

NEW MINERAL NAMES*

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Deloneite-(Ce)*

A.P. Khomyakov, D.V. Lisitsin, I.M. Kulikova, R.K. Rastsvetaeva (1996) Deloneite-(Ce), NaCa₂SrCe(PO₄)₃F, a new mineral with a belovite-like structure. Zapiski Vseross. Mineral. Obshch., 125(5), 83–94 (in Russian, English abs.).

R.K. Rastsvetaeva, A.P. Khomyakov (1996) Crystal structure of deloneite-(Ce), the highly ordered Ca analog of belovite. Doklady Akad. Nauk, 349(3), 354–357 (in Russian).

Electron microprobe analysis gave Na₂O 4.45, K₂O 0.07, CaO 14.77, SrO 18.19, BaO 0.10, La₂O₃ 8.12, Ce₂O₃ 13.14, Pr₂O₃ 1.13, Nd₂O₃ 3.81, Sm₂O₃ 0.34, Y₂O₃ 0.02, ThO₂ 0.02, SiO₂ 0.74, P₂O₅ 30.71, F 2.03, H₂O (calc) 0.38, O = F 0.85, sum 97.18 wt%, corresponding to (Na_{1.93}K_{0.02})_{Σ1.95}(Ca_{3.54}Sr_{2.36}Ba_{0.01})_{Σ5.91}(Ce_{1.08}La_{0.67}2Nd_{0.30}Pr_{0.09}Sm_{0.03})_{Σ2.17}(P_{5.81}Si_{0.17})_{Σ5.98}O₂₄[F_{1.44}(OH)_{0.56}]_{Σ2.00}, ideally NaCa₂SrCe(PO₄)₃F. The mineral occurs as grains, up to 1.5 mm in size, that are intimately intergrown with belovite and an apatite-like mineral rich in Sr and REE. Bright yellow color, transparent, vitreous luster, white streak, brittle, step-like fracture, *H* = 5, {10 $\bar{1}$ 0} and {0001} cleavages, *D*_{meas} = 3.92(5), *D*_{calc} = 3.95 g/cm³ for *Z* = 2. Optically uniaxial negative, ϵ = 1.660(2), ω = 1.682(2). Readily soluble in 10% HCl or HNO₃ at room temperature. Strongest absorption bands in the infrared spectrum are at 1164, 1098, 1047, 1010, and 949 cm⁻¹, and weaker bands are at 600, 575, and 547 cm⁻¹. Single-crystal X-ray structure study (*R* = 0.049) indicated trigonal symmetry, space group *P*3, *a* = 9.51(1), *c* = 7.01(1) Å. Strongest lines of the X-ray powder pattern (57.3 mm camera, FeK α radiation) are 3.51(30,002), 3.12(40,210), 2.84(100 broad,211,112), 2.753(40,300), 1.967(30,222), and 1.870(30,213).

The mineral occurs in hyperagpaitic pegmatites at the Khibina alkaline massif, Kola Peninsula, Russia. The new name is for Russian mathematician B.N. Delone (Delanay), 1890–1980. Type material is in the Fersman Mineralogical Museum, Moscow. The mineral is chemically the Ca analog of belovite, but the two minerals differ structurally. **J.L.J.**

* Before publication, minerals marked with an asterisk were approved by the Commission on New Minerals and Mineral Names, International Mineralogical Association.

Orthorhombic lamprophyllite

O. Johnsen (1996) TEM observations and X-ray powder data on lamprophyllite polytypes from Gardiner Complex, East Greenland. Neues Jahrb. Mineral. Mon., 407–417.

Electron diffraction patterns of lamprophyllite from the Gardiner complex showed that, in addition to monoclinic (*C*2/*m*) lamprophyllite and barytolamprophyllite, an orthorhombic polymorph of lamprophyllite is present. Partial Rietveld analysis of the orthorhombic mineral gave *a* = 19.356(2), *b* = 7.1040(2), *c* = 5.4083(2) Å, space group *Pnmm*. The minerals are designated lamprophyllite-2*M*, lamprophyllite-2*O*, and barytolamprophyllite-2*M*. **J.L.J.**

Malanite*

Zuxiang Yu (1996) Malanite—A new cupric platinum (Pt³⁺) and iridium (Ir³⁺) sulfide. Acta Geol. Sinica, 70(4), 309–314 (in Chinese, English abs.).

