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Mesaba [Mesabi] IV: [specimens 45065-45513]. No. 358 1900

Leith, C. K. (Charles Kenneth), 1875-1956

[s.l.]: [s.n.], 1900

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U. S. GEOLOGICAL SURVEY
FIELD SECTION BOOK

9-891

LAKE SUPERIOR DIVISION.

INSTRUCTIONS.

1. Ordinarily at least two pages of this book will be devoted to one section. On the left-hand page, place a map of as much of the section as has *actually been seen*. Denote rivers, lakes, marshes, etc., by the usual topographical signs. Denote the ledges of rock, when no structure is made out, by cross-hatching, making the cross-hatching cover as nearly as possible the areas occupied by the exposures. If the rock is a massive one, but still more or less plainly bedded, use the same sign with a dip arrow and number attached, showing the direction and amount of the dip. Denote a shaly or other very plainly bedded ledge by right parallel lines, and a ledge having a secondary structure by wavy parallel lines running in the direction of the strike, with dip arrow and number attached as before. The greatest care must be taken to avoid confusing slaty or schistose structure with bedding, and in all cases where there is the least doubt about the true bedding direction, indicate it by a query. To each exposure on the face of the map attach the number of the specimen representing it. In mapping the section count each of the spaces between the blue lines as 100 paces, and twenty of these spaces to one mile, or 2,000 paces. Usually the southeast corner will be placed at the bottom of the page, or at the first black line above the bottom of the page, and at the right-hand side. If, however, for any reason, it is desirable to show portions of an adjoining section, the southeast corner may be shifted up, or the map may be turned around and the north placed at the left-hand side of the page. The ruling of the left-hand pages is also arranged so that, if desirable, a larger or a smaller scale can be used, eight inches, two inches, one inch, or one-half inch to the mile. With the two-inch scale, the squares outlined in black represent sections, and those in red, quarter sections and "forties," while the space between the blue lines is 200 paces.

2. On the right-hand page place the notes descriptive of the exposures. Begin in each case with the number of the specimen, placing the number on the left-hand side of the red line, after which give in order on the right of the same red line the position of the ledges as reckoned in paces from the southeast corner of the section and the dip and strike when observable, the latter always being expressed from the north; for instance 4025, 250 N., 300 W., *Strike, N. 78° E., Dip 50° S.* Then follow with a full description of the ledge. When topographical maps are used for locations this paragraph applies only in part.

3. Collect a specimen from every ledge, or wherever there is a change of rock on any one ledge, taking care to get fresh material, unless for a special purpose the weathered surface is desired. In case of trips made on foot or in canoes, for long distances, neighboring ledges, unquestionably of one kind of rock, need not be specimened. The position and extent of the ledges not specimened should be marked on the map, with notes that each is of a rock identical with specimen so-and-so. Under the same conditions small-sized specimens, trimmed to a uniform size of 2 x 2½ x ½ inches will be allowed, but in all other cases *large-sized specimens*, trimmed to a size of 3 x 4 x 1 inches, must be selected, in accordance with section 3, chapter IV, p. 44, Regulations of the U. S. Geological Survey. Specimens should not be placed together without protection in the collecting bag, as the fresh surfaces, important in determining the character of rocks, are thus destroyed. They should be damaged by no temporary mark, but the numbers should be at once marked in at least two places upon the inclosing paper or cloth bags. Specimens may be permanently marked in camp by painting the numbers upon them in white upon a black background, using Silver White and Ivory Black oil tubes for color, with turpentine as a diluent.

4. On the last twenty-five pages of the book give, as may seem desirable, a general account of the examination of the region mapped in the previous pages, correlation of observations, sketches, cross sections, etc.

5. Forward this note book as soon as filled as registered mail matter to C. R. Van Hise, U. S. Geologist, Madison, Wis.

Notebook No. 358



853

45082
3)

14876 → ~ - 31° 1' ~ L 5
4-x L 0. 180° 0' 0" x
160 → ~ 180° 0' 0" x

16006 17006 / ~ ~ ~
p L 0. 180° 0' 0" x

17006 L 0 → ~ ~ ~ x

18500 ~ ~ ~ T

19106 ~ ~ ~ x

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p L 0

1150p ~ ~ ~ ~ ~ 4-x ~ ~ ~ x

S.

T.

R.

SEC. *X*T. *X*R. *X*

6	7	8	9	10
12	14	13	12	11
16	17	18	19	20

Published by Chamberlain & Taylor, 323 W. Superior Street,
Duluth, Minn.

