when exposed in the open flame and oxidation of the manganese occurs, it appears to be much more difficultly fusible when heated in a closed tube, the dehydrated mineral remaining white and fusing to a nearly colorless glass.

Dr. W. F. Ferrier, one of the earliest collectors of sussexite from Franklin Furnace, recently told the writers that a large number of specimens sold or exchanged as sussexite years ago were really chrysotile serpentine. It seems that the specimen supposed to be sussexite from the University of California examined by Larsen must have been chrysotile. The two minerals are so much alike that in the absence of optical data they can only be identified by chemical tests.

Larsen's figures for chrysotile serpentine and sussexite are as follows:

	α	β	γ	Elongation
Sussexite[5]	1.541 ± 0.003	1.545 ± 0.003	1.554 ± 0.003	+
Chrysotile serpentine[6]	1.542 ± 0.005		1.552 ± 0.005	+

leaving no doubt that the specimen examined by Larsen was really chrysotile.

The sussexite material analysed by Ellsworth was examined under the microscope and its optical properties are found to be in agreement with its chemical composition when compared with camsellite as follows:

	α	γ	Elongation
Camsellite	1.575 ± 0.005	1.649 ± 0.005	−
Sussexite	1.639 ± 0.003	1.704 ± 0.003	−

Thus camsellite and sussexite may be easily distinguished from chrysotile which has positive elongation.

[5] *Idem*. p. 140.
[6] *Idem* p. 133.

AN IMPROVED WENTWORTH RECORDING MICROMETER

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In one of the more recent issues of the Journal of Geology[1] Professor Chester K. Wentworth described a very ingenious mechanical device in the nature of a recording micrometer for rock analysis. This instrument, when attached to the stage of a

[1] *J. Geology*, **31**, 228-232 (1923).

petrographic microscope, will measure from one to five mineral constituents, record and add the results in a single operation.

Through the kindness of Professor Wentworth the writer was able to secure the loan of this instrument for a thorough trial and to verify the claims made for it. Naturally, after considerable experience with the micrometer, it became apparent that the addition of certain refinements would still further increase the efficiency of this valuable instrument. In fact several improvements were suggested by Professor Wentworth in his article which might be followed by anyone wishing to duplicate this piece of apparatus.

In order that the recording micrometer with these refinements might be available to all parties interested in quantitative mineralogy, the writer enlisted the services of Mr. Ralph Miller, instrument-designer and President of Eberbach & Son Co., Ann Arbor, Michigan, and it is largely due to his skill that this improved micrometer is now on the market.

The object of this short note is merely to state the nature of some of these refinements and to point out how readily the information gained by the use of this instrument can be applied in connection with Professor Johannsen's Quantitative System.[2]

The standard instrument as now manufactured is constructed of brass with a dull nickel finish. Three sliding clamps, easily adjusted by means of a key, attach the micrometer securely to the stage of the petrographic microscope. Such attachment renders unnecessary the drilling of holes in the stage, at least for most types of microscopes.[3] Figure 1 shows the instrument mounted on a microscope and in proper position to take readings. The micrometer in its present form is one inch shorter and weighs approximately 80 grams less than the previously described instrument. The slide holder and long, double, tension springs, which pull the slide carriage to the right, are additional refinements when compared with the mechanism previously employed.

[2] Albert Johannsen; Essentials for the Microscopical Determination of Rock-Forming Minerals and Rocks, page 40. The University of Chicago Press, 1922.

[3] Mr. Clarence Ross, geologist, U. S. Geological survey, who has used one of these instruments informs the writer that with his microscope, which contains a friction ring in the stage, attachment was secured by threaded holes and thumb screws. Mr. Ross also suggests that for rocks with decided schistosity a rotating slide holder would be a desirable refinement. The present instrument can be used for schistose rocks by cutting the slide and rotating it in the slide carrier.

