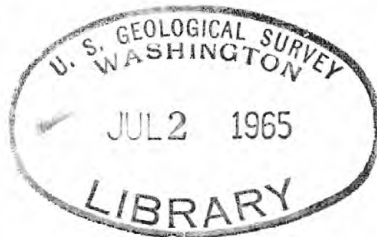


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TIN IN THE UNITED STATES

(exclusive of Alaska and Hawaii)

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[1965]

Introduction

The principal deposits and occurrences of tin minerals in the United States (exclusive of Alaska and Hawaii) are shown on the accompanying map. Although some very minor occurrences are included to indicate the extent of distribution, those in which only trace amounts of tin have been found spectrographically or geochemically have been omitted. Unverifiable reported occurrences of tin-bearing minerals have been excluded also.

Known tin-bearing deposits in the conterminous United States are small, few in number, and widely scattered; only small amounts of tin concentrates are being recovered at the present time (1964). The total amount of metallic tin produced since 1950, mainly as a by-product of molybdenum ores, is less than 500 tons, and the total production from all sources prior to 1950 is similar.

Map locations are shown by symbols, the shapes of which denote different geologic types of occurrence; some areas of scattered occurrences in pegmatites are shown by a stippled pattern. Occurrences are numbered by State on the map and identified by number in the index. The index also gives the geographic coordinates, brief geologic descriptions, and references to the principal published reports. The more important or better known localities are named on the map.

Geology

Tin minerals occur in lode deposits and in related placer deposits. The most important tin mineral is cassiterite, SnO_2 , which, because of its weight, hardness, and resistance to chemical alteration, is an important placer mineral. Placer or stream tin is derived from the weathering of lode deposits and accumulates in detrital deposits like gold. Much less common tin minerals are the sulfide, stannite, $\text{Cu}_2\text{FeSnS}_4$; franckeite, $\text{Pb}_5\text{Sn}_3\text{Sb}_2\text{S}_{14}$; cylindrite, another lead-tin-antimony sulfosalt; and colusite, $\text{Cu}_3(\text{As, Sn, V, Fe, Te})\text{S}_4$.

Almost all cassiterite-bearing lode deposits are closely associated, both spatially and genetically, with granitic intrusive rocks; some granites have been reported to contain cassiterite as a late primary constituent. The lode deposits commonly occur in well-defined veins, particularly pegmatite and pegmatitic quartz veins, in either the granitic host rock or adjacent country rocks. Associated with cassiterite are a number of high-temperature minerals, chiefly tourmaline, topaz, beryl, fluorite, apatite, wolframite,

molybdenite, and arsenopyrite. Most of the primary tin-bearing deposits in the Black Hills, S. Dak., in San Diego County, Calif., and in the Appalachian region are in pegmatites.

Closely related to pegmatites are the "greisen" deposits, which commonly contain cassiterite as an accessory mineral. Intense alteration of wall rocks and vein material is characteristic of these deposits. The alteration is believed to be the result of attack by hot acid solutions and vapors which converted the wall rock minerals, chiefly feldspar, to coarse-grained mixtures of muscovite, quartz, and topaz or tourmaline. The deposits at Temescal, Calif., Irish Creek, Va., and Majuba Hill, Nev., are of the greisen type.

Cassiterite also occurs in other, economically less important, kinds of deposits. Near Gorman, Calif., cassiterite forms pods, stringers, and disseminations in iron-rich replacement bodies in calc-silicate (tactite) zones of limestone roof pendants in a granitic intrusive. At Mescal, Calif., cassiterite occurs in a hematite-filled breccia pipe that appears to have been formed by replacement along intersecting fractures in dolomitic marble. Cassiterite and specularite form narrow incrustated veinlets in Tertiary porphyritic rhyolite lavas in the Black Range (Taylor Creek, Squaw Creek, and Hardcastle Creek), N. Mex., and in Miocene(?) lavas in the Izenhood Ranch area, Nevada.

The Climax, Colo., deposit is marked on the map by a diamond-shaped symbol for unspecified type. Perhaps it should have been included as a variant of the greisen type. Some of the cassiterite is in later veinlets with topaz, tungstates, sulfides, and fluorite. Sericitization occurs along the same fractures.