Remarks

Key for location
Samples on
Mesosaurus co

429x

6

27 27 13' A D R. Hayden
13 7x 67 4x, 61x

45084 x' 18 22 - 6013

45085 x₂ 160 9-20 23

45086 1719 8 5 23 12' 4.
2506 9 1000 22

45087 w' 15' L x 360 7.21
21

45088 2' 79 - 34 x 1100' 7 500 6'
13x

45089 1 15 - 10 3' 3-34
15' (10) 10 76 8x

45090 4300 5-10 34

45091 \ 10 $\rightarrow$ 34

45092 c_0 8 24 - (15)
4th Lx 121

7

45093 114 250 η 200 0 - ~~15~~ 13
 $\rightarrow$ 27
10th Lx

45094 \ 20 100 0 - 2 $\rightarrow$ 26

45095 $\hookrightarrow$ 500 - 13 $\rightarrow$ 26

45096 $\hookrightarrow$ 400 η '8 $\rightarrow$ 27

45097 71 76 $\sim$ P $\rightarrow$ 27

45098 $\hookrightarrow$ 300 $\hookrightarrow$ 11 $\rightarrow$ 27

45099 '7 5 8 27 $\times$ 300 8 100 η 24

45100 - 13 250 η 600 - 27

45101 '12 100 L 7 60 ~ 14 ~ 27 ⁸

45102 '31 19 ~ 32
2 ~ 2

45103 L 300 ~ 13 ~ 32

45104 '26 19 ~ 32
10 L max

45105 '32 ~ 32 12 4 ~
1 L

45106 2 100 L 22 ~ 32

45107 '34 200 L 15 ~ 32
6 L 10 L

45108 '24 150 L 15 ~ 32
6 L

45109 250 ~ 40 p 2 ~ 32

45110 509.9 → 28

45111 72.1 → 6.2 1.1 → 28

45112 3006.15 → 26

Aug 29

1927 102 12+13x

45113

14

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45115

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45116

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1927 102 12+13x
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1200 100 100 100 100 100
 1750 100 100 100 100 100
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800p. a 4x

184/2-1/2x

46117 18.2-80.1-1/2x

7 20.2-80.1-1/2x

71 7 198 17-60-12 1/16 2 1/2

600 7 2306 1/2
c. 7

45119 80-4-7 7 600 7 2306 1/2
1. 2 1/2 1/2
7 1/2 1/2 1/2

45120 80-6-1 119 1/2 1/2 1/2
10-1/2

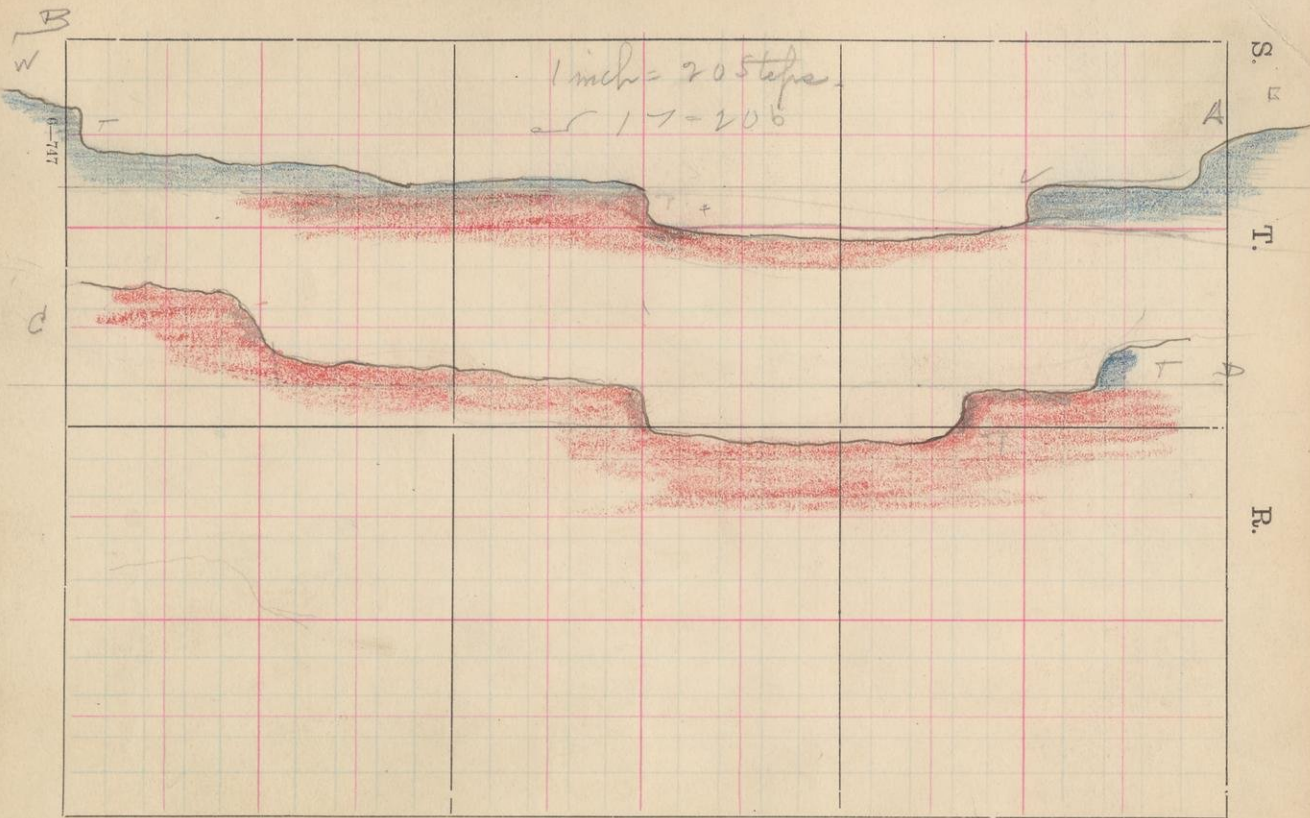
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1/2 1/2 1/2 1/2

