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GEOGRAPHICAL LOCATION OF MINERAL TYPE LOCALITIES

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An inventory of mineral type localities at which more than three new mineral species were discovered (nearly 200 sites over the world) has been compiled. Their geographical locations have been refined (the coordinates are presented) using the multimedia Microsoft Encarta-2001 World Atlas. Examples of the earliest (regarding the year of the publication) and last finds of new minerals are presented for each of the type localities. These data can be used for expansion of museum collections at the expense of additions of type specimens.

The place of discovery, or the type locality (TL), is obligatorily specified in publications on new minerals. However, the geographical location is commonly the least precise characteristic in the descriptions of the finds. The geographical location of the finds determines their scientific and collectional value and, therefore, it is of particular importance for large world-class museums that are interesting in standards of new minerals with their TL.

The interest to the type localities has begun to increase from the 1960s. For example, comprehensive reviews of new minerals were already present in summaries on mineralogy of Colorado (Eckel, 1961), Japan (*Introduction...*, 1970), and other regions. In 1970, Embrey and Hey were the first to consider in detail the concept of type specimens (Embrey and Hey, 1970). In the 1990s, the international project was already being realized on compilation of the Catalogue of Type Mineral Specimens (CTMS); its parts were the work on Zair published in 1995 by M. Deliens and H.A. Stalder and others. A preliminary inventory including reliable new mineral species etc. from the United States (arranged by the states) was compiled by 1993 by V.T. King (remained unpublished). In 1998, Pekov published a summary on new minerals from the former Soviet Union, the most comprehensive work among publications on this subject. The first reference-book where an effort was made to specify the TL for each mineral species was probably the work by Nickel and Nichols (1991). The number of TL mentioned in this reference-book exceeds 1500. Using the summaries by Nickel and Nichols, Pekov, and Mandarino (1997), as well as other works, I have compiled the present inventory of type localities where more than three new mineral species were discovered (data are as of the late 1990s).

This inventory includes about 200 TL for which the geographical coordinates are presented with the use of the multimedia Microsoft Encarta-2001 World Atlas. The figures preceding a TL name is the number of new species discovered here; the data borrowed from the work by Pekov (2000) are asterisked. For each TL, examples of finds of new minerals are provided from among the first (the year of the publication is specified) and last ones. In addition to the type locality proper, the inventory includes some districts 10—40 km across, if they incorporate several TL. It is obvious that comparing the objects in the number of new species and in the mineral diversity, it is important to take into account their sizes and surroundings, since finds derived from type localities different in name (or with different geographical locations) can belong to one and the same ore district, massif, and formation, or can be located very nearly to each other.

In this respect, it is useful to compile maps of regions (or countries), showing the TL location (see below). However, this problem is difficult to solve using ordinary geographical atlases, maps 1:500000, and reference-books on mineral deposits, since even many famous mineral type localities (Langban, Lengenbach, Ilimaussaq, etc.) are missing from them. The use of the Encarta-2001 World Atlas that contains 1.8 millions of geographical names facilitates the work, although the problem is not completely removed. Thus, the atlas does not contain some names (for example, Ilmeny = Ilmenskiye Mountains); on the other hand, it contains many names identical to each other, which hampers the search.

Thus, the name Panasqueira, Portugal, that is often encountered in mineralogical literature, is repeated 7 times in Encarta-2001. The same is true for Antisirabe, Madagascar (15 times); Mooihoek, South Africa (6 times); and Sar-e-Sang, Afghanistan (7 times, none of them being coincident with the famous lazurite deposit). The same problems persist with respect to finds of new minerals, made in the last few years. The TL of esperanzaite (the year 2000) is La Esperanza, Durango, Mexico; but the atlas refers to three populated localities La

Esperanza in this state. The TL of onite (1998), famous Tunaberg, is absent from the atlas, but there exists another point under the same name here. The TL of damiaoite (1997) is «the village of Damiao, 270 km apart from Beijing»; the atlas refers to 6 villages under this name in this region of China, but none of them is situated at the distance specified above. Another problem is related to an existence of different versions (including distorted ones) of Russian transcriptions for geographical names of foreign localities (for example, for the Italian names *Leviglinani*, *Cetino*, and *Cerchiara*). Incidentally, the name Cercharia is contained in Encarta-2001, but the locality it specifies is not the place where caoxite and mozartite were discovered.

The correctness of the names and locations is an individual issue (Evseev, 2000). Renamed TL, different TL under the same name, different spelling versions of the names, and dissimilar approaches to the location — all these complications make serious problems for many museums, collections, and publications. Significance of these problems can be estimated on the example of the inventory of 200 principal TL which comprise only a share of a percent of the total number of mineral localities.

Principal mineral type localities

Abbreviations:
(Dst.) district, area;
(Co.) county;
(m.) mine;
(Mf.) massif;
(Q.) quarry;
(N) north, northern latitude;
(S) south, southern latitude;
(W) west, western longitude;
(E) east, eastern longitude.

9 — **Alsar** \5 km NE from Rozden (41°11`N, 21°57`E), F.Y.R.O. Macedonia *1894-lorandite;...1989-bernardite; 1994-dorallcharite*

5 – Baia Sprie \ (47°39`N, 23°40`E), Romania *1853-felsobanyaite (felsobanyite);...1929-klebelsbergite*

5 – Baita Bihorului \[=Baita: 46°29`N, 22°34`E], Romania *1861-szaibelyite;...1985-paderaite; 1994-makovickyite*

5 — **Bambolla m.** \Moctezuma (29°48`N, 109°41`W), Sonora, Mexico *1972-bambollaite;...1989-cervelleite*

7 — **Bambollita (=La Oriental) m.** \Moctezuma (29°48`N, 109°41`W), Sonora, Mexico *1973-quetzalcoatlite;...1979-tlapallite*

9 — **Barberton district** \(25°48`S, 31°03`E), Transvaal, South Africa *1921-trevorite (Bon Accord 282 JU);...1978-nichromite (Bon Accord 282 JU)*

4 — **Bastnas** \Riddarhyttan (59°49`N, 15°33`E), Vastmanland, Sweden *1841-bastnasite-(Ce);...1921-tornebohmite-(Ce)(toernebohmite-(Ce))*

4 — **Baveno** \(45°55`N, 8°30`E), Piemonte, Italy * *1901-bavenite; 1998-scandiobabingtonite*

12 — **Bayan Obo = Bayin Obo** \(41°46`N, 109°58`E), Inner Mongolia, China *1959-bafertisite;...1987-baiyneboite-(Ce)*

10 — **Bellerberg q.** \SE of Ettringen, 2 km N of Mayen (50°19`N, 7°13`E), Laacher See Area, Eifel, Germany *1874-ettringite; ...1983-eifelite; 1999-schaferite*

4 — **Bergen** \(50°28`N, 12°16`E), 7 km W of Falkenstein, Saxony, Germany *1877-Uranocircite ;...1984-Bergenite*

4 — **Big Chief m.** \[~5 km SE of] Keystone (43°53`N, 103°25`W), Pennington Co., South Dakota, USA *1974-perloffite;...1984-sinkankasite*

8 — **Big Creek and Rush Creek area** \~8 km NE of Trimmer (36°54`N, 119°17`W), Fresno Co., California, USA *1965-fresnoite; ...2001-kampfite*

4 — **Big Fish River** \(68°28`N, 136°30`W), Yukon, Canada *1977-maricite;... 1981-wicksite*

