR, G. T. (1898), Petrographical notes on the rock-specimens collected in Antarctic

- regions during the voyage of H.M.S. *Erebus* and *Terror* under Sir James Clark Ross, in 1839-43. *Mineral. Mag.*, **12**, 61-91.
- (1902), Report on the rock-specimens collected by the "Southern Cross" Antarctic Expedition. *Rept. "Southern Cross" Collections (British Museum)*, 321-332.
- (1907), Report on the rock-specimens collected during the "Discovery" Antarctic Expedition 1901-4. *National Antarctic Exped. 1901-1904. Nat. Hist. 1, Geol.*, 101-140.
- (1910), Petrographical notes on the dolerites and rhyolites of Natal and Zululand. *Ann. Natal Mus.*, **2**(2), 141-157.
- RASTALL, R. G., AND PRIESTLEY, R. E. (1921), The slate-greywacke formation of Robertson Bay. *British Antarctic ("Terra Nova") Exped. 1910. Nat. Hist. Rept. Geol.*, **1**(4), 121-129.
- REINISCH, R. (1906), Petrographische Beschreibung der Gaussberg-Gesteine. *Deutsche Südpolar Exped. 1901-1903, 2*(1). *Kartographie und Geologie*, 73-87.
- (1912), Erratische Gesteine (besonders aus Eisbergen). *Ibid.*, **2**(7). *Geographie und Geologie*, 629-640.
- SCHETELIG, J. (1915), Report on the rock-specimens collected on Roald Amundsen's South Pole Expedition. *Videnskapselskapets Skrifter. I. Mat.-Naturv. Kl.*, **4**, 1-32. Christ-iania.
- SKEATS, E. W. (1916), Reports on the petrology of some limestones from Antarctica. *British Antarctic Exped. 1907-9. Repts. Sci. Investigations. Geol.*, **2**, pt. 12, 189-200.
- SMITH, W. CAMPBELL, AND DEBENHAM, F. (1921), The metamorphic rocks of the McMurdo Sound region. *British Antarctic ("Terra Nova") Exped. 1910. Nat. Hist. Rept. Geol.*, **1**(5), 133-144.
- , AND PRIESTLEY, R. E. (1921), The metamorphic rocks of the Terra Nova Bay region. *Ibid.*, 145-166.
- (1924), The plutonic and hypabyssal rocks of South Victoria Land. *Ibid.*, **1**(6), 167-227.
- STETSON, H. C., AND UPSON, J. E. (1937), Bottom deposits of the Ross Sea. *Jour. Sed. Petrology*, **7**, 2, 55-66.
- STEWART, DUNCAN, JR. (1934a), The petrography of some Antarctic rocks. *Am. Mineral.*, **19**, 4, 150-160.
- (1934b), The petrography of some rocks from South Victoria Land. *Proc. Amer. Philos. Soc.*, **74**, 4, 307-310.
- (1934c), The University of Michigan Collections of Antarctic rocks and minerals. *Ibid.*, 311-317.
- (1934d), Anorthoclase crystals as an index of the migration of penguins. *Am. Jour. Sci.*, **27**, 454-456.
- (1934e), A contribution to Antarctic petrography. *Jour. Geol.*, **42**, 546-550.
- (1934f), Petrography of the Beacon sandstone of South Victoria Land. *Am. Mineral.*, **19**, 8, 351-359.
- (1937), Petrography of some rocks from the South Orkney Islands and the Antarctic Archipelago. *Ibid.*, **22**, 3, 178-194.
- (1938), Notes on some Adelie Land rocks. *Ibid.*, **23**, 7, 464-467.
- (1939), Petrography of some South Victoria Land rocks. *Ibid.*, **24**, 3, 155-161.
- (1940), Petrography of rocks from the Pacific Antarctic. *Proc. Sixth Pacific Sci. Cong.*, **2**, 741-746.
- (1941), Notes on some Marie Byrd Land rocks. *Am. Mineral.*, **26**, 1, 42-49.
- (1942), Minerals reported from Antarctica. *Rocks and Minerals*, **17**, 1, 12.
- (1945a), Preliminary report on some intrusives of the Melchior Islands, Antarctica. *Proc. Amer. Philos. Soc.*, **89**, 146-147.

- (1945b), The petrography of some intrusive rocks from King Edward VII and Marie Byrd Lands. *Ibid.*, 148–151.
