

MINING, BUSINESS AND STOCKS.

ON GEOLOGY OF BEAVER COUNTY

Technical Treatment of Subject by
Henry M. Crowther.

LITTLE HAS BEEN WRITTEN

About the Formations of Copper Region in This Manner Herebefore—Has Great Possibilities.

In the last issue of the Engineering & Mining Journal, Henry M. Crowther, the mining engineer, of this city, contributed an article treating on the copper deposits of Beaver county. Little has been written and published bearing on the geology of this important region, hence the "News" gives space to it as follows:

Copper Mountain, 7,600 ft. high, at the southern end of Beaver River range, is a prominent peak of white limestone forming the crest of the range, and surrounded by deposits of copper ores as yet but little developed. Four miles south of Copper Mountain, and at the base of it, are the main copper mines of the region.

In structure probably three-fourths of the range is composed of eruptive rock. This fact renders the study of the region difficult, for the original uplift was accompanied by intrusions at successive periods, of igneous rocks, leaving but island-like masses of sedimentary strata in a sea of geological confusion.

The igneous rocks of the region include monzonites, rhyolite, mica and augite, andesite and diorite; of these rocks the monzonite varieties mentioned seem the most closely related to the copper mineralization.

Copper Mountain and Rocky Spur show evidence of being the opposite limbs of an anticline with a subside crest between, though great erosion and subsequent disturbance have combined to bring about the conditions as they are at present. A true granite forms the core of this fold and appears at surface towards Copper Mountain.

The sedimentary remaining are of the Paleozoic series; Cambrian quartzite and Carboniferous limestone predominate. The limestone occupies the most elevated position, with quartzite next and the monzonites the lowest (excepting the granite). This rule holds good in nearly all instances, and as the copper mineralization occurs in or near the monzonites, the copper mines of necessity occupy the lowest ground adjacent to the quartzite or lime.

The normal spring activity has been general, large surface crusts of porous calcite several feet thick exist; cementation by iron water is also common, making masses of iron-cemented breccia, and the floor of copper waters is clearly apparent in a few instances only.

The ore-veins are of three distinct kinds: 1. Fractures which contained in igneous rocks, 2. Shale and limestone at igneous-sedimentary contacts, 3. Typical contact deposits, mostly in lime, with or without porphyry wall.

The first variety are generally continuous in the ore and are fairly persistent; they appear to be fillings along flat thrust-planes rather than mere vertical contraction cracks or fissures caused by the cooling and shrinking of the monzonite. The ore feature of these veins is that of secondary ores of copper and seams of borate at surface, also considerable calcite associated with the quartz gangue. There are hundreds of acres of copper rock profusely seamed with copper minerals in joint planes, large masses of which carry about 1 per cent copper, with an occasional fracture vein with 40 per cent to 60 per cent. The ore bodies are in the footwall of the fissure; hence, no doubt, the quartzite resistance with subsequent denudation of overlying strata would account for this class of deposit.

Caves of underground caverns caused by dissolution of country rock, which were partly refilled with oxidized material, as silica, in large extent of the iron content. The fact that the ore generally contain gold and silver values enough to defray the cost of obtaining the copper is significant. The gold value of ore is somewhat in excess of the silver. The horizontal axis of the ore shoots is generally greater than the perpendicular.

Condition of ore in the larger deposits is complete down to 100 ft., where the zone of secondary enrichment begins, as marked by borate and chalcocite; the copper carbonate ores, however, continue to at least 40 ft. in conjunction with the sulphides. The carbonate ores contain but little iron. Silicates of copper are not uncommon, while some native copper exists, but it is not an important ore. Arsenic and

zinc are not evident, but there is some promise of nickel. Molybdenite occurs in small quantities, associated with white quartz, in connection with the copper ores. Chalcocite is the main copper-bearing ore of the region, though oxidized ores are too important to avoid, but are too siliceous to smelt alone.

Shaft-working is required in the region, but no water of consequence has yet appeared, nor is any likely to be encountered until greater depth is attained.

That the Beaver county district is destined to maintain a large production of copper is the well-advised opinion of all who examine the region, and it is also conceded that economic conditions admit of an unusually low cost of production.

FORENOON ON 'CHANGE'

Stocks Were Slumpish—May Day Falls Under 18 Cents Per Share.