122 80-1-1 1/2 1/2 1/2 1/2
123 1/2 1/2 1/2 1/2

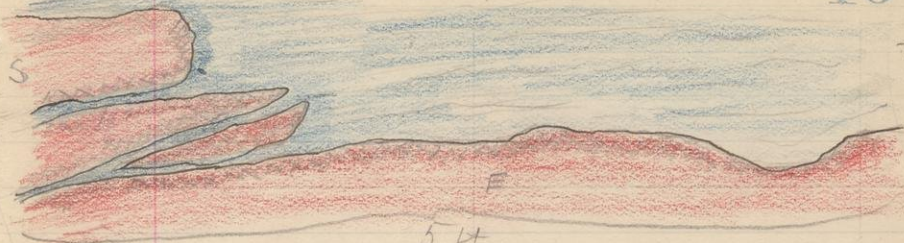
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124 80-2-1 1/2 1/2 1/2 1/2

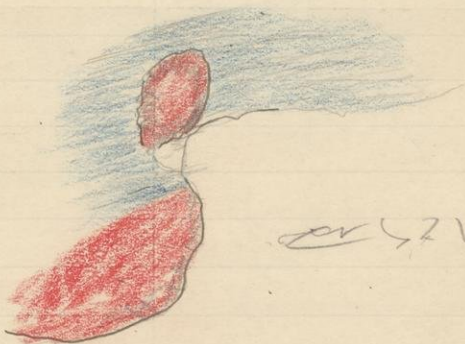
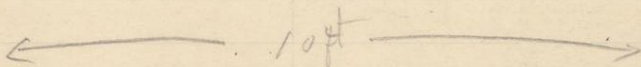
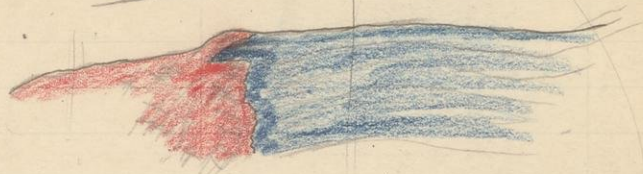
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1/2 1/2



Rich. 2 U.V. 4x



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 20 ft x 10 ft
 45 ft x 10 ft

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14

[illegible][illegible]

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$\gamma - \beta = 7$

[illegible]

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 $\frac{1}{2} \times \frac{1}{2} = \frac{1}{4}$

~~2~~ 0.1.1.0.6x

① $\sqrt{r} = \frac{r}{\sqrt{r}}$

② $c^6 z^2 y^3 b^4 u^2 v^2$

$$h = \sqrt{-1} \Rightarrow \sqrt{2} \sqrt{P_x}$$

③ $\frac{1}{2} \times \frac{1}{2} = \frac{1}{4}$

• 1277. 1277. 1277.

161274

④ 77-2, 70, 7, 7

$\frac{1}{2} \cdot 0.8 \cdot 10^6$

⑤ 712 2.10. - 2.11. '5

6. 3. 7. T 12. 10. 4.

[illegible]

⑥ 2 | 2 6 1 2 0 7 2

→ 4. 1. 5. 2, 2. 2. 6

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$\frac{1}{2} \times \frac{1}{2} = \frac{1}{4}$

(7) $\frac{1}{x^2} = x^{-2}$

[illegible]

[Faint handwritten notes at the bottom of the page]

$\frac{1}{2} \cdot \frac{1}{2} = \frac{1}{4}$

S.

T.

R.

Handwritten notes on graph paper, including a table with columns labeled 'x' and 'y' and several rows of data points. The table is partially obscured by a horizontal line. Below the table, there are several lines of handwritten text, including 'x = 1000', 'y = 1000', and 'x = 1000'.