9 – Big Fish River and Rapid Creek (see below) (area) \Yukon, Canada *1976-baricite; ...1986-rapidcreekite*

30 — **Binntal = Binnental = Val di Binn** \E of Binn (46°22`N, 8°10`E), Valais (= Wallis), Switzerland (finds in area 6 x 6 km, including Cherbadung (= Pizzo Cervandone, Italy)) *1845-dufrenoysite;...1994-fetiasite (Gorb); 1998-graeserite(Monte Leone thrust)*

5 — **Bisbee** \(31°26`N, 109°55`W) (area), Cochise Co., Arizona, USA *1891-paramelaconite;...1983-henryite*

22 — **Black Hills** \ (area 160 x 88 km); pegmatites of area of Custer (43°46`N, 103°36`W) and Keystone (43°53`N, 103°25`W); Pennington\ Custer Co., South Dakota, USA *1891-griphite;...1989-pararobertsite*

7 — **Bon Accord** \15 km NE from Barberton (25°48`S, 31°03`E) Distr., Transvaal, South Africa *1921-trevorite;...1978-nichromite*

5 – Bou Azzer \(30°31`N, 6°54`W), Morocco *1956-smolianinovite;...1987-wendwilsonite*

9 – Branchville \ about 6 km E of Redding (41°18`N, 73°23`W, Fairfield Co., Connecticut, USA *1878-eosphorite;...1880-eucryptite*

12 – Broken Hill \(31°58`S, 141°28`E), New South Wales, Australia *1892-marshite; ...1992-segnitite; Sutherland F.L., 2000*

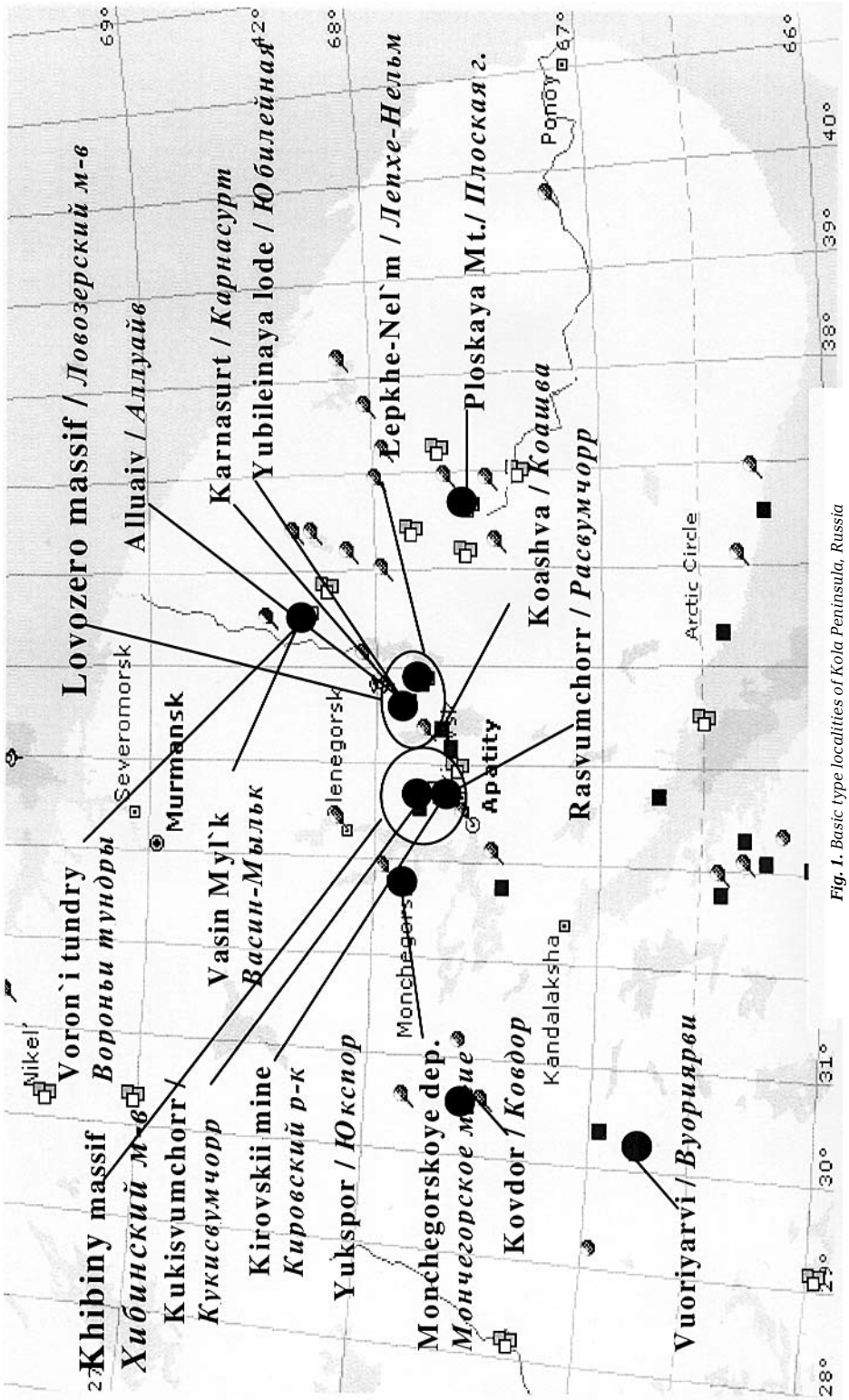

Fig. 1. Basic type localities of Kola Peninsula, Russia

5 – Buca della Vena m. \Stazzema (43°59`N, 10°18`E), Tuscany, Italy *1979-apuanite; ...1997-dessauite; 1999-scainiite*

4 – Bultfontein m. \Kimberley (28°43`N, 24°45`W) area (SE), South Africa *1932-bultfonteinite;... 1989-hawthorneite*

4 – Candoglia \Val di Toce, ~2 km NE of Ornavasso (45°58`N, 8°24`E), Piemonte, Italy *1905-paracelsian;...1984-titantaramellite*

11 – Cap Garonne \Le Pradet (43°06`N, 6°01`E), Var, France *1910-cuproadamite; ...1997-pushcharovskite*

4? – Carleton m. \Chester (43°16 `N, 72°36`W), Windsor Co., Vermont, USA *1977-jimthompsonite;...1977-chesterite*

5 – Carlin m. (Au) \~15 km NW of Carlin (40°43`N, 116°06`W), Eureka Co., Nevada, USA *1974-frankdicksonite;... 1979-ellisite*

4 – Cerny Dul \(50°37`N, 15°42`E), Krkonose, Czech Republic *1958-koutekite;...1979-kutinaite*

5 – Cetine di Cotorniano \Rosia (43°15`N, 11°12`E), ~10 km SW of Siena, Tuscany, Italy *1968-onoratoite;...1999-clinocervantite*

4 – Christmas m. (Cu) \(33°03`N, 110°44`W), 7 km NE of Hayden, Gila Co., Arizona, USA *1976-junitoite;...1980-apachite*

12 – Chuquicamata \(22°18`S, 68°55`W), 15 km N of Calama, Antofagasta, Chile *1908-natrochalcite;...1986-obradovicite*

14 – Clara m. \8 km NW of Wittichen (48°19`N, 8°20`E), Schwarzwald (=Black Forest), Germany *1966-barium-pharmacosiderite;...1984-cualstibite; 1993-arsenogorceixite*

6 – Clay Canyon \~2 km W of Fairfield (40°16`N, 112°06`W), Utah Co., Utah, USA *1896-wardite;...1940-montgomeryite*