Tin sulfide minerals are rare in pegmatites and greisen deposits; rather they occur—although sparsely in the United States—in veins containing sulfides of other metals, chiefly those of copper, lead, and zinc. Stannite has been reported in the Etta pegmatite of the Keystone area in the southern Black Hills, S. Dak., and in greisenized quartz veins in the Franklin Mountains, Tex. Stannite occurs in veins with base-metal sulfides at several localities in Washington State, and is also reported from New Mexico, and near Basin, Mont. Stannite and franckeite occur with lead-antimony sulfides in limestone near Santa Cruz, Calif., and with bismuth selenide in silver ores in limestone adjacent to a quartz monzonite stock near Darwin, Calif. Stannite and cylindrite are reported in the Silver Still mine, Idaho. Colusite occurs with copper and lead sulfides at Butte, Mont., Red Mountain in the Ouray district, Colorado, and in Santa Fe County, N. Mex.

A tin sulfo-salt is reported in the Jumbo Extension mine at Goldfield, Nev.

In this report all occurrences of cassiterite in detritus, including surface "float" in northern California, are mapped as placer. Although no extensive placer tin deposits have been found in the United States, secondary or detrital deposits are represented by small residual, eluvial, and alluvial deposits in the vicinity of many of the lode sites, as well as at additional alluvial sites where the source lodes are yet unknown. Much of the tin recovered near Gaffney, S. C., in the early 1900's was from residual or eluvial deposits. Stream tin production has been mainly from creeks in the Black Hills of South Dakota and Wyoming. A low content of cassiterite is reported in the heavy mineral fraction from Eocene conglomerate at Skykomish and elsewhere in Washington State. Cassiterite is among the heavy minerals from sands of Aptos Beach (loc. 5) in California, and in dune sand at Long Beach, Pacific County, southwestern Washington.

The lode occurrences of tin minerals, as might be anticipated from their scattering over a vast area and in many geologic settings, represent several ages of formation. Tin in the oldest terranes may belong to a Precambrian mineralization. Much of the tin in the Appalachians and Piedmont is probably of middle or late Paleozoic age. Some of the tin in the Western States appears to belong with Late Cretaceous mineralization. Part of the tin in Idaho may be related to a mid-Tertiary mineralization. The veinlets in Catron and Sierra Counties, N. Mex., and in Lander County, Nev., cut Tertiary lavas.

At the 15 sites named on the map, deposits were of sufficient size, number, or richness to encourage development attempts. Initial work at these places rarely had a duration of several years. Only a few sites, after varying intervals of inactivity, became targets of renewed effort in further development. Much of the small output has been from test shipments during development. More continuous work has been restricted to an earlier small, intermittent output of stream and lode tin from South Dakota, and in the current decade to by-product recovery of cassiterite at Climax, Colo. In addition to the named localities, a few small shipments have been made from placers in Montana, and discarded dredge concentrates from Jordan Creek, Idaho, were reputedly hauled away for their tin content. Early unsuccessful attempts were made to develop the small vein occurrences at Jackson, N. H., and at Winslow, Maine.

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Locality	Lat. N.	Long W.
ALABAMA		
1. Rockford. Cassiterite in pegmatites; very minor in associated detritus deposits. Heinrich and Olson, 1953; Hunter, 1944; Reed, 1950.	33°10' to 32°48'	86°00' to 86°28'
CALIFORNIA		
1. Hungry Creek. Placer (hillside float). Ireland, 1888; Segerstrom, 1941; Murdock and Webb, 1956.	41°57'	122°36'