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20.5 20.5 20.5 20.5 20.5 20.5

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45151 ~ q d / 6 ~ T / 1.1' d o.
~ ~ ~ ~ / 3 2 T
3 ~ ~ ~ x

45152 ~ q d / 6 ~ 6.1-~ T ~ ~ ~
~ ~ ~ ~ ~ ~ ~ ~ ~

45153 ~ q d ~ 1.1' ~ ~ ~ ~ ~ T ~ ~ ~
4 " " " " " ~ ~ ~ ~ ~ x

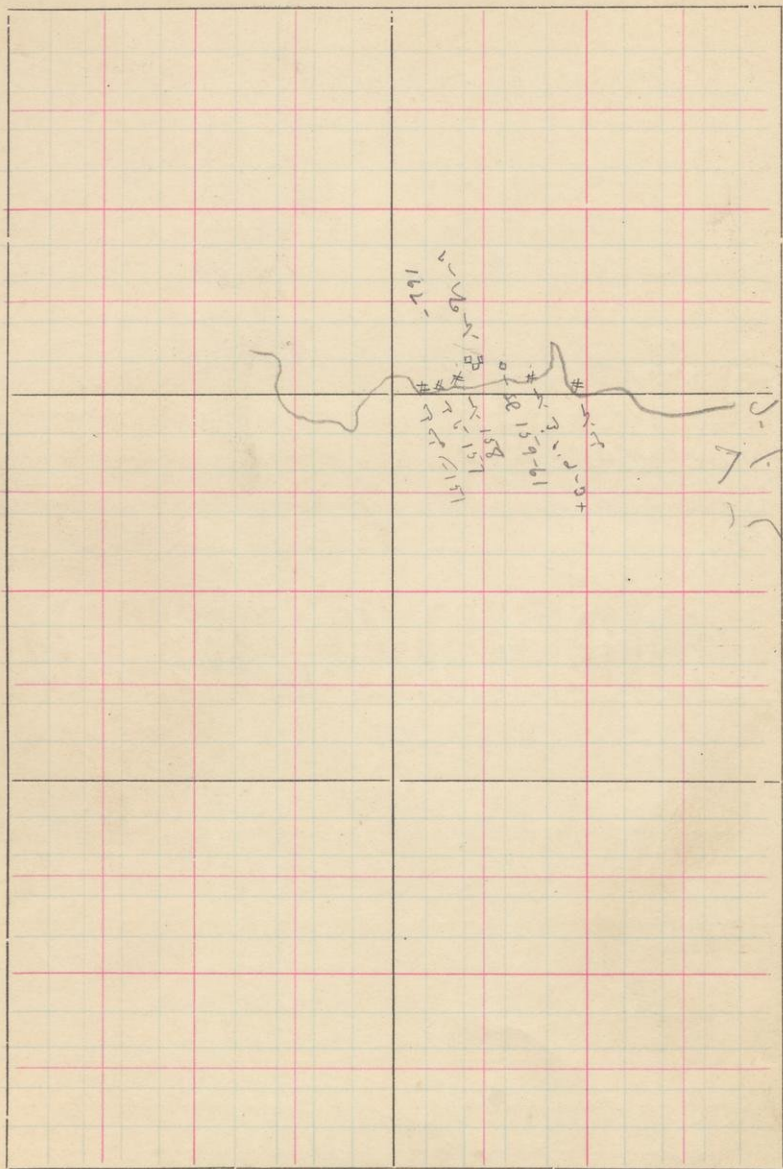
45155 ~ ~ ~ ~ ~ ~ ~ ~ ~ ~
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45156 ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~
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S.

T.

R.



45157 80-7P 2 2-1-2 2 9d 7/25

45158 $\rightarrow 6, 1, 4$

[illegible]
$$\left. \begin{array}{l} 45/62 \\ 3 \\ 4 \\ 5 \end{array} \right\} \rightarrow \text{ex. 410} \sqrt{r^6}$$