The most noteworthy improvement, however, pertains to the manner of recording complete turns of the dials used to record the constituent minerals. In the original instrument this was

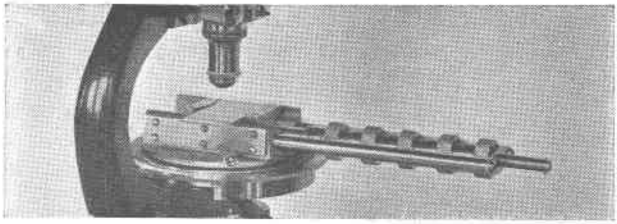

Figure 1

accomplished by counting the threads exposed after having previously calibrated the micrometer for one to twelve turns of the dial. In the present form the complete revolutions of the graduated micrometer heads can be read off directly by the horizontal displacement measured in half and whole millimeters, the same as in micrometer calipers. Figure 2 shows the instrument with the five graduated micrometer heads, all in the zero position.

The pitch of the screw used is 0.5mm. and with one hundred divisions on each micrometer head a definite value of 0.005 mm. is established for each small division. While in general computations involving the measurements of mineral grains are wholly relative in character, still in determining the actual size of phenocrysts or grain size of sandstones it is very desirable to know the absolute value of each division of the micrometer head.

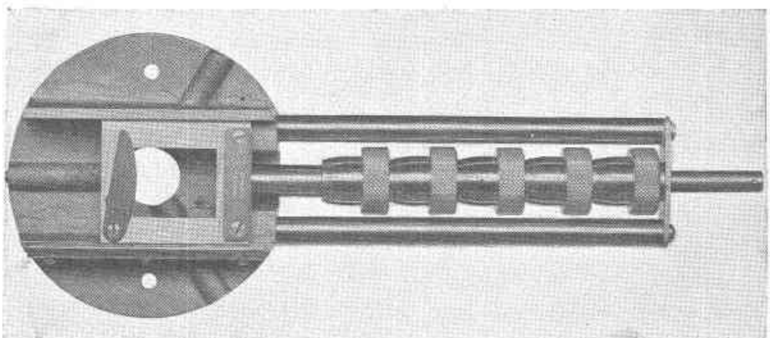

Figure 2

The concluding two examples will illustrate applications of the use of this instrument in quantitative petrography. Twelve traverses across the slide at intervals of about 1/2 mm. were taken in each case.[4] The values obtained and the necessary computations are as follows:

(a) Rock section of gabbro from Risör, Norway

Designation	Minerals	Micrometer readings	Per cent	
Plag.	Bytownite	18957	58.1	
Mafites	Hornblende	5831	17.9	41.9%
	Pyroxenes (enstatite and diallage)	4699	14.4	
	Olivine	2640	8.1	
	Magnetite, Pyrite	503	1.5	
		32630	100.0	

Leucocrates = 58.1% = *Class 2* (between 95 and 50 per cent). Plagioclase = $Ab_{20}An_{80}$ = *Order 3* (between $Ab_{50}An_{50}$ and Ab_5An_{95}). As no quartz is present the family falls in the row of Families 9, 10, 11 or 12. With no orthoclase, therefore *Family 12;* or the rock number is *2.3.12* (olivine norite).

(b) Rock section of syenite from Miask, Ural Mts.

Designation	Minerals	Micrometer readings	Per cent	
KF.	Orthoclase, Microcline and Microperthite	13321	42.7	89.8%
Foids.	Nephelite, Sodalite	6326	20.3	
	Cancrinite	4687	15.0	
Plag.	Albite	3676	11.8	
Mafites	Biotite	2979	9.5	
	Magnetite	186	0.6	
Auxiliaries	Apatite, Zircon	32	0.1	
		31207	100.0	

Leucocrates = 89.8% = *Class 2* (between 95 and 50 per cent). Plagioclase = $Ab_{94}An_6$ = *Order 1* (between $Ab_{100}An_0$ and $Ab_{95}An_5$). In recalculating Quarfeloids (KF. + Foids. + Plag.) to 100%, Foids = 39.3%. The Family with 39.3% Foids. falls in the row of Families 17, 18, 19 or 20. KF. and Plag. recalculated to 100% gives KF. = 78.2%; therefore *Family 18*, or the rock number is *2.1.18* (albite-nephelite-syenite).

[4] These readings were taken by Mr. Floyd Poindexter, graduate student in the Department of Mineralogy.