7 – Clear Creek claim \(36°23`N, 120°46`W), 10 km SW of Idria, San Benito Co., California, USA *1990-edgarbaileyite;...1997-hanawaltite*

6 – Cobalt (area) \(47°23`N, 79°40`W) (area), Ontario, Canada *1924-ferrisymplesite (Hudson Bay m.);...1972-larosite (Foster m.)*

4 – Colquechaca (area) \(18°39`S, 66°01`W) (area), Potosi, Bolivia *1926-penroseite;...1978-mandarinoite (both pacajake*)

7 – Copiapo (mining disrict) \(27°21`S, 70°20`W) = (area), Atacama, Chile *1833-copiapite;...1933-amarillite*

4 – Coyote Peak \SW of Orick (41°17`N, 124°03`W), Humboldt Co., California, USA *1980-erdite;...1983-coyoteite*

8 – Crestmore q., \8 km NW of Riverside (33°59`N, 117°22`W), Riverside Co., California, USA *1917-riversideite;...1966-jennite*

9 – Death Valley \(area ~130 x 15 km), Inyo Co., California, USA *1883-colemanite (Furnace Creek, 5-12 km NW of Ryan (36°19`N, 116°40`W);...1970-wardsmithite (Hardscrable Claim, Furnace Creek)*

7 – Elba Island \(central part:~ 42°47`N, 10°15`E), Italy *1811-ilvaite (Rio Marina);... 1957-bonattite*

9 – Ettringer – Bellerberg, 2 km N of Mayen (50°19`N, 7°13`E), Laacher See area, Eifel, Germany *1964-mayenite;...1997-ternesite*

6 – Falun \(60°36`N, 15°38`E), Kopparberg, Sweden *1828-botryogen;...1980-nordstromite*

9 – Foot Mineral Company m. \2 km SW of Kings Mountain (35°14`N, 81°20`W), Cleveland Co., North Carolina, USA *1967-switzerite;...1990-lithiomarsturite*

8 – Francon q. \St. Michel Distr. (~46°31`N, 73°35`W), Montreal Island, Quebec, Canada *1968-weloganite;...1990-voggite*

45* – Franklin \(41°07`N, 74°35`W), Sussex Co., New Jersey, USA *1819-franklinite; ...1992-franklinphilite*

65* – Franklin (area) \(41°07`N, 74°35`W), Sussex Co., New Jersey, USA *1814-zincite; 1819-franklinite;...1994-samfowlerite*

10 – Franklin Furnace, Franklin (41°07`N, 74°35`W), Sussex Co., New Jersey, USA *1830-willemite;...1928-larsenite*

43 – Franklin m., Franklin (41°07`N, 74°35`W), Sussex Co., New Jersey, USA *1814-zincite;... 1994-samfowlerite*

4 – Fredriksvarn = Stavern (59°00`N, 10°02`E), Vestfold, Norway *1826-pyrochlore; 1852-meliphanite*

12 – Freiberg and area \ (50°54`N, 13°20`E), Erzgebirge, Saxony, Germany *1829-polybasite (Neuer Morgenstern m.);...1963-arsenpolybasite (Neuer Morgenstern m.)*

7 – Fuka m., = Bicchu = Bitchu (34°46`N, 133°26`E), Okayama Pref., Japan *1973-bicchulite;...1992-clinotobermorite*

7 – Furnace Creek, Furnace Creek Wash (~36°23`N, 116°44`W), 5-12 km NW of Ryan (36°19`N, 116°40`W), Death Valley, Inyo Co., California, USA *1883-colemanite; ...1965-mcallisterite*

5 – Gabe Gottes vein \ Ste.-Marie-aux-Mines (48°14`N, 7°10`E), Alsace, France *1964-rauenthalite;...1982-phaunouxite)*

4 – Gambatesa m., Reppia (44°22`N, 9°26`E), Val Graveglia, Liguria, Italy *1979-saneroite;...1992-reppiaite; 1994-vanadomalayaite*

5 – Good Hope m., Vulcan (38°20`N, 107°00`W), Gunnison Co., Colorado, USA

1903-rickardite;...1986-cameronite

4 – Grand Central m., Tombstone (31°43`N, 110°04`W), 30 km NNE of Bisbee, Cochise Co., Arizona, USA *1979-girdite;...1979-winstanleyite*

4 – Grand Reef m., Aravaipa (32°57`N, 110°21`W) district, near Klondyke (32°50`N, 110°19`W), Graham Co., Arizona, USA *1989-aravaipaite;...1989-grandreefite*

8 – Green River Formation \ (finds in area (wide of this area is up to 170 km): 1) Duchesne Co. and Uintah Co., Utah, USA 2) Sweetwater Co., Wyoming, USA *1954-eitelite (Duchesne Co., Utah);...1978-abelsonite (Uintah Co., Utah)*

4 – Guanajuato \ (21°01`N, 101°16`W), mining district (area 200 sq. km), Guanajuato (state), Mexico *1873-guanajuatite (Santa Catarina m.);...; [1963-antimonpearceite]*

15 – Hagendorf \(49°38`N, 12°27`E), 3 km NW of Waidhaus, Oberpfalz, Bavaria, Germany *1920-phosphophyllite;...1988-lehnerite*

11 – Harstigen = Harstigsgrufvan \ [~3 km NE of] Persberg (59°45`N, 14°14`E), Varmland, Sweden *1865-monimolite;...1891-svabite*

5 – Hatrurim \ W of Dead Sea (NW point: 31°46`N, 35°30`E), Israel *1928-bayerite; ...1985-ye`elimite*

4 – Hillside m. \ (34°25`N, 112°54`W), Bagdad, Yavapai Co., Arizona, USA *1951-andersonite;...1976-zinc-zippeite*

4 – Himmelsfurst m. \8 km SSW of Freiberg (50°54`N, 13°20`E), Erzgebirge, Saxony, Germany *1840-xanthoconite;...1909-jordisite*

25* – Ilimaussaq \(central part ~60°55`N, 45°52`W), ~25 km NNE of Julianehab (60°43`N, 45°52`W), Greenland (SW) *1819-eudialyte(Kangerdluarsuk);...1989-nacareniobsite-(Ce)*

4 – Iquique \(20°13`S, 70°09`W) and area, Tarapaca, Chile *1850-ulexite;...1986-iquiqueite*

4 – Itabira \(19°37`S, 43°13`W), Minas Gerais, Brazil *1955-arsenopalladinite;...1977-palladseite*

18* – Ivigtut \(61°12`N, 48°10`W), Greenland (SW) *1799-cryolite;...1997-jorgensenite*

8 – Izalco volcano \ (13°49`N, 89°38`W), El Salvador *1979-stoiberite;...1988-howardevansite*

24* – Jachymov \(50°21`N, 12°55`E), Czech Republic *1727-uraninite;...1996-jachymovite*

6 – Jakobsberg \S of Nordmark (59°49`N, 14°06`E), Varmland, Sweden *1869-jacobsite;...1993-lindqvistite*

4 – Jas Roux m. \(~44°49`N, 6°18`E), 12 km SSW of Mont Pelvoux (44°55`N, 6°21`E), Hautes Alpes, France *1970-pierrotite; ...1981-chabourneite*

5 – Jo Dandy m. \~10 km SE of Paradox (38°22`N, 108°57`W), Paradox Valley, Montrose Co., Colorado, USA *1914-metahewettite;...1970-metadelrioite*