1794 27, 28, 29, 30, 31, 1
159-61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100, 101, 102, 103, 104, 105, 106, 107, 108, 109, 110, 111, 112, 113, 114, 115, 116, 117, 118, 119, 120, 121, 122, 123, 124, 125, 126, 127, 128, 129, 130, 131, 132, 133, 134, 135, 136, 137, 138, 139, 140, 141, 142, 143, 144, 145, 146, 147, 148, 149, 150, 151, 152, 153, 154, 155, 156, 157, 158, 159, 160, 161, 162, 163, 164, 165, 166, 167, 168, 169, 170, 171, 172, 173, 174, 175, 176, 177, 178, 179, 180, 181, 182, 183, 184, 185, 186, 187, 188, 189, 190, 191, 192, 193, 194, 195, 196, 197, 198, 199, 200, 201, 202, 203, 204, 205, 206, 207, 208, 209, 210, 211, 212, 213, 214, 215, 216, 217, 218, 219, 220, 221, 222, 223, 224, 225, 226, 227, 228, 229, 230, 231, 232, 233, 234, 235, 236, 237, 238, 239, 240, 241, 242, 243, 244, 245, 246, 247, 248, 249, 250, 251, 252, 253, 254, 255, 256, 257, 258, 259, 260, 261, 262, 263, 264, 265, 266, 267, 268, 269, 270, 271, 272, 273, 274, 275, 276, 277, 278, 279, 280, 281, 282, 283, 284, 285, 286, 287, 288, 289, 290, 291, 292, 293, 294, 295, 296, 297, 298, 299, 300, 301, 302, 303, 304, 305, 306, 307, 308, 309, 310, 311, 312, 313, 314, 315, 316, 317, 318, 319, 320, 321, 322, 323, 324, 325, 326, 327, 328, 329, 330, 331, 332, 333, 334, 335, 336, 337, 338, 339, 340, 341, 342, 343, 344, 345, 346, 347, 348, 349, 350, 351, 352, 353, 354, 355, 356, 357, 358, 359, 360, 361, 362, 363, 364, 365, 366, 367, 368, 369, 370, 371, 372, 373, 374, 375, 376, 377, 378, 379, 380, 381, 382, 383, 384, 385, 386, 387, 388, 389, 390, 391, 392, 393, 394, 395, 396, 397, 398, 399, 400, 401, 402, 403, 404, 405, 406, 407, 408, 409, 410, 411, 412, 413, 414, 415, 416, 417, 418, 419, 420, 421, 422, 423, 424, 425, 426, 427, 428, 429, 430, 431, 432, 433, 434, 435, 436, 437, 438, 439, 440, 441, 442, 443, 444, 445, 446, 447, 448, 449, 450, 451, 452, 453, 454, 455, 456, 457, 458, 459, 460, 461, 462, 463, 464, 465, 466, 467, 468, 469, 470, 471, 472, 473, 474, 475, 476, 477, 478, 479, 480, 481, 482, 483, 484, 485, 486, 487, 488, 489, 490, 491, 492, 493, 494, 495, 496, 497, 498, 499, 500, 501, 502, 503, 504, 505, 506, 507, 508, 509, 510, 511, 512, 513, 514, 515, 516, 517, 518, 519, 520, 521, 522, 523, 524, 525, 526, 527, 528, 529, 530, 531, 532, 533, 534, 535, 536, 537, 538, 539, 540, 541, 542, 543, 544, 545, 546, 547, 548, 549, 550, 551, 552, 553, 554, 555, 556, 557, 558, 559, 560, 561, 562, 563, 564, 565, 566, 567, 568, 569, 570, 571, 572, 573, 574, 575, 576, 577, 578, 579, 580, 581, 582, 583, 584, 585, 586, 587, 588, 589, 590, 591, 592, 593, 594, 595, 596, 597, 598, 599, 600, 601, 602, 603, 604, 605, 606, 607, 608, 609, 610, 611, 612, 613, 614, 615, 616, 617, 618, 619, 620, 621, 622, 623, 624, 625, 626, 627, 628, 629, 630, 631, 632, 633, 634, 635, 636, 637, 638, 639, 640, 641, 642, 643, 644, 645, 646, 647, 648, 649, 650, 651, 652, 653, 654, 655, 656, 657, 658, 659, 660, 661, 662, 663, 664, 665, 666, 667, 668, 669, 670, 671, 672, 673, 674, 675, 676, 677, 678, 679, 680, 681, 682, 683, 684, 685, 686, 687, 688, 689, 690, 691, 692, 693, 694, 695, 696, 697, 698, 699, 700, 701, 702, 703, 704, 705, 706, 707, 708, 709, 710, 711, 712, 713, 714, 715, 716, 717, 718, 719, 720, 721, 722, 723, 724, 725, 726, 727, 728, 729, 730, 731, 732, 733, 734, 735, 736, 737, 738, 739, 740, 741, 742, 743, 744, 745, 746, 747, 748, 749, 750, 751, 752, 753, 754, 755, 756, 757, 758, 759, 760, 761, 762, 763, 764, 765, 766, 767, 768, 769, 770, 771, 772, 773, 774, 775, 776, 777, 778, 779, 780, 781, 782, 783, 784, 785, 786, 787, 788, 789, 790, 791, 792, 793, 794, 795, 796, 797, 798, 799, 800, 801, 802, 803, 804, 805, 806, 807, 808, 809, 810, 811, 812, 813, 814, 815, 816, 817, 818, 819, 820, 821, 822, 823, 824, 825, 826, 827, 828, 829, 830, 831, 832, 833, 834, 835, 836, 837, 838, 839, 840, 841, 842, 843, 844, 845, 846, 847, 848, 849, 850, 851, 852, 853, 854, 855, 856, 857, 858, 859, 860, 861, 862, 863, 864, 865, 866, 867, 868, 869, 870, 871, 872, 873, 874, 875, 876, 877, 878, 879, 880, 8

~~2000 + 5000 = 7000~~
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 2000 - 1000 = 1000

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~~67, 50 - r - 10, T~~ 500 x
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Northwest of Mesaba Station.