On the stock exchange this forenoon 11,823 shares were sold for the sum of \$3,857.12. The first seller of the day was Ajax which brought 24 cents per share. Carissa fell into the basket at 10 cents. Lower Mammoth entered the pit weak; the initial sale being posted at 70 cents, which was followed by a slight rally, closing a half-cent higher. May Day dropped to 13 1/2 cents, California went at 14 1/2 cents. The closing quotations and sales of the day were posted as follows:

| FORENOON QUOTATIONS. | Bid. | Asked. |
|--------------------------|--------|--------|
| Ajax | 23 1/2 | 25 |
| Carissa | 10 1/2 | 10 3/4 |
| Con. Mercu. | 1 1/2 | 1 3/4 |
| Cresce | 1 1/2 | 1 3/4 |
| Daly | 1 1/2 | 1 3/4 |
| Daly-Judge | 10 1/2 | 10 3/4 |
| Silver Star | 42 1/2 | 43 1/2 |
| Grand Central | 15 1/2 | 16 1/2 |
| Alena | 4 1/2 | 4 3/4 |
| Horn Silver | 150 | 151 |
| Ingot | 2 1/2 | 2 3/4 |
| Little Bell | 70 1/2 | 71 |
| Lower Mammoth | 17 1/2 | 18 1/2 |
| May Day | 1 1/2 | 1 3/4 |
| Mammoth | 1 1/2 | 1 3/4 |
| Northern Light | 5 | 5 1/2 |
| Sacramento | 23 1/2 | 24 |
| Silver King | 70 1/2 | 71 |
| Silver Star | 42 1/2 | 43 1/2 |
| South Swansea | 15 1/2 | 16 1/2 |
| Star Con. | 22 1/2 | 23 1/2 |
| Sunshine | 60 | 61 |
| U. S. Mining Co. | 21 1/2 | 22 1/2 |
| U. S. Mining Co. | 22 1/2 | 23 1/2 |
| Valco | 12 1/2 | 13 |
| Ben Butler | 12 1/2 | 13 |
| Rocco-Homestead | 14 1/2 | 15 |
| Century | 61 | 62 |
| Dalton | 10 | 11 |
| Emerald | 10 | 11 |
| Little Eagle | 4 1/2 | 4 3/4 |
| La. Is. | 1 1/2 | 1 3/4 |
| Manhattan | 14 1/2 | 15 |
| Martha Washington | 14 1/2 | 15 |
| New York | 21 1/2 | 22 1/2 |
| Victory | 15 1/2 | 16 1/2 |
| Wabash | 20 1/2 | 21 1/2 |
| West Morning Glory | 1 | 1 1/2 |
| White Rock | 50 | 51 |
| Yankee | 30 | 31 |