7 – Johanngeorgenstadt \(50°25`N, 12°44`E), Erzgebirge, Saxony, Germany *1855-emplectite; ...2000-paganoite*

4 – Kamoto East m. \[~5 km] S of Musonoi (10°40`N, 25°25`E), Shaba,Congo (DRC) *1986-kamotoite-(Y);...1990-astrocyanite-(Ce)*

7 – Kangerdluarsuk \~15 km N of Julianehab (60°43`N, 45°52`W), Ilimaussaq, Greenland (SW) *1819-eudialyte;...1967-tundrite-(Nd)*

6 – Kank \(49°58`N, 15°17`E), 3 km NE of Kutna Hora, Czech Republic *1901-kutnohorite;...1999-parascorodite*

7 – Kasolo \ (11°03`S, 26°32`E), 5 km SW of Shinkolobwe, Shaba, Congo (DRC) *1921-curite;...1923-schoepite*

4 – Keweenaw peninsula \ (80—100 x 20—25 km), NE of Houghton (47°06`N, 88°32`W), Lake Superior, Michigan, USA *1925-pumpellyite -(Mg); 1963-anthonyite and calumetite (Centennial m. , Calumet: 47°14`N, 88°27`W); 1979-macfallite (Copper Harbor)*

4 – Keystone m. \Magnolia Distr. , 9 km SW of Boulder (40°01`N, 105°16`W), Boulder Co., Colorado, USA *1877-coloradoite;...1988-keystoneite*

14 – Kobokobo \(3°05`N, 28°08`E), Shaba, Congo (DRC) *1958-lusungite;...1987-althupite*

7 – Kombat \ (19°42`N, 17°42`E), ~50 km S of Tsumeb, Namibia *1986-kombatite;...1990-damaraite*

5 – Kuusamo \ (65°57`N, 29°10`E), Finland *1964-wilkmanite;...1964-trustedtite*

68* – Langban \ (59°51`N, 14°15`E), 15 km NNE of Filipstad, Varmland, Sweden *1830-hedyphane;...1998-philolithite*

101 – Langban \(59°51`N, 14°15`E) area (Harstigen, Nordmarken, Jakobsberg and others), Varmland, Sweden *1808-pyrosmalite;...1998-philolithite*

23* – Langesundfjord \~5—10 km SE of Brevik (59°04`N, 9°41`E), Norway (S) *1829-thorite (Lovo (=Laven) Isl.);...1890-hambergite (Helgeraen)*

6 – Larderello \(43°14`N, 10°52`E), Tuscany, Italy *1854-larderellite;...1970-santite*

16* – Lavrion = Laurium \(37°42`N, 24°03`E), Greece *1881-serpierite;...1998-niedermayrite; 2000-zincwoodwardite*

7 – Leadhills \(55°24`N, 3°45`W), Scotland, Great Britain *1832-caledonite;...1987-mattheddleite*

25* – Lengenbach \(~46°21`N, 8°21`E), Binntal, Valais, Switzerland *1845-dufrenoysite; ...1997-jentschite*

5 – Little Green Monster m. \Clay Canyon (40°16`N, 112°07`W), 2 km W of Fairfield, Utah Co., Utah, USA *1930-englishite; ...1940-montgomeryite*

5 – Llallagua \(18°25`S, 66°38`W), Potosi, Bolivia *1922-vauxite (Siglo XX m.); ...1982-jeanbandyite*

7 – Loven (= Laven =Lovo) Isl. \ ~5 km E of Langesund (59°00`N, 9°44`E), Langesundfjord, Norway (S) *1829-thorite;...1885-lavenite*

8 – Madoc \ (44°30`N, 77°28`W), 45 km NE of Hastings, Ontario, Canada *1967-veenite; ...1967-madocite*

4 – Magadi (Lake Magadi) \W of Magadi (1°53`S, 36°18`E), Kenya *1909-uhligite; ...1970-makatite*

8 – Mammoth – St. Anthony m. \(32°43`N, 110°37`W), Tiger, Pinal Co., Arizona, USA *1950-wherryite;...1989-pinalite*

6 – Menzenschwand \ (47°49`N, 8°04`E), Schwarzwald, Germany *1976-joliotite; ...1985-uranotungstite*

4 – Merume River \[compare – Merume Mountains, Mazaruni River and Potaro River (sources: 5°16`N, 59°50`W), Guyana *1967-guyanaite;...1976-mcconnellite*

8 – Minasragra \ ~35 km SW of Cerro de Pasco (10°41`N, 76°15`W), Pasco, Peru *1906-patronite;...1994-fernandinite*

23 – Moctezuma (area) \(29°48`N, 109°41`W), Sonora, Mexico \\ *1960-paratellurite; ...1989-cervelleite*

7 – Moctezuma m. \[22 km] S of Moctezuma (29°48`N, 109°41`W), Sonora, Mexico \\ *1961-zemannite;...1979-burckhardtite*

4 – Molinello \9 km NE of Lavagna (44°21`N, 9°27`E), Val Graveglia, Liguria, Italy *1980-tiragalloite;...1990-strontiopiemontite*

41 – Mont Saint Hilaire (area) \near **Mont Saint Hilaire** (45°31`N, 73°09`W) (area), 32 km ENE of Montreal, Quebec, Canada *1967-lemoynite;...1999-khomyakovite; 2001-natrolemoynite*

17 – Monte Somma \Vesuvius (40°49`N, 14°25`E), near Naples, Campania, Italy *1795-vesuvianite; 1800-nepheline;...1990-montesommaite*

5 – Moschellandsberg \1km E of Obermoschel (49°43`N, 7°46`E), Rheinland-Pfalz, Germany *1972-schachnerite;...1992-belendorffite*

4 – Moss m. \near Nordmark (59°49`N, 14°06`E), Sweden *1884-allactite;...1884-synadelphite*

9 – Mounana \(1°26 `S, 13°09`E), (U) deposit, 55 km NW of Franceville, Gabon *1957-francevillite;...1971-bariandite*

7 – Musonoi m. \(10°42`S, 25°23`E), W of Kolwezi (10°41`S, 25°39`E), Shaba, Congo (DRC) *1965-guilleminite;...1971-derriksite*

10 – Musonoi m. – Kolwezi m. (area) \ (10°42`S, 25°23`E) (~10°44`S, 25°27`E), W of Kolwezi (10°41`S, 25°39`E), Shaba Congo (DRC) *1965-guilleminite (Musonoi m.); ...1990-astrocyanite-(Ce) (Kamoto-East pit)*

15 – Narssarssuk = Narsarsuk = Narsarsuaq, massif \~15 km SSE of Narsarsuaq (61°09`N, 45°25`W) or 10 km NE of Igaliko = Igaliku (60°59`N, 45°26`W), Greenland (SW) *1893-neptunite;...1897-lorenzenite;...1953-rontgenite-(Ce)*

8 – Nordmarken = Nordmark \ (59°49`N, 14°06`E), Varmland, Sweden *1808-pyrosmalite (Bjelkes Grufvan); 1835-safflorite; ...1917-katoptrite*

>100 Nordmark area \(Brattfors (20 km S of Nordmark), Harstigen, Jakobsberg, Langban (8 km ENE of Nordmark), Moss and other, Varmland, Sweden *1808-pyrosmalite (Bjelkes Grufvan);...1998-philolithite (Langban)*

5 – Ojuela m. \Mapimi (25°50`N, 103°50`W), Durango, Mexico *1956-paradamite; ...1983-lotharmeyerite (Mapimi)*