The mean and range of five electron microprobe analyses of grains from a magmatic Ni-Cu sulfide ore, and six analyses of grains from placer concentrates gave, respectively, S 23.8 (23.2–24.2), 22.6 (21.9–23.3), Fe 0.6 (0.2–0.9), 0.7 (0.3–1.1), Co 2.21 (1.73–2.74), 1.1 (0.7–1.5), Ni 0.3 (0.1–0.5), –, Cu 10.9 (10.1–11.8), 10.7 (10.2–11.1), Rh 0.7 (0.5–0.9), 1.5 (1.0–2.0), Pd 0.5 (0.3–0.9), 0.0, Ir 23.2 (22.2–24.0), 15.5 (14.3–17.3), Pt 37.0 (36.4–37.8), 47.4 (45.8–48.9), sum 99.2 (99.1–99.7), 99.5 (99.0–99.8) wt%, corresponding to (Cu_{0.93}Fe_{0.06})_{Σ0.99}(Pt_{1.03}Ir_{0.66}Rh_{0.04}Pd_{0.03}Co_{0.21}Ni_{0.03})_{Σ2.00}S_{4.03}, and (Cu_{0.95}Fe_{0.07})_{Σ1.02}(Pt_{1.37}Ir_{0.45}Co_{0.11}Rh_{0.08})_{Σ2.01}S_{3.97}, ideally CuPt₂S₄. Occurs as euhedral octahedral and dodecahedral crystals to 0.2 mm; also as veinlets up to 10 × 200 μm in iridisite. Steel-gray color, metallic luster, opaque, black streak, brittle, *H* = 5, *VHN*₂₀ = 417, {111} cleavage, non-magnetic, *D*_{calc} = 7.57 g/cm³ [*Z* = 8]. White with a greenish tint in reflected light, no birefractance or pleochroism, isotropic. Reflectance percentages (given in 10-nm steps from 400 to 700 nm; WTiC standard) are 37.3 (470), 37.7 (546), 38.1 (589), and 38.6 (650). Single-crystal X-ray study indicated isometric symmetry, space group *Fd*3*m*, *a* = 9.910 Å. Strongest lines of the powder pattern are 2.98(60,311), 2.48(80,400), 1.90(80,333), 1.75(100,440), and 1.001(70,844).

The magmatic Ni-Cu sulfide ore, which also contains

moncheite, cooperite, and sperrylite, is associated with olivine pyroxenite dikes that occur about 150 km east of Beijing. The chromite placers are near the village of Shuangfeng, about 200 km NNE of Beijing.

Discussion. Data for the mineral from the magmatic occurrence were abstracted in *Am. Mineral.*, 61, p. 185 (1976), which introduced several new but unapproved names, including malanite and dayingite (p. 184). Data for malanite were subsequently revised (*Am. Mineral.*, 65, p. 408, 1980), following which dayingite was shown to be Co-rich malanite (*Am. Mineral.*, 67, 1081–1082, 1982). Malanite has now been approved by the CNMMN (IMA No. 95–003). **J.L.J.**

Sn intermetallic compounds

N.N. Krivitskaya, M.S. Sakharova, A.N. Ryabov, A.I. Tsepin (1995) New data on the intermetallic compounds of tin. *Moscow Univ. Geol. Bull.*, 50(6), 65–70 (English translation of *Vestnik Mosk. Univ. Geol.*).

Complex intergrowths, to 0.5 mm, of native tin and intermetallic compounds occur in the Kubaka Au-quartz-orthoclase (adularia) deposit in the Okhotsk–Chukotka volcanogenic belt, northeastern Russia. The largest intermetallic inclusions, to 20 μm , are represented by Sn-Sb compounds; inclusions of other compounds are 2–10 μm . All inclusions are white with a yellowish shade, and have a high reflectance and low hardness. Electron microprobe analyses are given for compounds corresponding to Sn_2Sb , Sn_3Sb_2 , Sn_4Sb_3 , Cu_6Sn_5 , SnPb , Sn_7Pb , Fe_{10}Sn , and native tin and stibnite. **J.L.J.**

(Bi,Pb)₃(Te,S)₄

R.F. de Souza Lima, T. Mizuta, D. Ishiyama, T. Fujita (1996) Tellurium-bearing minerals in the Córrego Criminoso gold mining district, Goiás State, Brazil. Report Research Institute Natural Resources, Mining College, Akita University, No. 61, 1–16.