REGULAR CALL

Ajax, 700 at 24.
Carissa, 1,000 at 10.
Lower Mammoth, 100 at 70; 100 at 71; 500 at 72; 500 at 73; 600 at 74; 700 at 75; 800 at 76; 900 at 77; 1,000 at 78; 1,100 at 79; 1,200 at 80; 1,300 at 81; 1,400 at 82; 1,500 at 83; 1,600 at 84; 1,700 at 85; 1,800 at 86; 1,900 at 87; 2,000 at 88; 2,100 at 89; 2,200 at 90; 2,300 at 91; 2,400 at 92; 2,500 at 93; 2,600 at 94; 2,700 at 95; 2,800 at 96; 2,900 at 97; 3,000 at 98; 3,100 at 99; 3,200 at 100; 3,300 at 101; 3,400 at 102; 3,500 at 103; 3,600 at 104; 3,700 at 105; 3,800 at 106; 3,900 at 107; 4,000 at 108; 4,100 at 109; 4,200 at 110; 4,300 at 111; 4,400 at 112; 4,500 at 113; 4,600 at 114; 4,700 at 115; 4,800 at 116; 4,900 at 117; 5,000 at 118; 5,100 at 119; 5,200 at 120; 5,300 at 121; 5,400 at 122; 5,500 at 123; 5,600 at 124; 5,700 at 125; 5,800 at 126; 5,900 at 127; 6,000 at 128; 6,100 at 129; 6,200 at 130; 6,300 at 131; 6,400 at 132; 6,500 at 133; 6,600 at 134; 6,700 at 135; 6,800 at 136; 6,900 at 137; 7,000 at 138; 7,100 at 139; 7,200 at 140; 7,300 at 141; 7,400 at 142; 7,500 at 143; 7,600 at 144; 7,700 at 145; 7,800 at 146; 7,900 at 147; 8,000 at 148; 8,100 at 149; 8,200 at 150; 8,300 at 151; 8,400 at 152; 8,500 at 153; 8,600 at 154; 8,700 at 155; 8,800 at 156; 8,900 at 157; 9,000 at 158; 9,100 at 159; 9,200 at 160; 9,300 at 161; 9,400 at 162; 9,500 at 163; 9,600 at 164; 9,700 at 165; 9,800 at 166; 9,900 at 167; 10,000 at 168; 10,100 at 169; 10,200 at 170; 10,300 at 171; 10,400 at 172; 10,500 at 173; 10,600 at 174; 10,700 at 175; 10,800 at 176; 10,900 at 177; 11,000 at 178; 11,100 at 179; 11,200 at 180; 11,300 at 181; 11,400 at 182; 11,500 at 183; 11,600 at 184; 11,700 at 185; 11,800 at 186; 11,900 at 187; 12,000 at 188; 12,100 at 189; 12,200 at 190; 12,300 at 191; 12,400 at 192; 12,500 at 193; 12,600 at 194; 12,700 at 195; 12,800 at 196; 12,900 at 197; 13,000 at 198; 13,100 at 199; 13,200 at 200; 13,300 at 201; 13,400 at 202; 13,500 at 203; 13,600 at 204; 13,700 at 205; 13,800 at 206; 13,900 at 207; 14,000 at 208; 14,100 at 209; 14,200 at 210; 14,300 at 211; 14,400 at 212; 14,500 at 213; 14,600 at 214; 14,700 at 215; 14,800 at 216; 14,900 at 217; 15,000 at 218; 15,100 at 219; 15,200 at 220; 15,300 at 221; 15,400 at 222; 15,500 at 223; 15,600 at 224; 15,700 at 225; 15,800 at 226; 15,900 at 227; 16,000 at 228; 16,100 at 229; 16,200 at 230; 16,300 at 231; 16,400 at 232; 16,500 at 233; 16,600 at 234; 16,700 at 235; 16,800 at 236; 16,900 at 237; 17,000 at 238; 17,100 at 239; 17,200 at 240; 17,300 at 241; 17,400 at 242; 17,500 at 243; 17,600 at 244; 17,700 at 245; 17,800 at 246; 17,900 at 247; 18,000 at 248; 18,100 at 249; 18,200 at 250; 18,300 at 251; 18,400 at 252; 18,500 at 253; 18,600 at 254; 18,700 at 255; 18,800 at 256; 18,900 at 257; 19,000 at 258; 19,100 at 259; 19,200 at 260; 19,300 at 261; 19,400 at 262; 19,500 at 263; 19,600 at 264; 19,700 at 265; 19,800 at 266; 19,900 at 267; 20,000 at 268; 20,100 at 269; 20,200 at 270; 20,300 at 271; 20,400 at 272; 20,500 at 273; 20,600 at 274; 20,700 at 275; 20,800 at 276; 20,900 at 277; 21,000 at 278; 21,100 at 279; 21,200 at 280; 21,300 at 281; 21,400 at 282; 21,500 at 283; 21,600 at 284; 21,700 at 285; 21,800 at 286; 21,900 at 287; 22,000 at 288; 22,100 at 289; 22,200 at 290; 22,300 at 291; 22,400 at 292; 22,500 at 293; 22,600 at 294; 22,700 at 295; 22,800 at 296; 22,900 at 297; 23,000 at 298; 23,100 at 299; 23,200 at 300; 23,300 at 301; 23,400 