4 – Pacajake \Colquechaca (18°39`S, 66°01`W), bolivia *1926-penroseite;...1978-mandarinoite*

4 – Pala District \ (Stewart m. and others), Pala (33°21`N, 117°04`W), San Diego Co., California, USA *1912-sicklerite (Vanderberg m.); 1912-stewartite (Stewart m.)...1978-jahnsite-(MnMnMn) (Stewart m.)*

8 – Pala District – Mesa Grande District – Ramona District \(33°21`N, 117°04`W) (33°10`N, 116°46`W) (33°02`N, 116°52`W) (~ 40 x 20 km), San Diego Co. , California, USA *1912-sicklerite (Vanderberg m.); 1915-stibiocolumbite (Himalaya m.); ...1991-boromuscovite-1M (Little Three m.)*

10 – Palermo #1 m. (pegmatite) \1.6 km SW of North Groton (43°45`N, 71°52`W), Grafton Co., New Hampshire, USA *1940-whitlockite;...1977-schoonerite; 1984-sinkankasite*

4 – Panasqueira \ (40°09`N, 7°45`W), 23 km W of Fundao, Portugal *1966-berndtite-4H; ...1979-panasqueiraite*

9 – Paradox Valley \ (~40 x 15 km), SE of Paradox (38°22`N, 108°57`W), Montrose Co., Colorado, USA *1914-metahewettite (Jo Dandy Claim);...1962-hendersonite (J. J. mine)*

4 – Pitigliano \ (42°37`N, 11°39`E), Grosseto,

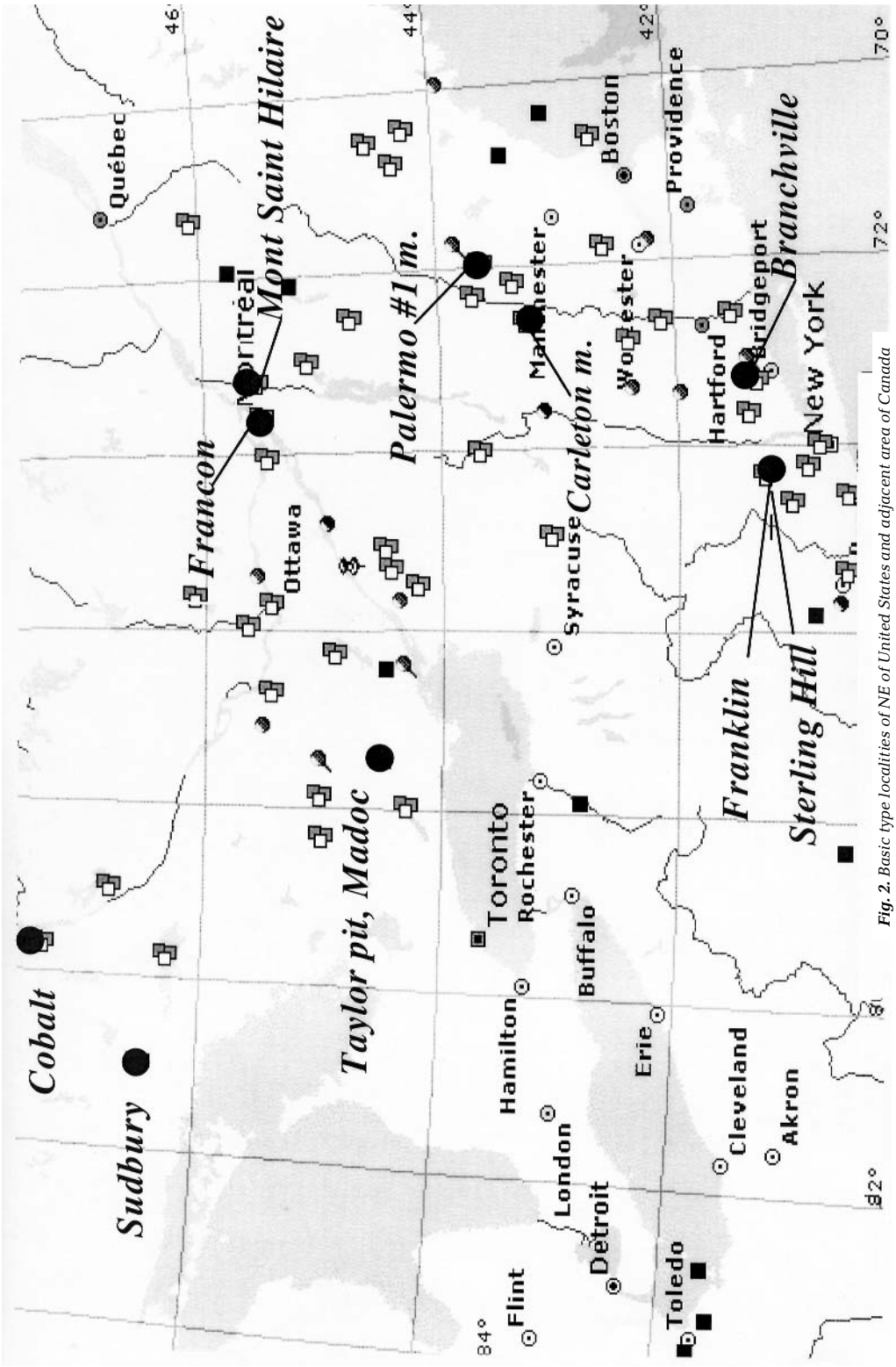

Fig. 2. Basic type localities of NE of United States and adjacent area of Canada

Tuscany, Italy *1977-tuscanite;...1991-pitiglianoite*

>10 – Poudrette q. \Mont Saint Hilaire (45°31`N, 73°09`W), Quebec, Canada *1989-griceite;...2001-micheelsenite*

5 – Pribram \ (49°41`N, 14°00`E), Czech Republic *1820-cronstedtite;...1990-znucalite (Lill mine)*

6 – Rapid Creek \(point A: 68°33`N, 136°47`W; point B: 68°31`N, 136°57`W), Yukon, Canada *1976-baricite;...1986-rapidcreekite*

5 – Richelsdorf \ (~50°58`N, 10°00`E), Hessen, Germany *1819-picropharmacolite;...1985-simomkolleite*

8 – Sacaramb = Sacarimb = Nagyag (former) \ (44°57`N, 23°03`E), Romania \\ *1835-sylvanite;...1929-fuloppite*

4 – San Piero in Campo \ (42°54`N, 10°12`E), Elba, Italy *1846-pollucite;...1993-uranopolycrase*

7 – Sapucaia \6 km SE of Sapucaia do Norte (18°50`S, 41°31`W), Minas Gerais, Brazil *1949-frondelite;...1958-roscherite*

6 – Scawt Hill \ near Larne (54°51`N, 5°50`W), Antrim Co., Northern Ireland, Great Britain *1929-scawtite;...1973-ferrobustamite*

38* – Schneeberg \(50°36`N, 12°38`E), Erzgebirge, Saxony, Germany *1786-metatorbernite;...1998-brendelite*

4 – Scotia Talc m. \ Bon Accord (~25°41`S, 31°10`E), 15 km NE of Barberton (25°48`S, 31°03`E), Transvaal, South Africa *1968-nimite;...1974-bonaccordite*

11 – Searles Lake \ (15 x 12 km), near Trona (35°45`N, 117°22`W), San Bernardino Co., California, USA *1878-tincalconite; 1885-hanksite;... 1963-galeite*