A sample of Au-bearing quartz vein contains mainly pyrite and chalcopyrite, with native gold and tetradymite, pilsenite, aleksite, and mineral A. An electron microprobe analysis (one of three listed) of mineral A gave Bi 56.98, Pb 6.68, Ag 0.04, Cu 0.16, Te 31.18, S 5.16, sum 100.20 wt%, corresponding to $(\text{Bi}_{2.69}\text{Pb}_{0.32}\text{Cu}_{0.02})_{\Sigma 3.03}(\text{Te}_{2.41}\text{S}_{1.59})_{\Sigma 4.00}$. The mineral is light gray in reflected light, weakly anisotropic, and has a high reflectance.

Discussion. Data for a mineral with the composition $\text{Bi}_3(\text{Te},\text{Se},\text{S})_4$ were abstracted in *Am. Mineral.*, 81, p. 519, 1996. **J.L.J.**

U⁴⁺ Phosphate

L.N. Belova, A.I. Gorshkov, O.A. Doynikova, A.V. Sivtsov, N.V. Trubkin (1996) A new phosphate of tetravalent uranium. *Doklady Akad. Nauk*, 349(3), 361–363 (in Russian).

Electron microprobe analyses of two particles gave CaO 0.76, 0.74, P₂O₅ 20.62, 18.70, V₂O₅ 2.20, 2.27, UO₂ 71.82, 68.46, H₂O (by difference) 4.60, 9.83; after deducting for tyuyamunite impurity (an energy dispersion scan showed only U, P, and a trace of Fe), the analyses correspond to, respectively, $\text{U}_{0.994}\text{Ca}_{0.006}(\text{PO}_4)_{1.194}(\text{OH})_{0.42} \cdot \sim 0.3\text{H}_2\text{O}$, ideally $\text{U}_5(\text{PO}_4)_6(\text{OH})_2 \cdot 1.5\text{H}_2\text{O}$, and to $\text{U}_{0.997}\text{Ca}_{0.003}(\text{PO}_4)_{1.116}(\text{OH})_{0.51} \cdot \sim 0.7\text{H}_2\text{O}$, ideally $\text{U}_6(\text{PO}_4)_7(\text{OH})_3 \cdot 4\text{H}_2\text{O}$. The O/U ratio is 2.15 in an ore sample consisting predominantly of phosphate, indicating that U is probably quadrivalent in the mineral. Aggregates of the mineral from Uzbekistan are very small, compact, and dark green (size of particles not given). Average $n = 1.735$. Least-squares refinement of electron diffraction data (63 reflections) showed the mineral to be monoclinic, space group $C2/m$, $a = 14.09(5)$, $b = 13.19(3)$, $c = 15.02(15)$ Å, $\beta = 89.4(6)^\circ$. No powder X-ray data could be obtained. The mineral was first found in the Kanzhugan exogenic deposit in the Chu-Sarysuyskaya depression, Kazakhstan, and later in the oxidized zone of the Koscheka and Dzhanuar deposits, Uzbekistan. At the latter localities the mineral has settled out mostly on unspecified “uran-micas” (autunite, torbernite, etc.) and less commonly on coconinoite. The mineral formed repeatedly during a complex hypogene process.

Discussion. The data reported are for material from Uzbekistan, but which locality is not specified. **E.S.G.**

Ca_{3,2}(Sr,Na,Ce)_{1,8}(PO₄)₃F

R.K. Rastsvetaeva, A.P. Komyakov (1996) Structural features of a new naturally occurring representative of the fluorapatite-deloneite series. *Kristallografiya*, 41(5), 831–834 (in Russian).