Locality	Lat. N.	Long W.
CALIFORNIA--Continued		
2. Weaverville area. Placer. Whitney, 1865; Segerstrom, 1941; Murdock and Webb, 1956.	40°43'	122°58'
3. Sonoma County: Healdsburg (Derrick). Trace of tin along and adjacent to fault in Franciscan Formation. Bedford and Johnson, 1946; Gealey 1951. Stream tin, Murdock and Webb, 1956.	38°37'	122°55'
4. Santa Cruz area. Stannite and franckeite with lead-antimony sulfides in limestone. Murdock and Webb, 1956.	36°58'	122°04'
5. Ano Nuevo Creek and Aptos Beach. Cassiterite in beach sands. Hutton, 1959.	36°58'	121°54'
6. Darwin (Thompson mine). Stannite and franckeite with bismuth selenide in silver ores along faults in late Paleozoic limestone adjacent to quartz monzonite stock. Hall and MacKevett, 1958.	36°16'	117°36'
7. Woody (Greenback Copper and Iron Mountain). Small amounts of tin in ferruginous material along shears in granodiorite. Bedford and Johnson, 1946.	35°42'	118°49'
8. Big Blue. Alaskite body adjacent to metamorphic sedimentary rocks. Nature of tin occurrence unknown. Bedford and Johnson, 1946.	35°42'	118°27'
9. Black Jack. Tin-bearing gossan in limestone. Bedford and Johnson, 1946.	35°36'	118°24'
10. Rocky Point. Basic dike in granitic rock; nature of tin occurrence unknown. Bedford and Johnson, 1946.	35°30'	118°13'
11. Lucky Three and Jennette Grant. Traces of tin along contact of granitic batholith with metamorphic sedimentary rocks. Bedford and Johnson, 1946.	35°26'	118°23'
12. Atolia (Union mine). Traces of tin with tungsten along shear zone in quartz monzonite intrusive body. Bedford and Johnson, 1946.	35°19'	117°36'
13-16. Gorman area. Cassiterite-bearing gossan and tactite bodies near contact of limestone and granite intrusive body. Wiese, 1950; Wiese and Page, 1946; Little 1960.		

<u>Locality</u>	<u>Lat. N.</u>	<u>Long W.</u>	<u>Locality</u>	<u>Lat. N.</u>	<u>Long W.</u>
CALIFORNIA--Continued			COLORADO--Continued		
13-16--Continued			3. Devils Head (Platte) Mountain. Cassiterite and topaz in pegmatite. Cross and Hillebrand, 1885; Landes, 1935; Pearl, 1941a; Peacock, 1935; Eckel, 1961.	39°16'	105°06'
Gray Eagle	34°53'	118°45'	4. Crystal Peak (Topaz Butte). Cassiterite and topaz in pegmatite. White, 1935; Heinrich, 1953; Eckel, 1961.	39°00'	105°17'
Butler	34°52'	118°43'	5. St. Peters Dome-Cook Stove Mountain. Cassiterite in pegmatite. Over, 1929; Pearl, 1941b.	38°45'	104°55'
Crow Bar Gulch	34°50'	118°45'	6. Red Mountain. Colusite with lead-silver-copper sulfides in volcanic breccia pipe. Burbank, 1947; Nelson, 1939; Eckel, 1961.	37°54'	107°42'
Meeke	34°51'	118°44'	CONNECTICUT		
17. Mescal (Cima) (Evening Star mine). Cassiterite in hematite-filled shatter zone in dolomitic limestone near granitic intrusion. Tucker and Sampson, 1943; Bedford and Johnson, 1946; Hewett, 1956; Wright and others, 1953.	35°23'	115°32'	1. Strickland quarry. Cassiterite in pegmatite. Schooner 1961.	41°35'	72°35'
18. Temescal (Cajalco mine). Cassiterite in tourmaline-quartz replacement veins and breccia pipes along fractures in quartz monzonite and metamorphic rocks. Tucker and Sampson, 1945; Bedford and Johnson, 1946.	33°51'	117°30'	2. Gillette quarry. Cassiterite in pegmatite. Schooner 1961.	41°30'	72°30'
19. Pala (Hiriart Mountains). Cassiterite in pegmatite. Jahns and Wright, 1951.	33°23'	117°04'	IDAHO		
20. Chihuahua Valley. Cassiterite in pegmatite. Schaller, 1916.	33°24'	116°39'	1. Pierce. Placer. Shannon, 1926.	46°29'	115°41'
21. Mountain Lily mine. Cassiterite with tourmaline in pegmatite. Murdock and Webb, 1956.	33°20'	116°46'	2. Salmon (3 mi NW of). Tin reported with copper-lead sulfides in brecciated quartz vein in granite, near contact with quartzite. Bell, 1904, 1905.	45°14'	114°02'
22. Mesa Grande (Himalaya mine). Cassiterite with stibio-tantalite in gem pegmatite. Penfield and Ford, 1906; Schaller, 1916; Carnahan, 1960.	33°13'	116°47'	3. Panther Creek. Placer. Umpleby, 1913; Livingston, 1919; Bell, 1901; Shannon, 1926; Hubbard, 1955.	45°01'	114°19'
23. Little Three Gem mine. Cassiterite with topaz in pegmatite. Schaller, 1916.	33°02'	116°52'	4. Silver Creek. Placer. Umpleby, 1913; Livingston, 1919; Bell, 1901; Ross, 1927.	44°53'	114°21'
24. Granite Mountain (Banner Canyon). Cassiterite with lithium minerals in pegmatite. Murdock and Webb, 1956.	33°03'	116°29'	5. Silver Still mine, mineral district. Stannite and cylindrite in Cu-Pb ore, filling and replacement in fractured andesitic volcanics. Anderson, 1963.	44°32'	117°02'
25. Laguna Mountains. Placer. Merrill, 1916; Schaller, 1916; Segerstrom, 1941.	32°55'	116°23'	6. Jordan Creek. Placer. Northwest Mining News, 1942; Blake, 1866, Ohly, 1903; Shannon, 1926.	42°52'	116°50'
COLORADO			MAINE		
1. Arapahoe Peak. Cassiterite in greisen veins. George, 1927.	40°00'	105°41'	Cassiterite in complex pegmatites containing minerals of columbium, beryllium, and lithium, and arsenopyrite and tourmaline; some with minor amounts of topaz, fluorite, gahnite, pollucite, and uranium minerals.		
2. Climax. Quartz-molybdenite veinlets with minor amounts of copper, tin, lead, zinc, and tungsten in Precambrian granite and schist intruded by quartz monzonite porphyry stock and dikes of Tertiary age. Tin occurs as cassiterite. Vanderwilt and King, 1955; Burk, 1959.	39°21'	106°10'	1. Newry mines. Cameron and others, 1954; Maine Geological Survey, 1957.	44°32'	70°44'
			2. Black Mountain quarries. Cameron and others, 1954; Maine Geological Survey, 1957.	44°35'	70°38'