at 302; 23,500 at 303; 23,600 at 304; 23,700 at 305; 23,800 at 306; 23,900 at 307; 24,000 at 308; 24,100 at 309; 24,200 at 310; 24,300 at 311; 24,400 at 312; 24,500 at 313; 24,600 at 314; 24,700 at 315; 24,800 at 316; 24,900 at 317; 25,000 at 318; 25,100 at 319; 25,200 at 320; 25,300 at 321; 25,400 at 322; 25,500 at 323; 25,600 at 324; 25,700 at 325; 25,800 at 326; 25,900 at 327; 26,000 at 328; 26,100 at 329; 26,200 at 330; 26,300 at 331; 26,400 at 332; 26,500 at 333; 26,600 at 334; 26,700 at 335; 26,800 at 336; 26,900 at 337; 27,000 at 338; 27,100 at 339; 27,200 at 340; 27,300 at 341; 27,400 at 342; 27,500 at 343; 27,600 at 344; 27,700 at 345; 27,800 at 346; 27,900 at 347; 28,000 at 348; 28,100 at 349; 28,200 at 350; 28,300 at 351; 28,400 at 352; 28,500 at 353; 28,600 at 354; 28,700 at 355; 28,800 at 356; 28,900 at 357; 29,000 at 358; 29,100 at 359; 29,200 at 360; 29,300 at 361; 29,400 at 362; 29,500 at 363; 29,600 at 364; 29,700 at 365; 29,800 at 366; 29,900 at 367; 30,000 at 368; 30,100 at 369; 30,200 at 370; 30,300 at 371; 30,400 at 372; 30,500 at 373; 30,600 at 374; 30,700 at 375; 30,800 at 376; 30,900 at 377; 31,000 at 378; 31,100 at 379; 31,200 at 380; 31,300 at 381; 31,400 at 382; 31,500 at 383; 31,600 at 384; 31,700 at 385; 31,800 at 386; 31,900 at 387; 32,000 at 388; 32,100 at 389; 32,200 at 390; 32,300 at 391; 32,400 at 392; 32,500 at 393; 32,600 at 394; 32,700 at 395; 32,800 at 396; 32,900 at 397; 33,000 at 398; 33,100 at 399; 33,200 at 400; 33,300 at 401; 33,400 at 402; 33,500 at 403; 33,600 at 404; 33,700 at 405; 33,800 at 406; 33,900 at 407; 34,000 at 408; 34,100 at 409; 34,200 at 410; 34,300 at 411; 34,400 at 412; 34,500 at 413; 34,600 at 414; 34,700 at 415; 34,800 at 416; 34,900 at 417; 35,000 at 418; 35,100 at 419; 35,200 at 420; 35,300 at 421; 35,400 at 422; 35,500 at 423; 35,600 at 424; 35,700 at 425; 35,800 at 426; 35,900 at 427; 36,000 at 428; 36,100 at 429; 36,200 at 430; 36,300 at 431; 36,400 at 432; 36,500 at 433; 36,600 at 434; 36,700 at 435; 36,800 at 436; 36,900 at 437; 37,000 at 438; 37,100 at 439; 37,200 at 440; 37,300 at 441; 37,400 at 442; 37,500 at 443; 37,600 at 444; 37,700 at 445; 37,800 at 446; 37,900 at 447; 38,000 at 448; 38,100 at 449; 38,200 at 450; 38,300 at 451; 38,400 at 452; 38,500 at 453; 38,600 at 454; 38,700 at 455; 38,800 at 456; 38,900 at 457; 39,000 at 458; 39,100 at 459; 39,200 at 460; 39,300 at 461; 39,400 at 462; 39,500 at 463; 39,600 at 464; 39,700 at 465; 39,800 at 466; 39,900 at 467; 40,000 at 468; 40,100 at 469; 40,200 at 470; 40,300 at 471; 40,400 at 472; 40,500 at 473; 40,600 at 474; 40,700 at 475; 40,800 at 476; 40,900 at 477; 41,000 at 478; 41,100 at 479; 41,200 at 480; 41,300 at 481; 41,400 at 482; 41,500 at 483; 41,600 at 484; 41,700 at 485; 41,800 at 486; 41,900 at 487; 42,000 at 488; 42,100 at 489; 42,200 at 490; 42,300 at 491; 42,400 at 492; 42,500 at 493; 42,600 at 494; 42,700 at 495; 42,800 at 496; 42,900 at 497; 43,000 at 498; 43,100 at 499; 43,200 at 500; 43,300 at 501; 43,400 at 502; 43,500 at 503; 43,600 at 504; 43,700 at 505; 43,800 at 506; 43,900 at 507; 44,000 at 508; 44,100 at 509; 44,200 at 510; 44,300 at 511; 44,400 at 512; 44,500 at 513; 44,600 at 514; 44,700 at 515; 44,800 at 516; 44,900 at 517; 45,000 at 518; 45,100 at 519; 45,200 at 520; 45,300 at 521; 45,400 at 522; 45,500 at 523; 45,600 at 524; 45,700 at 525; 45,800 at 526; 45,900 at 527; 46,000 at 528; 46,100 at 