Then running north the graywacke was examined with reference to its metamorphism in approaching the granite. It is found to become very much metamorphosed.

Beginning at 283 north numerous exposures begin to appear which may be followed to 300 north.

2 hands 45400 and 45401 are collected in order from south to north.

45402. Specimen of granite 400 north, 100 west.

580 west, 385 North is a ledge showing beautiful granite with the Lower Huronian sediments. The granite *is on the north and the sediments to the south* ^{*the actual contact of*} The relations are clearly those of intrusion. The solid granite on the one side is separated from the solid slate and graywacke on the other by about 8 feet which is neither one or the other, but a most intricate mixture of the two. See sketches. Injection is a most minute one. Layers of slate in the granite vary from a fraction of an inch to several inches and same can be said of layers of granite in the slate. The granite also cuts across the slate layers in a subordinate way, and both are contorted. Near the contact the graywacke series could not be distinguished from a schist derived from igneous rocks. There is no sedimentary texture left.

Further examination shows that the granite stringers are found to the southern *extremity* of the exposure. However, in an exposure about 20 paces to the south the solid slate and graywacke are found. In this exposure the rock is very much contorted and broken up.

45403. Specimen of the solid granite which is a few inches from the contact.

45404. Various phases of the contact rocks, some of them being partly granite and partly slate.

by hand 45405. Phases of the slate close to the contact.

45406. Another phase of the slate a little eastward and from the south side of the exposure.

45407. Slate, contorted, from the south exposure.

Running north from the road on the east lines of sections 21, 16, and 9 of township 59 N. R. 14 W., Mesabi Range.

No exposures until a point 1300 north in 16 is reached, where there appears^{typical.} beautifully banded graywacke and slate: They are gently folded and the strike varies somewhat. As an average, however, it runs about n. 80° E. The dip is to the south at 70°.

- 45412. ^{To be analyzed} Siliceous, light colored and white weathering phase.

45413. At 1400 north is an intermediate rock intruding the graywacke and slate about 25 paces across. Is this associated with the granite? The graywacke and slate on the north side has the normal strike and dip.

- 45414. At 680 north is graywacke which becomes micaceous and hornblendic, however still banded. Strike and dip the same.

45415. Just N. E. of the corner. Sediment or green schist (?) probably sediment.

At 50 steps north of the quarter post in 9 is a high exposure of granite rising out of the swamp on the north side of which is much micaceous, hornblendic and schistose sedimentary material which has been injected by granite. The contact is almost a sharp one and is clearly an intrusive one. If found alone one could not say that the schist is a sediment, and it is possible that it is not, but when traced from the south there seems to be little question about this.

45416. ^{To be analyzed} Specimen of schist next to the contact. Fraction of an inch.

45417. Specimen showing schist and granite.

45418. Granite.

$$711 \times 14 = 9954$$

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45416 $\frac{9}{2} \times 2$ 0, 2x 8x 0

45417 2. 1. 2. 5

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→ x 22-2. 8 e d e T + d w x
100 → 7. b h c x
y. L 6. b. 2 c x