Electron microprobe analysis (results not listed) gave the formula $(\text{Ca}_{6.31}\text{Sr}_{2.33}\text{Na}_{0.65})_{\Sigma 9.29}(\text{Ce}_{0.34}\text{La}_{0.19}\text{Nd}_{0.10}\text{Pr}_{0.02}\text{Sm}_{0.01})_{\Sigma 0.66}(\text{P}_{5.93}\text{Si}_{0.11})_{\Sigma 6.04}\text{O}_{24}[\text{F}_{1.33}(\text{OH})_{0.67}]_{\Sigma 2.00}$, simplified as $\text{Ca}_{3.2}\text{R}_{1.8}(\text{PO}_4)_3\text{F}$ where $\text{R} = \text{Sr}_{1.2}\text{Na}_{0.3}\text{Ce}_{0.3}$. Occurs as yellow, transparent, prismatic crystals to 5 mm; optically uniaxial negative, $\epsilon = 1.637$, $\omega = 1.649$, $D_{\text{meas}} = 3.60$, $D_{\text{calc}} = 3.57$ g/cm³ for $Z = 2$. Single-crystal X-ray structure study ($R = 0.029$) indicated hexagonal symmetry, space group $P6_3$, $a = 9.485(3)$, $c = 7.000(3)$ Å. The mineral is associated with belovite and deloneite-(Ce) in hyperagpaitic pegmatites at the Khibina alkaline massif, Kola Peninsula, Russia. **J.L.J.**

Pb-Al sulfosilicate

C. Cipriani, M. Corazza, G. Pratesi (1995) A new lead silicate sulfate hydroxide from Val Fucinaia, Tuscany, Italy. *Periodico Mineral.*, 64, 309–313.

Six electron microprobe analyses gave a mean and range of MnO 0.40 (0.34–0.46), PbO 83.75 (83.16–84.33), Al₂O₃ 1.04 (0.95–1.11), SiO₂ 9.35 (8.65–9.86), SO₃ 1.83 (1.67–1.93), H₂O (by difference) 3.63, sum 100 wt%, corresponding to $\text{Pb}_{27}(\text{Al}_{1.6}\text{Mn}_{0.4})(\text{Si}_6\text{O}_{15})_2(\text{SO}_4)_2\text{O}_{10}$

(OH)₂₄. Occurs as round masses, 100 μm in diameter, consisting of white, platy crystals. White color, translucent, brittle, perfect {001} cleavage, *H* not determinable, $D_{\text{calc}} = 6.37 \text{ g/cm}^3$ for $Z = 1$. The infrared spectrum has absorption bands at 3350 cm⁻¹ (retained after heating to 104 °C, thus suggesting structural water), and at 1551, 1347, 1142, and 976 cm⁻¹. Electron diffraction patterns indicated hexagonal symmetry and gave the value for *a*, on the basis of which the Gandolfi X-ray pattern (114 mm, CuKα radiation) was indexed with $a = 9.203(4)$, $c = 25.72(2) \text{ \AA}$; strongest lines of the powder pattern are 25.7(70,001), 3.20(80,008), 2.86(100,009), 1.95(40,227), 1.92(35,1.0.13), and 1.87(80,228).

The mineral occurs at Campiglia Marittima, Tuscany, within cavities in weathered rock fragments that are debris from a sphalerite-chalcopyrite-galena skarn deposit initially mined in the Etruscan age. **J.L.J.**

New Data

Kalborosite

I.V. Pekov, N.V. Chukanov (1996) New data on kalborosite. *Zapiski Vseross. Mineral. Obsch.*, 125(4), 55–59 (in Russian).

Electron microprobe analyses at seven points gave an average of SiO₂ 37.81, B₂O₃ 4.13, Al₂O₃ 22.10, SrO 0.02, K₂O 28.45, Na₂O 0.13, Cl 3.84, F 0.05, calculated H₂O 3.81, O ≡ (Cl,F) 0.89, sum 99.45 wt%. The corresponding formula for (Si,Al)₁₀O₂₀ is (K_{5.69}Na_{0.04}Sr_{0.01})_{Σ5.74}[Al_{4.08}Si_{5.95}O₂₀][B_{1.12}(OH)_{3.98}F_{0.03}]Cl_{1.02}, in good agreement with the ideal formula K₆[Al₄Si₆O₂₀][B(OH)₄]Cl, and with analysis of the type material. The infrared spectrum has absorption bands at 3635, 3595, 3573, 3560, 3550, ~3400, ~3200, 1640, 1194, 1130, 1095, 1045, 1015, 988, 970, 950, 891, 757, 517, and 424 cm⁻¹. In addition, bands at 722, 707, 677, 627, and 574 cm⁻¹, attributed to the aluminosilicate framework, are virtually identical in position and intensity to the corresponding ones in natrolite. The mineral forms tetragonal prisms up to 2 mm long and 1.5 mm across, somewhat elongated || *c* with the prism {110} and pinacoid {001}; less common are the dipyrmaid {101} and tetragonal tetrahedron {112}, so the mineral has symmetry $\bar{4}2m$. Goniometric measurements gave $c/a = 1.338$. Colorless, vitreous luster, transparent. Powder X-ray data gave $a = 9.84(1)$, $c = 13.09(1) \text{ \AA}$ (the pattern is very close to that of type material, but no lines are listed).