4 – Shaheru (Mt. Shaheru) volcano \(~1°29`S, 29°14`E), ~5 km N of Nyiragongo, Nord-Kivu, Congo (DRC) *1957-combeite;...1959-delhayelite*

36 – Shinkolobwe \ (11°02`S, 26°34`E), Shaba, Congo (DRC) *1921-curite;...1985-gysinite-(Nd); 1986-protasite*

9 – Sierra Gorda \ (22°53`S, 69°18`W) area (Caracoles [= Placilla de Caracoles: 23°02`S, 69°00`W] and others), Antofagasta, Chile *1888-amarantite;...1999-changoite*

5 – Sjo m. = Sjo Grufvan \SE of Grythyttan (59°42`N, 14°32`E), Orebro, Sweden *1888-arseniopleite;...1986-orebroite*

4 – Skipton Caves \ (37°41`S, 143°22`E), 45 km SW of Ballarat, Victoria, Australia *1878-hannayite;...1887-dittmarite*

5 – Sophia m. \ (~48°20`N, 8°20`E), 300 m WSW of Kloster Wittichen (Weiss,1990), Schwarzwald, Germany *1958-metakahlerite;...1998-chadwickite*

5 – Stassfurt \ (51°51`N, 11°35`E), Sachsen (= Saxony)-Anhalt, Germany *1856-carnallite;...1884-pinnoite*

8 – Ste.-Marie-aux-Mines \ (48°14`N, 7°10`E), Alsace, France *1941-dervillite;...1984-villyaellenite*

22* – Sterling Hill \ Ogdensburg (41°05`N, 74°35`W), Sussex Co., New Jersey, USA *1823-tephroite;...1987-parabrandtite*

19 – Sterling m., Sterling Hill, Ogdensburg (41°05`N, 74°35`W), Sussex Co., New Jersey, USA *1823-tephroite;...1987-wendwilsonite*

5 – Stillwater Complex \ ~40 km across NW (~45°30`N, 110°15`W), Montana, USA *1974-rhodium;...1979-telluropalladinite*

7 – Sudbury \ (46°29`N, 81°00`W), area 60 x 30 km, Ontario, Canada *1889-sperrylite (Vermilion m.);...1980-tellurohauchecornite (Strathcona m.)*

5 – Tachgagalt = Tachguagalt \ (30°47`N, 6°51`W), near Quarzazate, Morocco *1963-marokite;...1969-henrytermierite*

4 – Tanco pegmatite m. \ (50°26`N, 95°27`W), Bernic Lake, Manitoba, Canada *1978-cernyite;...1992-titanowodginite*

8 – Taylor pit, Madoc \ (44°30`N, 77°28`W), Hastings Co., Ontario, Canada *1967-veenite;...1967-twinnite*

9 – Temple Mountain (area) \ (38°41`N, 110°40`W), Emery Co., Utah, USA *1914-uvanite (Temple Rock);...2001-ortominasragrite*

8 – Terlingua (area) \(29°19`N, 103°36`W), Brewster Co., Texas, USA *1900-terlinguaite;...1974-pinchite; 1981-Comancheite (Mariposa m.)*

4 – Tincalayu \(25°07`S, 67°04`W), Salta, Argentina *1957-ezcurrite;...1974-aristarainite*

10 – Tintic District \mining district (~ 10 x 5 km) from Tintic Junction (39°55`N, 112°09`W), Juab Co. Dividend (39°57`N, 112°03`W), Utah Co. , Utah, USA \\ *1916-arsenobismite (Mammoth m.);...1997-utahite and juabite (Centennial Eureka m.)*

12 – Tip Top m. \8.5 km SW of Custer (43°46`N, 103°36`W), Custer Co., Black Hills, South Dakota, USA *1974-robertsite;...1992-parafransoletite*

11 – Tombstone area \(31°43`N, 110°04`W), Cochise Co., Arizona, USA *1885-emmonsite;...1980-schieffelinite* (Joe m.)

4 – Trogtal q. \ 1 km N of Lautenthal (51°52`N, 10°17`E), Harz, Germany *1955-trogtalite; ...1957-freboldite*

57* – Tsumeb \(19°14`S, 17°42`E), Namibia \\1912-tsumebite;

1920-duftite;...1999-wilhelmkleinite; 1999-sidpietersite

7 – United Verde m. \near Jerome (34°45`N, 112°07`W), Yavapai Co., Arizona, USA *1885-gerhardtite;...1959-yavapaiite*

4 – Utoe Isl. \(58°58 `N, 18°19`E), 30 – 40 km SSE of Stockholm, Sweden *1800-petalite; [1800-spodumene]...1978-magnesioholmquistite*

5 – Vestana = Vestane = Westana m. \ (56°10`N, 14°29`E), 1.5 km W of Nasum, Skane, Sweden *1868-augelite;...1868-trolleite*

60* – Vesuvius = Vesuvio \ (40°49`N, 14°25`E), near Naples, Italy *1791-leucite; 1795-vesuvianite;...1988-panunzite; 1990-montesommaite (Monte Somma)*

4 – Viitaniemi \ [63°08`N, 28°30`E], Finland *1954-vayrynenite;...1983-manganotapiolite*

5 – Vulcano Island \ (Island ~8 km across; volcano: 38°23`N, 14°58`E), Aeolian (= Eolie = Lipari) Islands, N of Sicily, Italy *1882-hieratite;...2000-mozgovaite*

6 – Weisser Hirsch m. \ Neustadtel, Schneeberg (50°36`N, 12°38`E), Erzgebirge, Saxony, Germany *1871-walpurgite; 1871-trogerite (troegerite);...1983-asselbornite*

8 – Wessels m. \(~27°04`S, 22°46`E), NW of Kuruman, Northern Cape, South Africa *1983-sturmanite;...1996-wesselsite*

>3 – Wheal Gorland \~1 km N of St. Day (50°14`N, 5°10`W), Cornwall, England, Great Britain *1787-olivenite; 1823-clinoclase*

7 – Wittichen \ (48°19`N, 8°20`E), Schwarzwald, Germany *1800-pharmacolite;...1853-wittichenite; 1989-camgasite (Johann m.)*

24 – Wittichen (area) \ (48°19`N, 8°20`E) (Clara m., Sophia m. and others), Schwarzwald, Germany *1800-pharmacolite; ...1998-chadwickite (Sophia m.)*

4 – Wolfsberg \(51°32`N, 11°05`E), 8 km SW of Harzgerode, Harz, Germany *1826-zinkenite (zinckenite);...1969-dadsonite*

4 – Xitieshan deposit \ (37°20`N, 95°32`E) , Qinghai Prov., China *1983-xitieshanite; ...1990-lishizhenite*

4 – Aginskoye deposit, near Aginskiy (55°28`N, 158°00`E), Kamchatka, Russia *1978-bilibinskite;...1980-balyakinite*

24 – Alluaiv Mount, (~67°51`N, 34°32`E), ~27 km SW of Lovozero (68°01`N, 35°00`E), Lovozero massif, Kola Peninsula, Russia *1979-sidorenkite;...2000-litvinskite («Shkatulka» vein); 2000-manganonaujakasite*

4 – Arzak, deposit (Hg), [~20—25 km] NW of Terlig-Khaya (51°49`N, 93°28`E), Tuva, Middle Siberia (S), Russia *1980-kuznetsovite;...1989-grechishchevite*

7 – Balasauskandyk (~44°32`N, 67°25`E), ~15 km NW of Aksumbe (44°27`N, 67°32`E), Karatau Range (NW), Kazakhstan *1959-alvanite;...1989-kazakhstanite*