529; 46,200 at 530; 46,300 at 531; 46,400 at 532; 46,500 at 533; 46,600 at 534; 46,700 at 535; 46,800 at 536; 46,900 at 537; 47,000 at 538; 47,100 at 539; 47,200 at 540; 47,300 at 541; 47,400 at 542; 47,500 at 543; 47,600 at 544; 47,700 at 545; 47,800 at 546; 47,900 at 547; 48,000 at 548; 48,100 at 549; 48,200 at 550; 48,300 at 551; 48,400 at 552; 48,500 at 553; 48,600 at 554; 48,700 at 555; 48,800 at 556; 48,900 at 557; 49,000 at 558; 49,100 at 559; 49,200 at 560; 49,300 at 561; 49,400 at 562; 49,500 at 563; 49,600 at 564; 49,700 at 565; 49,800 at 566; 49,900 at 567; 50,000 at 568; 50,100 at 569; 50,200 at 570; 50,300 at 571; 50,400 at 572; 50,500 at 573; 50,600 at 574; 50,700 at 575; 50,800 at 576; 50,900 at 577; 51,000 at 578; 51,100 at 579; 51,200 at 580; 51,300 at 581; 51,400 at 582; 51,500 at 583; 51,600 at 584; 51,700 at 585; 51,800 at 586; 51,900 at 587; 52,000 at 588; 52,100 at 589; 52,200 at 590; 52,300 at 591; 52,400 at 592; 52,500 at 593; 52,600 at 594; 52,700 at 595; 52,800 at 596; 52,900 at 597; 53,000 at 598; 53,100 at 599; 53,200 at 600; 53,300 at 601; 53,400 at 602; 53,500 at 603; 53,600 at 604; 53,700 at 605; 53,800 at 606; 53,900 at 607; 54,000 at 608; 54,100 at 609; 54,200 at 610; 54,300 at 611; 54,400 at 612; 54,500 at 613; 54,600 at 614; 54,700 at 615; 54,800 at 616; 54,900 at 617; 55,000 at 618; 55,100 at 619; 55,200 at 620; 55,300 at 621; 55,400 at 622; 55,500 at 623; 55,600 at 624; 55,700 at 625; 55,800 at 626; 55,900 at 627; 56,000 at 628; 56,100 at 629; 56,200 at 630; 56,300 at 631; 56,400 at 632; 56,500 at 633; 56,600 at 634; 56,700 at 635; 56,800 at 636; 56,900 at 637; 57,000 at 638; 57,100 at 639; 57,200 at 640; 57,300 at 641; 57,400 at 642; 57,500 at 643; 57,600 at 644; 57,700 at 645; 57,800 at 646; 57,900 at 647; 58,000 at 648; 58,100 at 649; 58,200 at 650; 58,300 at 651; 58,400 at 652; 58,500 at 653; 58,600 at 654; 58,700 at 655; 58,800 at 656; 58,900 at 657; 59,000 at 658; 59,100 at 659; 59,200 at 660; 59,300 at 661; 59,400 at 662; 59,500 at 663; 59,600 at 664; 59,700 at 665; 59,800 at 666; 59,900 at 667; 60,000 at 668; 60,100 at 669; 60,200 at 670; 60,300 at 671; 60,400 at 672; 60,500 at 673; 60,600 at 674; 60,700 at 675; 60,800 at 676; 60,900 at 677; 61,000 at 678; 61,100 at 679; 61,200 at 680; 61,300 at 681; 61,400 at 682; 61,500 at 683; 61,600 at 684; 61,700 at 685; 61,800 at 686; 61,900 at 687; 62,000 at 688; 62,100 at 689; 62,200 at 690; 62,300 at 691; 62,400 at 692; 62,500 at 693; 62,600 at 694; 62,700 at 695; 62,800 at 696; 62,900 at 697; 63,000 at 698; 63,100 at 699; 63,200 at 700; 63,300 at 701; 63,400 at 702; 63,500 at 703; 63,600 at 704; 63,700 at 705; 63,800 at 706; 63,900 at 707; 64,000 at 708; 64,100 at 709; 64,200 at 710; 64,300 at 711; 64,400 at 712; 64,500 at 713; 64,600 at 714; 64,700 at 715; 64,800 at 716; 64,900 at 717; 65,000 at 718; 65,100 at 719; 65,200 at 720; 65,300 at 721; 65,400 at 722; 65,500 at 723; 65,600 at 724; 65,700 at 725; 65,800 at 726; 65,900 at 727; 66,000 at 728; 66,100 at 729; 66,200 at 730; 66,300 at 731; 66,400 at 732; 66,500 at 733; 66,600 at 734; 66,700 at 735; 66,800 at 736; 66,900 at 737; 67,000 at 738; 67,100 at 739; 67,200 at 740; 67,300 at 741; 67,400 at 742; 67,500 at 743; 67,600 at 744; 67,700 at 745; 67,800 at 746; 67,900 at 747; 68,000 at 748; 68,100 at 749; 68,200 at 750; 68,300 at 751; 68,400 at 752; 68,500 at 753; 68,600 at 754; 68,700 at 755; 68,800 at 756; 68