The mineral occurs in a cancrinite-rich pegmatite that cuts nepheline syenite at the Kirov mine, Kukisvumchorr Mountain, Khibina massif, Kola Peninsula, Russia, which is the second locality for the mineral (see *Am. Mineral.*, 66, p. 879, 1981). The mineral occurs in interstices between cancrinite crystals; it is associated with villiaumite, pirssonite, rasvumite, and thermonatrite, and crystallized after a second generation of villiaumite and before the

other associated minerals and a third generation of villiaumite.

Discussion. On the basis of a structure refinement (*Am. Mineral.*, 66, p. 879, 1981) and the new IR data, the authors propose that kalborosite is a zeolite-group mineral closely related to edingtonite and natrolite. **E.S.G.**

Korzhinskite

S.V. Malinko, V.T. Dubinchuk (1996) New data on calcium borates—sibirskite and korzhinskite. *Zapiski Vseross. Mineral. Obsch.*, 125(4), 60–71 (in Russian).

Electron diffractograms of material from the type (and only known) locality, the Novofrolovskoye deposit, northern Urals, Russia, gave $a = 4.33(6)$, $b = 6.47(6)$, $c = 10.08(6) \text{ \AA}$, $\beta = 85(2)^\circ$, space group *P2/m*. As a result, the original powder X-ray data could be indexed; strongest lines in the pattern (19 lines given, plus one attributed to an impurity; cf. *Am. Mineral.*, 49, p. 441, 1964) are 3.11(70,021), 2.81(70,01 $\bar{2}$), 2.02(100,211), 1.905(50,131), and 1.757(40,203). Because the powder pattern closely resembles that of synthetic CaB₂O₄·0.5H₂O, the same formula is proposed for korzhinskite, originally given as CaB₂O₄·H₂O. Under the electron microscope, the crystals of the mineral are characteristically platy.

Discussion. There is no information on the structural position of the hydrogen. **E.S.G.**

Sibirskite

S.V. Malinko, V.T. Dubinchuk (1996) New data on calcium borates—sibirskite and korzhinskite. *Zapiski Vseross. Mineral. Obsch.*, 125(4), 60–71 (in Russian).

Electron diffraction patterns gave the space group as *P2/m*. The cell parameters $a = 3.67$, $b = 4.89$, $c = 19.30 \text{ \AA}$, $\beta = 62^\circ$ were calculated to give the optimal correspondence between measured and calculated *d* values for X-ray powder data on material from the type locality, the Yuliya Svintsoviya deposit, Khakassiya, Siberia, Russia. The original powder X-ray data could be indexed; strongest lines in the pattern (17 lines given, plus two lines attributed to calcite, cf. *Am. Mineral.*, 48, p. 433, 1963) are 3.74(40,013), 3.29(60,100), 2.93(100,112), 2.58(100,10 $\bar{2}$), 2.20(40,023), 2.05(40,122), 1.934(40,120), and 1.878(60,203). Similarly, previously published *d* values based on electron diffraction patterns of material from the Solongo deposit, Buratiya, and the Novofrolovskoye deposit, northern Urals, Russia, are optimally matched with the following cell parameters, respectively, $a = 3.68$, $b = 4.89$, $c = 19.32 \text{ \AA}$, $\beta = 63^\circ$, and $a = 3.67$, $b = 4.89$, $c = 19.30 \text{ \AA}$, $\beta = 62^\circ$. On the basis of similarities between the X-ray patterns of sibirskite and synthetic hydrated calcium borates, and given that the amount of water in sibirskite cannot be determined, the preferred formula is Ca₂B₂O₅·*n*H₂O, where $1 < n < 2$, rather than the CaHBO₃ formulation proposed originally. Review of

Russian occurrences, all of which are B-bearing skarn deposits, indicates that, at Yuliya Svintsova and Solongo, sibirskite formed with chlorite, calcite, and szaibelyite from breakdown of sakhaite and harkerite, whereas at Novofrolovskoye, sibirskite formed nearly coevally with calciborite.