<u>Locality</u>	<u>Lat. N.</u>	<u>Long W.</u>	<u>Locality</u>	<u>Lat. N.</u>	<u>Long W.</u>
MAINE--Continued			MISSOURI--Continued		
3. Stoneham. Cassiterite in pegmatite and as "float". Morrill and others, 1958; Bastin, 1911.	44°15'	70°47'	2. Einstein silver mine. Disseminated cassiterite in veins bearing topaz, fluorite, wolframite, and lead-zinc sulfides. Singewald and Milton, 1929.	37°33'	90°29'
4. Harvard quarry-Tamminen mine. Cameron and others, 1954; Landes, 1925.	44°15'	70°39'	MONTANA		
5. Tubbs ledge. Clarke, 1886; Kunz 1890; Maine Geological Survey, 1957.	44°14'	70°32'	1. Missouri River (French, Eldorado). Placer. Blake, 1882; Kunz, 1893; Osborn, 1920.	46°40'	111°45'
6. Mount Mica. Clarke, 1886; Kunz, 1890; Wigglesworth, 1919.	44°16'	70°28'	2. Clancy creek. Placer. Blake, 1882; Browne, 1868.	46°30'	112°01'
7. Bennett feldspar quarry. Cameron and others, 1954; Landes, 1925; Maine Geological Survey, 1957.	44°17'	70°25'	3. Cataract creek (Morning Glory mine). Stannite reported with ruby silver and copper and lead sulfides in crushed zone in grano-aplite. Roby and others, 1960.	46°19'	112°15'
8. Little Singepole-Hibbs feldspar quarries. Cameron and others, 1954; Morrill and others, 1958; Maine Geological Survey, 1957.	44°13'	70°24'	4. Ten Mile creek. Placer. Blake, 1882; Knopf, 1913; Raymond, 1870.	46°25'	112°20'
9. Mount Rubellite. Clarke, 1886; Kunz, 1890.	44°12'	70°23'	5. Basin creek. Placer. Blake, 1882; Hess and Graton, 1905; Ruppel, 1963.	46°18'	112°18'
10. Berry quarry-Mount Apatite. Cameron and others, 1954; Clarke, 1886; Kunz, 1890; Wigglesworth, 1919.	44°04'	70°18'	6. Peterson creek (Deer Lodge). Placer. Blake, 1882; Becker, 1885.	46°17'	112°38'
11. Winslow. Cassiterite in narrow veins with lepidolite, fluorite, muscovite, arsenopyrite and quartz. Jackson, 1869; Hussey, 1958.	44°32'	69°37'	7. Butte (Summit Valley). Colusite and cassiterite with copper-lead-zinc sulfides in replacement lodes and veins in quartz monzonite. Grimes, 1928; Landon and Mogilnor, 1933; Smith, 1941; Murdock, 1953; Nelson, 1939; Perry, 1932; Sales, 1914.	46°01'	112°32'
12. Warren. Cassiterite in pegmatite. Hess and others, 1943; Morrill, 1959.	44°07'	69°15'	8. Big Hole River (Wisdom). Placer. Day and Richards, 1906; Sahinen and Crowley, 1959.	45°37'	113°27'
MASSACHUSETTS			9. Hughes creek (Alta). Placer. Lindgren, 1904; Day and Richards, 1906.	45°40'	114°15'
1. Goshen-Lithia area. Cassiterite in pegmatites. Hitchcock, 1829; Shaub and Schenck, 1954; Billings, 1941.	42°27'	72°47'	NEVADA		
2. Chesterfield. Cassiterite in pegmatite. Haidinger, 1825; Teschemacker, 1843; Shepard, 1866.	42°23'	72°50'	1. Izenhood Ranch area. Veinlets in Miocene(?) lavas bearing cassiterite, specularite, quartz, topaz, and fluorite. Knopf, 1916a, b; Vanderburg, 1939; Fries, 1942b; Gianella, 1941.	40°58'	116°51'
3. Norwich. Cassiterite in pegmatite. Shepard, 1864.	42°17'	72°51'	2. Antelope (Majuba Hill). Cassiterite with tourmaline, quartz, and sericite in breccia zone in rhyolite plug. Smith and Gianella, 1942; Matson, 1948; Trites and Thurston, 1958.	40°40'	118°27'
4. Leominster-Fitchburg. Cassiterite in pegmatite. Billings, 1941; Seaman, 1953; Hess and others, 1943.	42°35'	71°49'	3. Goldfield (Jumbo Extension mine). Sulfo-salt of tin with gold, silver, and bismuth in Tertiary dacite and other volcanic rocks.	37°42'	117°15'
5. Beverly. Shepard, 1838.	42°33'	70°52'			
MISSOURI					
1. Sheahan granite quarry, St. Francois Mountains. Cassiterite with topaz, fluorite, beryl, and muscovite in complex pegmatite. Tolman and Goldich, 1935.	37°40'	90°42'			