7 – Berezovskoye deposit, Berezovskiy (56°54`N, 60°47`E), 14 km NE of Yekaterinburg, Middle Ural, Russia *1766-crocoite; ...1988-cassedanneite*

4 – Burpala massif, ~30 km NE from month Levaya Mama River (~56°14`N, 110°46`E), Lake Baikal Region (N), Russia *1964-burpalite;...1969-plumbobetafite*

**9 – Vasin-Myl`k,** Voron`м tundry (~68°18`N, 35°32`E), Kola Peninsula, Russia *1981-alumotantite;...1992-manganosegelerite*

4 – Vishnevye gory (mountains), near Vishnevogorsk (56°00`N, 60°40`E), South Ural, Russia *1931-vishnevite;...1993-fluorrichterite (=fluororichterite)*

**11 – Voron`м tundry** (~68°18`N, 35°32`E), ~13 km ENE of the mouth of the Uima River (68°15`N, 35°16`E), Kola Peninsula, Russia \\*1957-lithiophosphate (Okhmyl`k Mount.);...1992-manganosegelerite*

9 – Vuonnemiok (Vuonnemiyok) river = (sources : ~67°39`N, 33°50`E), к NE of Kirovsk (67°36`N, 33°40`E), Khibiny, Kola Peninsula, Russia *1929-fersmanite (the third Northern tributary);...1983-Kostylevite*

10 – Vuoriyarvi massif (~66°47`N, 30°10`E), Karelia (NW), Murmansk Oblast', Russia *1961-carbocernaite;...1999-tumchaite*

13 – Dara-i-Pioz = Dara-Pioz massif (~39°28`N, 70°42`E), ~20 km E from month of Zeravshan River, Alaiskii Range, Tadzhikistan *1963-calcybeborosilite-(Y); 1967-tienshanite;...2000-kapitsaite-(Y)*

4 – Zod deposit, near Zod (40°12`N, 45°51`E), Armenia *1965-volynskite;...1987-chekhovichite*

14 – Ilmeny Mtns(~40x5 km), NNE of Miass (55°00`N, 60°05`E), South Ural, Russia *1826-ilmenite;...1986-makarochkinite; 1993-fluorrichterite (=fluororichterite)*

4 – Inagli massif (~58°44`N, 124°56`E), ~30 km NW of Aldan, Yakutia, Russia *1960-batisite;...1984-inaglyite*

5 – Inder deposit, ~15 km E of Inderborskiy (48°33`N, 51°44`E), Kazakhstan *1937-inderite;...1966-volkovskite*

**4 – Kadyrel`skoye deposit**, ~23 km N of Shagonar (51°32`N, 92°48`E), Tuva, Middle Siberia (S), Russia *1984-lavrentievite; ...1989-grechishchevite*

10 – Karatau Range (NW), Range (NW), Aksu-

mbe (44°27`N, 67°32`E) area, Kazakhstan (S) *1954-kurumsakite (Kurumsak); ...1989-kazakhstanite (Balasauskandyk*)

31 – Karnasurt Mount, (~67°53`N, 34°38`E), ~20 km SW of Lovozero (68°01`N, 35°00`E), Lovozero massif, Kola Peninsula, Russia *1954-beryllite; 1955-nenadkevichite; ...2000-malinkoite; 2000-organovaite-Mn*

4 – Kirovskii mine, Kukisvumchorr, ~5 km N of Kirovsk (67°36`N, 33°40`E), Khibiny, Kola Peninsula, Russia *1990-tuliokite; ...1997-isolueshite*

12 – Koashva Mount , ~13 km E of Kirovsk (67°36`N, 33°40`E), Khibiny, Kola Peninsula, Russia *1974-koashvite;...1999-lemmleinite; 2000-lisitsynite*

13* – Kovdor (67°32`N, 30°30`E), Kola Peninsula, Russia *1980-kovdorskite;...2000-[bakchisaraitsevite]; 2000-gladiusite; 2000-henrymeyerite*

8 – Kopeisk (55°07`N, 61°39`E), 15 km E of Chelyabinsk, South Ural, Russia *1985-srebrodolskite;...1990-dmisteinbergite; 1991-tinnunculite*

3 – Kochbulak deposit, [~10 km] E of Angren (41°01`N, 70°09`E), Uzbekistan *1979-kuramite; 1981-chatkalite; 1982-mohite*

8 – Kukisvumchorr Mount, ~5-8 km N of Kirovsk (67°36`N, 33°40`E), Khibiny, Kola Peninsula, Russia *1959-magnesium astrophyllite;...1997-ancylite-(La)(Marchenko Peak)*

4 – Kuranakh deposit, near Kuranakh (58°45`N, 125°29`E), Aldan, Yakutia, Russia *1975-kuranakhite;...1990-kuksite (Delbe orebody)*

6 – Kurumsak, ~20 km SW of Aksumbe (44°27`N, 67°32`E), Karatau Range (NW), Kazakhstan *1954-kurumsakite;...1989-kazakhstanite*

4 – Kyzylsai (=Kyzyl-Sai) ore field, [~30 km] SW of Chiganak (45°06`N, 73°58`E), Kazakhstan *1962-mourite; 1965-sedovite; ...1975-sodium boltwoodite boltwoodite*

**>5 – Lepkhe-Nel`m Mount** (~67°48`N, 34°48`E), ~25 km SW of Lovozero (68°01`N, 35°00`E), Lovozero massif, Kola Peninsula, Russia *1956-kupletskite;...[2001-tsepinite-Na]*

71* – Lovozero massif (central part: ~67°48`N, 34°43`E), SW of Lovozero (68°01`N, 35°00`E), Kola Peninsula, Russia *1894-lamprophyllite;...2000-[litvinskite]*

11 – Mayak mine, Talnakh deposit, Talnakh (69°29`N, 88°26`E), Noril`sk district, Middle Siberia (N), Russia *1969-godlevskite; ...1982-taimyrite*

4 – Monchegorskoye deposit, near Monchegorsk (67°54`N, 32°49`E), Kola Peninsula, Russia *1963-moncheite;...1964-imgreite; 1982-sopcheite*

8 – Murun massif, Murun Mount (~58°22`N, 118°53`E), ~50 km W of Torgo (58°28`N, 119°49`E), Aldan (NW), Yakutia\ Irkutsk Oblast, Russia *1965-tinaksite; 1978-charoite;...1992-frankamenite; 1995-odintsovite*

7 – Novofrolovskoye deposit, near Krasnotur`insk (59°47`N, 60°30`E), North Ural, Russia *1955-calciborite;...1968-vimsite*

**5 – Noril`sk-I deposit**, near Noril`sk (69°19`N, 88°11`E), Middle Siberia, Russia *1962-vysotskite;...1969-godlevskite*

**30 – Noril`sk district** (including Talnakh), near Noril`sk (69°19`N, 88°11`E), Middle Siberia, Russia *1947-stannopalladinite (Ugol`nyi Ruchei mine);...1992-vyalsovite (Komsomol`skii mine)*

**13 – Oktyabr`skoye deposit**, Talnakh (69°29`N, 88°26`E), Noril`sk district, Middle Siberia, Russia *1966-zvyagintsevite;...1983-cabriite*

4 – Pereval q. , near Slyudyanka (51°38`N, 103°42`E), Lake Baikal Region (SW), Russia *1985-kalininite;...1995-magnesiocoulsonite*