66. 4-22 ✓ 6-1-24 x
 66. 4-22 ✓ 5-2-24 x
 66. 4-22 ✓ 6-1-24 x

45419

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21

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23-

✓ 15766

22. 21. 23 x

45429 $\frac{1}{2}$ 11+ 76\ 3007189 38

1165 365 11+ 76\ 3007189 38

45430
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45432

1165 365 11+ 76\ 3007189 38

45433

1165 365 11+ 76\ 3007189 38

45434

1165 365 11+ 76\ 3007189 38

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4. 2 200 $\times \frac{1}{4} 5 \times 5006 - 1000$
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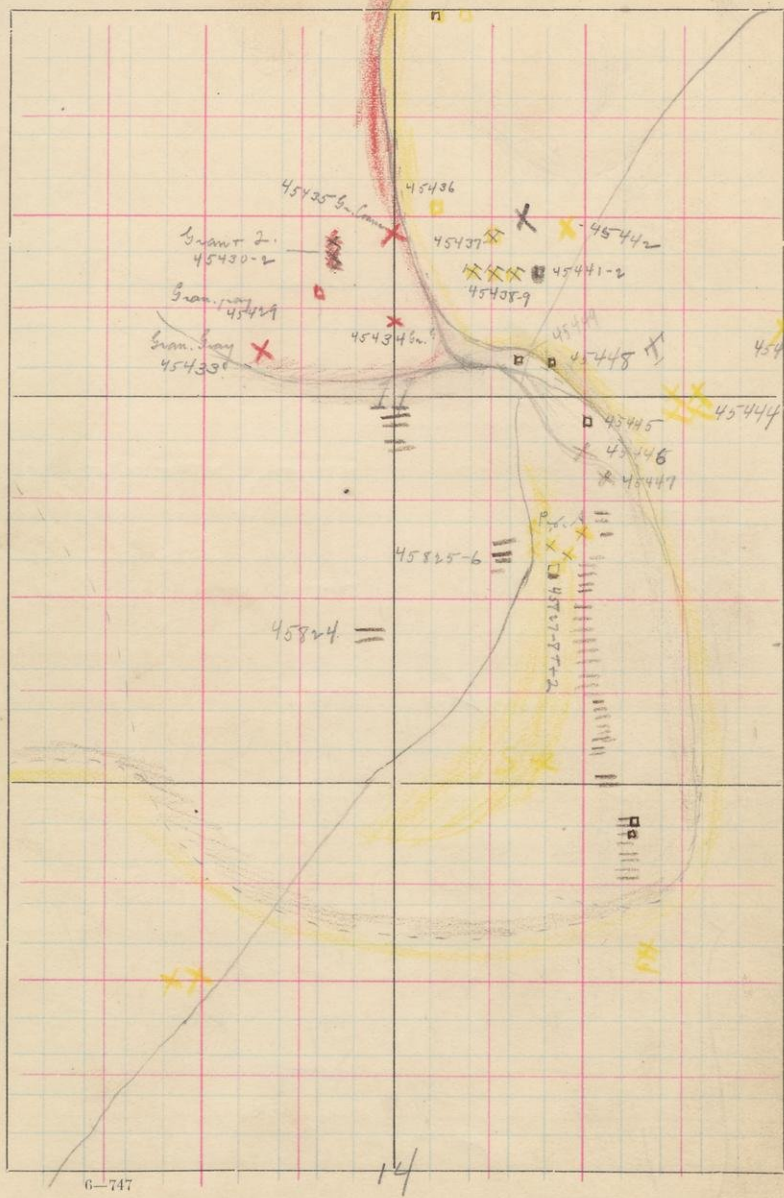
45445
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 60. N.S. — L — x — — — 169
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45449 ~ 17 ~ 50 b ~ 20 ~ A x 60
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45451 325 b ~ A ~ 9 ~ ~ 1-59-14
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Insert A28?

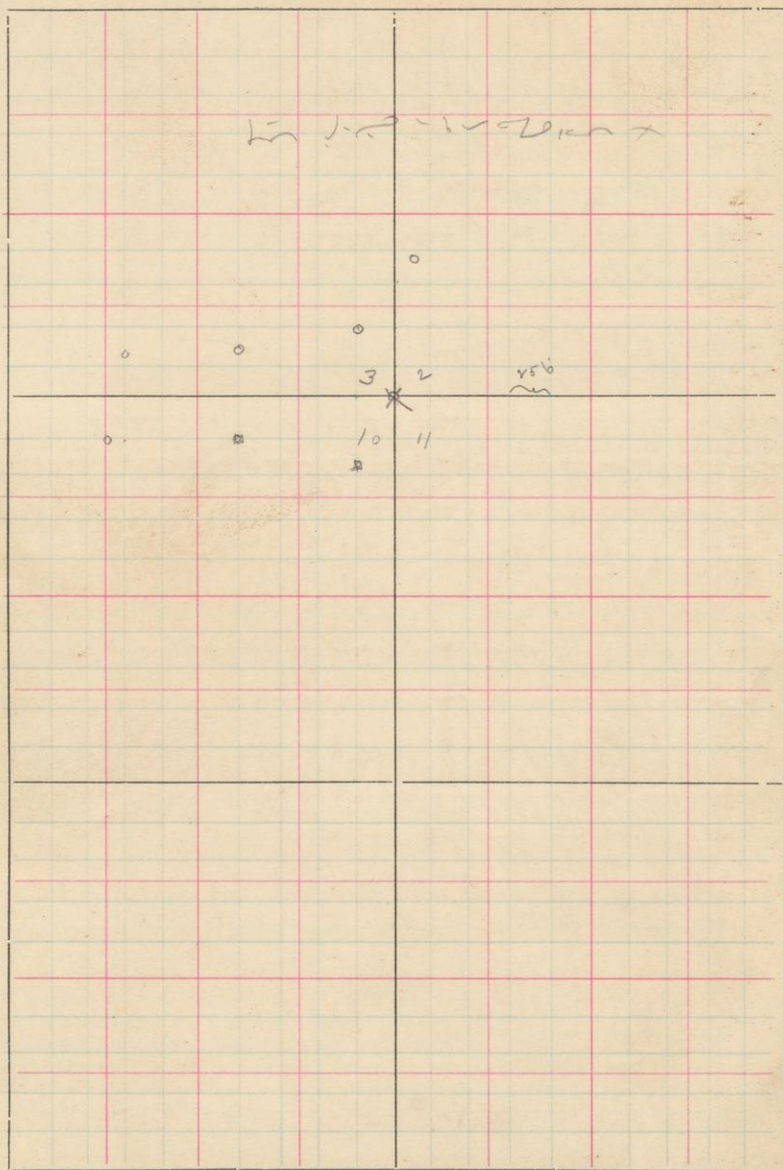
$\frac{1000}{1000} \times \frac{500}{500} \times \frac{70}{70} \times \frac{100}{100} \times \frac{40}{40} \times \frac{44}{44} \times \frac{14}{14}$
 $\frac{100}{100} \times \frac{50}{50} \times \frac{70}{70} \times \frac{100}{100} \times \frac{40}{40} \times \frac{44}{44} \times \frac{14}{14}$
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1. A_{470L} 1928.7
 2. A_{470L} 1928.7