Locality	Lat. N.	Long W.	Locality	Lat. N.	Long W.
NEVADA--Continued			OREGON		
3--Continued			1. Pine Creek, Baker vicinity. Cassiterite in placer deposits. Day and Richards, 1906; Treasurer, 1939; Dake, 1949.	44°35'	117°50'
D. F. Hewett, unpublished data, 1941; Wilson, 1944; York, 1944.			SOUTH CAROLINA		
NEW HAMPSHIRE			1. Ross mine. Cassiterite in pegmatite and in related placer deposits. Kesler, 1942; Griffitts, 1954.	35°05'	81°37'
1. Tin Mountain (Eastman Hill). Cassiterite with wolframite in veins cutting micaceous slate and granite. Jackson, 1843, 1844; Hitchcock, 1878.	44°08'	71°13'	2. Brewer mine. Replacement bodies of topaz with trace amounts of enargite, covellite, cassiterite, native bismuth and gold in silicified schist; related placers of topaz, cassiterite, kyanite, and gold. Clarke and Chatard, 1884; Nitze and Wilkins, 1897; Fries, 1942a.	34°40'	80°24'
2. Parker Mountain mine. Cassiterite in pegmatite. Switzer, 1938; Cameron and others, 1954; Morrill, 1960.	43°18'	71°10'	SOUTH DAKOTA		
NEW MEXICO			1. Southern Black Hills. Cassiterite in pegmatite. Page and others, 1953; Ricketts, 1960; Gardner, 1939; Hess, 1909a.	43°59'	103°24'
1. Petaca. Cassiterite in pegmatite. Jones, 1915; Jahns, 1946.	36°31'	106°02'	to	to	103°45'
2. Harding pegmatite. Cassiterite in zoned tantalum, beryl, lithium-rich pegmatite. Montgomery, 1950; Northrop, 1959.	36°11'	105°47'	2. Tinton. Cassiterite in pegmatite and in related placer deposits. Smith and Page, 1941; Page and others, 1953; Gardner, 1939.	44°23'	104°02'
3. Lone Star mine. Colusite in copper ores along fault in Miocene rocks. Lustig and Rosenweig, 1959.	35°32'	106°12'	TEXAS		
4. Taylor creek. Cassiterite and specularite in stringers in altered porphyritic rhyolite flow and in placers. Fries, 1940; Hill, 1921; Volin, 1947.	33°22'	108°03'	1. Franklin Mountains. Cassiterite and stannite in quartz veins in granite and in related placer deposits. Sellards and others, 1934; Weed, 1901, 1903; Chauvenet, 1910, 1911; Dinsmore, 1909; Richardson, 1906, 1909.	31°53'	106°30'
5. Squaw creek. Cassiterite and specularite in stringers in altered porphyritic rhyolite flow and in placers. Fries, 1940; Volin, 1947.	33°29'	107°57'	2. Quitman Mountains. Lead-tin mineral with tourmaline, wolframite, tetrahedrite, and pitchblende. Streeruwitz, 1890, 1891; Simonds, 1902.	31°04'	105°31'
6. Hardcastle creek. Cassiterite and specularite in stringers in altered porphyritic rhyolite flow and in placers. Fries, 1940; Volin, 1947.	33°29'	107°52'	3. Grit-Streeter area. Placer. McCammon, 1941; Comstock, 1891a, b; Baker, 1932; Hess, 1909b, 1911; Meyer, 1913.	30°47'	99°22'
7. Chloride. Cassiterite-bearing veinlets in extrusive porphyries. Harley, 1934; Harrington, 1943; Anderson, 1957.	33°21'	107°40'	VIRGINIA		
8. Organ, Merrimac mine. Stannite reported. Northrop, 1959.	33°27'	106°36'	1. Irish Creek. Cassiterite in greisenized granodiorite. Koschmann and others, 1942; Glass and others, 1958.	37°52'	79°09'
NORTH CAROLINA			2. Amelia (Rutherford and Morefield mines). Cassiterite in pegmatite. Lemke and others, 1952; Gordon, 1918.	37°21'	77°59'
1. Hiddenite (Colburn mine). Cassiterite in pegmatite. Griffitts and Olson, 1953.	35°52'	81°05'			
2. Tin-spodumene belt. Cassiterite in pegmatite and greisen and in related placer deposits. Kesler, 1942; Griffitts, 1954.	35°29'	81°15'			
	to	to			
	35°11'	81°30'			