6 – Ploskaya Mount (~67°38`N, 36°42`E), ~35 km NNW of Krasnoshchel`ye, Keivy, Kola Peninsula, Russia *1983-vyuntspakhkite-(Y); 1983-keivite-(Y);...1997-fluorthalenite-(Y)*

>8 – Rasvumchorr Mount, NE of Kirovsk (67°36`N, 33°40`E), Khibiny, Kola Peninsula, Russia \\1954-shcherbakovite ; ...1970 — rasvumite ;... 1993-megacyclite

7 – Slyudyanka (51°38`N, 103°42`E) and area, Lake Baikal Region (SW), Russia *1985-kalininite (Pereval q.);...1991-bystrite (Malo-Bystrinskoye lazurite deposit);...1997-chromphyllite (Kaber`s Pit)*

**5* – Solov`yeva Mount** (~57°41`N, 59°39`E), ~35 km SW of Nizhnii Tagil, Middle Ural, Russia *1909-tantalcarbide («native tantalum»);...1997-jedwabite*

4 – Solongo deposit ,~20 km N Gunda (52°47`N, 111°43`E), Transbaikalia, Buryatia, Russia *1965-kurchatovite;...1977-fedorovskite*

15 – Talnakhskoye deposit, Talnakh (69°29`N, 88°26`E), Noril`sk district, Middle Siberia, Russia \\*1968-talnakhite;...1992-vyalsovite (Komsomol`skii mine)*

24 – Tolbachik volcano (~55°49`N, 160°22`E), ~30 km S of Klyuchevskaya Sopka volcano, Kamchatka, Russia *1983-tolbachite; ...2001-[bradachekite]*

4 – Trudovoye deposit, near Inyl`chek (= Enyl`chek) (42°01`N, 79°04`E), Kirg(h)i-

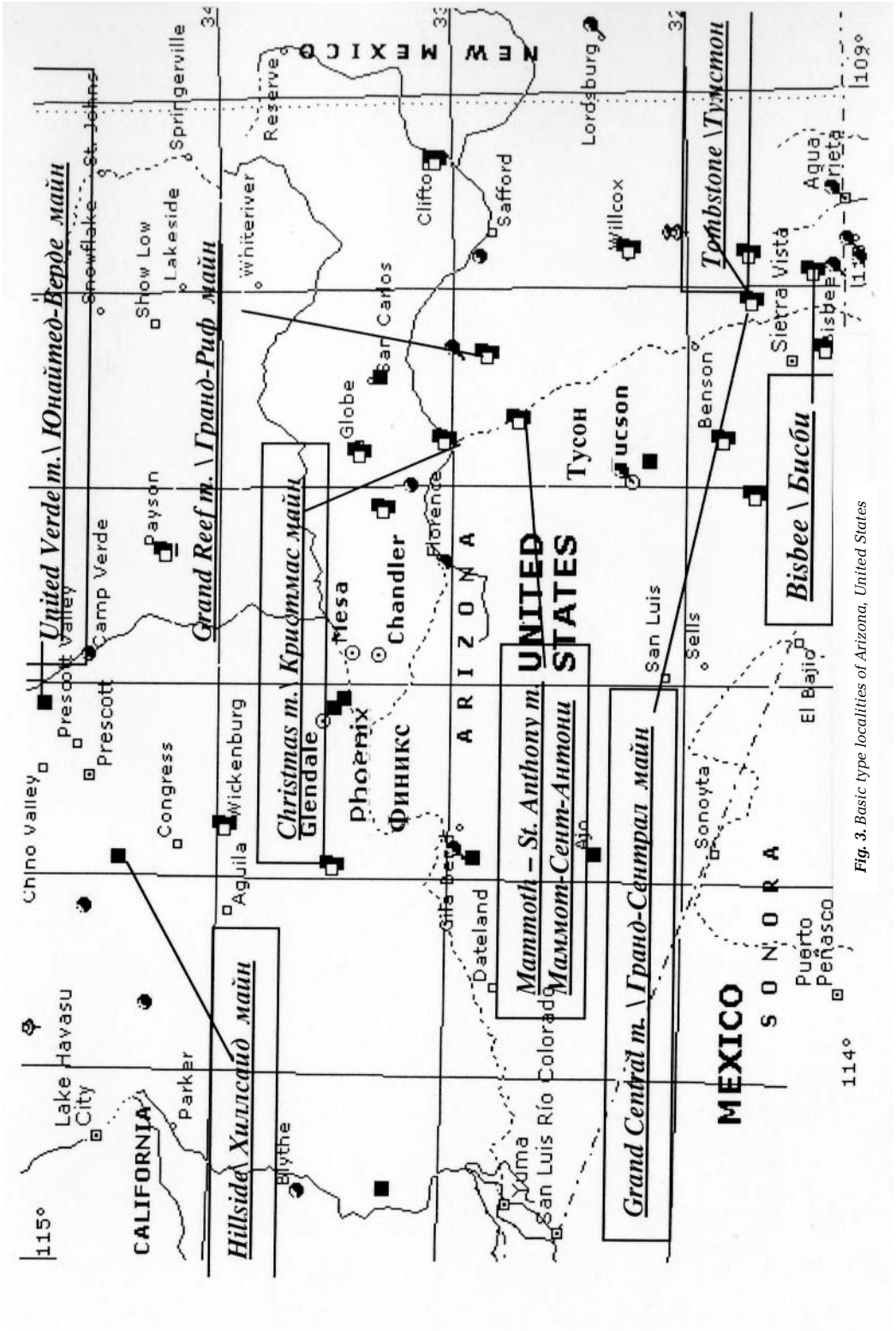

Fig. 3. Basic type localities of Arizona, United States

sia (=Kyrgyzstan) *1981-natanite;...1992-vistepite; 1993-khristovite-(Ce)*

6 – Khardaikan deposit, Khaidarkan (39°56`N, 71°20`E), Kirg(h)isia (=Kyrgyzstan) *1972-galkhaite; 1977-velikite;...1984-chursinite*

136* – Khibiny-Lovozero complex (~80x40 km), between Kirovsk (67°36`N, 33°40`E) and Lovozero (68°01`N, 35°00`E), Kola Peninsula, Russia *1894-Lamprophyllite ;... 2001-tsepinite -(Na)*

70* – Khibiny massif (central part: 67°43`N, 33°44`E), Kirovsk (67°36`N, 33°40`E) area, Kola Peninsula, Russia *1923-mangan-neptunite (Malyi Mannepahk Mount); 1925-loparite-(Ce) (Malyi Mannepahk Mount);...2000-lisitsynite (Koashva Mount)*

6 – Khovu-Aksy deposit, near Khovu-Aksy (51°07`N, 93°40`E), Tuva, Middle Siberia (S), Russia *1953-vladimirite; 1953-shubnikovite;...1981-lazarenkoite*

6 – Chelkar (47°49`N, 59°37`E), 100 km SE from Ural`sk, Kazakhstan *1960-strontioborite; 1962-halurgite;...1968-chelkarite*

13 – Yubileinaya pegmatite lode, Karnasurt Mount (~67°53`N, 34°38`E), Lovozero massif, Kola Peninsula, Russia *1972-ilmajokite; 1973-zorite; 1973-lovdarite; 1973-raite;...1998-seidite-(Ce)*

>12 – Yukspor Mount, ~8 km NW of Kirovsk (67°36`N, 33°40`E), Khibiny, Kola Peninsula, Russia *1925-yuksporite;...1992-paranatisite (Material`naya Adit)*

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