Discussion. There is no information on the structural position of the hydrogen. A request for a redefinition has not been submitted to the CNMMN. **E.S.G.**

Villamaninite

C. Marcos, A. Paniagua, D.B. Moreiras, S. García-Granda, M.R. Diaz (1996) Villamaninite, a case of noncubic pyrite-type structure. *Acta Crystallograph.*, B52, 899–904.

Single-crystal X-ray structure study of two grains of villamaninite, $(\text{Cu,Ni,Co,Fe})(\text{S,Se})_2$, from the type locality showed that the mineral is monoclinic, space group $P2_1$, with $a = 5.709(2)$, $b = 5.707(2)$, $c = 5.708(2)$ Å, $\beta = 90.01(1)^\circ$, $R = 0.051$, and $a = 5.704(3)$, $b = 5.703(3)$, $c = 5.704(3)$ Å, $\beta = 89.99(2)^\circ$, $R = 0.034$. Both grains are optically anisotropic.

Discussion. A request for a redefinition has not been submitted to the CNMMN. **J.L.J.**

Volkonskoite

A.G. Kossovskaya, A.V. Gomon'kov, N.V. Gor'kova, Ye.V. Shchepetova (1996) New data on the composition and genesis of volkonskoite. *Litologiya i Poleznye Iskopayemye*, 1996(2), 146–156 (in Russian).

Four electron microprobe analyses of massive material that replaced fossilized wood at the Samosadka deposit gave SiO_2 51.530–53.796, Al_2O_3 4.894–5.364, Cr_2O_3 19.795–20.690, Fe_2O_3 1.616–1.696, CaO 2.144–2.444, NiO 0–0.04, sum 80.845–83.074 wt%. Where it has replaced the central parts of fossil trunks, the mineral in hand specimen is dark green, massive, with a conchoidal fracture. Generally fibrous or acicular under the SEM; distinctive spongy texture if recrystallized from a gel. Polarization weak, extinction straight, $n = 1.550$ – 1.560 , Δ

$= 0.15$ – 0.20 . Some is pleochroic from light green to green with a blue hue. A diffractogram of natural material in a preparation with strong preferred orientation has the following lines (in Å): 15.1 (sss), 5.32 (www), 5.06 (www), 4.49 (w), 3.34 (ww), 3.017 (ww), 2.60 (ww), 2.56 (ww) (strong, weak for relative intensities estimated from published diffractogram), a pattern typical of smectites.

The mineral occurs in Upper Permian deposits exposed in the Pakhomovoy Mountains, banks of the Pikhtovki River, and in the Samosadka and Bosh'yanovskaya deposits, Kama River region west of the Ural Mountains, Russia. The mineral in economic concentrations is closely related to silicified and carbonated fossil wood, dominantly *Araucarites sp.*, in sandstone, wherein the mineral has formed veinlets, nests, inclusions, and has completely pseudomorphosed the woody remains. Less commonly, the mineral cements grains in sandstone. Some massive material developed by recrystallization of a gel.

Discussion. Compared to analyses of the neotype and cotype specimens, also from the Perm Basin (*Am. Mineral.*, 73, p. 934, 1988), the mineral analyzed here has higher SiO_2 and lower Fe_2O_3 ; Cr_2O_3 contents are comparable. See also *Clays Clay Minerals*, 36(6), 540–541, 1988 for discussions of volkonskoite nomenclature. **E.S.G.**

Discredited Mineral

Ferrazite

D. Atencio, A.M. Clark (1996) Ferrazite is identical to gorceixite. *Mineral. Mag.*, 60, 841–842.

Electron microprobe analyses and X-ray powder patterns of ferrazite, including the type specimen, have shown the mineral to be gorceixite. The discreditation of ferrazite has been approved by the CNMMN. **J.L.J.**

Erratum

In the abstract of **mereiterite** (*Am. Mineral.*, 81, p. 251, 1996), the angle for the monoclinic unit cell ($\beta = 94.87^\circ$) was inadvertently omitted. **J.L.J.**