S.

T. 58

R. 18



992-6401006x

2009. — 4

(faint handwritten notes)

60 $\nearrow$ 350e $\rightarrow$ 1425e 29 R

67 05259x

64 25-06 x 4.50 / e ✓

$\frac{1}{2} \times \frac{1}{2} = \frac{1}{4}$

1670 L. ✓ 209 (0.1/168)

1. T_x 60 a 31. Φ_x

Dr. C. W. Allen

6707500

64 700 η 100 5'16" ° T ~~ax~~ / °

6907 Tx

636

17807 636.7 $\leftarrow$ 0. h. A $\rightarrow$
 sl 1.4 v. ex 6 $\rightarrow$ 17
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 6 x 2 1.0 1.0 1.0
~~0.00 0.00 0.00~~

45472

0.00 0.00 1406 7707x

45473

8007 256.0 $\leftarrow$ 2
 8407 06.0 $\leftarrow$ 2

9307 756.0 $\leftarrow$ 2x

325
 19507 756.0 $\leftarrow$ 2x

45474

525
 10-9507 1756.0 $\leftarrow$ 2x 6.0 1.2
~~7.0 2.0 2.0~~

11007 - 5506.0 $\leftarrow$ 2 1.0 1.0
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6.0 2.0 7.0 4x

S.

T.

R.

$\left. \begin{array}{l} 45480 \\ 81 \end{array} \right\} \begin{array}{l} \text{so } \overline{\alpha} = \overline{\beta} - \overline{\gamma} \cdot \overline{\delta} = \overline{\epsilon} \\ \overline{\gamma} = \overline{\delta} \times \overline{\epsilon} / \overline{\alpha} \end{array}$

$\begin{matrix} \text{C} & \text{L} & \text{L} & - & \text{T}^x & \text{ } & \text{ } & \text{ } & \text{ } \\ \text{L} & \text{S} & \text{V} & (-) & \text{L}_6 & \text{L} & , & \text{T}_6^x & \end{matrix}$

11707 4750 6e. 190060-7
6-68x

1325 ⁶²⁵⁶ 75 70 23 2 x 60 W 7.7
6320 75 70 23 2 x 60 W 7.7

45482

14007 ⁵⁰ 6506 ° / - Cbx
6.2.7.7x

6. 0-7-2 2. 7708x
10. 2-7-2 2. 7708x

775 50869.1 22

2) - 100%
4) - 150%

182560 ✓ 725-

12259° 125°
 12259° 125°

45483

to be 2 x 1

52

716

19702-339-254

1257-1457 x

1. 6da 2 ✓ $\sqrt{p_x}$ $\sqrt{p_x}$ -

20. x 7 20 - 20. 1

45484 ∞T_x 9.0 5.0 0.0 0.0

$\phi_2 \sim e^{-\sqrt{2}(\pi + \frac{\pi}{2})}$

$\tau_x \rightarrow \tau_x, \text{ } \tau_x \rightarrow \tau_x$

6-26-20

45485 TT 27571 Nov 25/6

1300638 (200)

66. 100 6 (100) =

66 x 2 A / 115 6' 1/4 6 x

$$1921 \frac{1}{2} = 1921 \frac{1}{2}$$

$p-3 \leq 2 \rightarrow 2, 6 \rightarrow 1-2 \text{ } 4 \times$

S.

T.

R.

7

4

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106006 17577° 62° 54

7.8 x 62° 54' 54" 9x
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15756 x 116 12 54 (2 5)
1.3 2 1 5 x

45486

117007 6 3 2 1 1 1 1 1 1 1
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45488

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45492 x 4-10-32 20 20 20 20
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45493 x 2-4-20 20 20 20 20

45494 x 2-4-20 20 20 20 20

2-4-20 x
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Handwritten text: $\frac{1}{2} \log \frac{1}{2} - \frac{1}{2} \log \frac{1}{2}$

1-102, D7, 3x

43497 - 104-114¹
498 114-124
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109 D 7/13

45501 - 47-52
502 52-57
503 57-62
504 - 62-67
505 - 67-72

45566 } ser. 1020 0-7
7 } ser. 1021 761

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