- (1945c), Abstracts of works on Antarctic petrography. *Ibid.*, 152–159.
- (1947), Rocks of the Melchior Islands, Antarctica. *Ibid.*, 91, 229–233.
- STILLWELL, F. L. (1918), The metamorphic rocks of Adelie Land. Section 1. *Australasian Antarctic Exped. 1911–1914. Sci. Repts. ser. A, Geog., Physiog., Glaciol., Oceanog., and Geol.*, 3, pt. 1, 1–230.
- (1923), Amphibolites and related rocks from the moraines, Cape Denison, Adelie Land. *Ibid.*, ser. A, 3, *Geol.* pt. 4, 259–280.
- SUMMERS, H. S., and EDWARDS, A. B. (1940), Granites of King George Land and Adelie Land. With an appendix by A. W. Kleeman. *Ibid.*, ser. A, 4, *Geol.* pt. 3, 87–113.
- THOMAS, H. H. (1921), On the Innes Wilson collection of rocks and minerals from the South Shetland Islands and Trinity Island. *Trans. Roy. Soc. Edinburgh*, 53, 81–89.
- THOMSON, J. A. (1912), On the rock specimens from Central and Western Australia. Collected by the Elder Scientific Exploring Expedition of 1891–2. *Journ. and Proc. Roy. Soc. New South Wales 1911*, 45, pt. 3, 292–317.
- (1916), Report on the inclusions of the volcanic rocks of the Ross Archipelago. *British Antarctic Exped. 1907–9. Repts. Sci. Investigations. Geol.* 2, pt. 8, 129–148.
- TILLEY, C. E. (1923), The metamorphic limestones of Commonwealth Bay, Adelie Land. *Australasian Antarctic Exped. 1911–14. Sci. Repts.*, ser. A, 3, *Geol.* pt. 2, 231–244.
- (1930), Petrographical notes on rocks from Elephant Island, South Shetlands. Report on the geological collections made during the voyage of the "Quest" on the Shackleton-Rowett Expedition to the South Atlantic and Weddell Sea in 1921–1922. British Museum (Natural History), 55–62.
- (1936), Enderbite, a new member of the charnockite series. *Geol. Mag.*, 73, 312–316.
- (1937a), Rocks from Enderby Land. *B.A.N.Z. Antarctic Research Exped. 1929–1931. Repts.*, ser. A, 2, *Geol.* pt. 1, 1–16.
- (1937b), Rocks from MacRobertson Land, Antarctica. *Ibid.*, pt. 2, 17–26.
- (1940), A group of gneisses (sillimanitic and cordieritic) from the moraines at Cape Denison, Antarctica. *Australasian Antarctic Exped. 1911–14. Sci. Repts.*, ser. A, 4, *Geol.* pt. 10, 337–344.
- TYRRELL, G. W. (1921), A contribution to the petrography of the South Shetland Islands, the Palmer Archipelago, and the Danco Land Coast, Graham Land, Antarctica. *Trans. Roy. Soc. Edinburgh*, 53, 57–79.
- (1945), Report on rocks from West Antarctica and the Scotia Arc. *Discovery Reports*, 23, 37–102.
- WADE, F. A. (1937), Petrologic and structural relations of the Edsel Ford Range, Marie Byrd Land, to other Antarctic mountains. *Bull. Geol. Soc. America*, 48, 1387–1396.
- (1945), The geology of the Rockefeller Mountains. *Proc. Amer. Philos. Soc.*, 89, 1, 67–77.
- WALKOM, A. B. (1916), Report on the pyroxene granulites collected by the British Antarctic Expedition, 1907–1909. *British Antarctic Exped. 1907–09. Repts. Sci. Investigations. Geol.* 2, pt. 10, 161–168.
- WARNER, L. A. (1945), Structure and petrography of the Southern Edsel Ford Ranges, Antarctica. *Proc. Amer. Philos. Soc.*, 89, 1, 78–122.
- WOOLNOUGH, W. G. (1916), Petrological notes on some of the erratics collected at Cape Royds. *British Antarctic Exped. 1907–09. Repts. Sci. Investigations. Geol.* 2, pt. 11, 169–188.
- WORDIE, J. M. (1921), Shackleton Antarctic Expedition, 1914–1917. Geological observations in the Weddell Sea area. *Trans. Roy. Soc. Edinburgh*, 53, 17–27.