Locality	Lat. N.	Long W.
WASHINGTON		
1. Long Beach. Cassiterite in dune sand, Wilson and others, 1942.	46°21'	124°03'
2. Silverton (Hoodoo). Stannite with copper sulfides in veins in conglomerate and slate. Hunting, 1956; Hodges, 1897.	48°05'	121°33'
3. Buena Vista (Bear Basin). Stannite with copper-lead-zinc sulfides along fault zones in granodiorite. Purdy, 1951.	47°39'	121°29'
4. Skykomish. Cassiterite in Eocene conglomerate. Wilson and others, 1942.	47°43'	121°21'
5. Northport (Young America). Stannite and cassiterite with copper-lead-zinc sulfides in stringers and lenses in Cambrian(?) dolomite. Hundhausen, 1949; Purdy, 1951.	48°45'	118°03'
6. Metaline (Frisco Standard). Stannite with copper-lead-zinc sulfides in quartz veins in sheared schist. Hunting, 1956.	48°58'	117°26'
7. Blue Grouse Mountain area (Tungsten Products). Tin-bearing huebnerite and pyrite in greisen vein in granite. Hunting, 1956.	48°06'	117°31'
8. Silver Hill. Cassiterite in pegmatite. Page, 1942; Culver and Broughton, 1945; Collier, 1908.	47°33'	117°20'

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