student of trigonometry. It seems easier to solve such a triangle by dividing it into two right triangles and I understand this method is commonly pursued by the engineer. The love for generalization on the part of the teacher seems to have led him in this case to commit a serious pedagogical blunder.

In closing, I desire to urge you to do your own thinking and not to allow yourself to waste energies on the many modern fads appearing under the high sounding term of reform. The very rapid modern transformations have made us unduly vulnerable to the darts of the faddist whose audacity has outstripped that of the mine and oil promoters of the last few decades. A few mines and oil wells have paid handsomely but most of those which have been advertised extensively proved to be disastrous to the too credulous investor. A similar fate has come to those who are too credulous about educational reforms, whether they appear in the form of the function rattle popularized by F. Klein, vocational training, transfer of training, ability tests, or simply the emphasis on methods above knowledge.

As a result of the many wildcat propositions the universities used to avoid pedagogical investments altogether and they used to be fearless in warning the public against investing their hard-earned money in this way. During recent years, however, our American universities have abandoned this policy, under the leadership of Columbia, and have invested heavily in this line of securities. At first they selected the best class only but recently they seem also to invest heavily, again under the leadership of our largest university, in the more doubtful class. This is done even in the graduate schools.

Hence the public has become more and more unwary, and wildcat pedagogical promotions are thriving as never before. The richness of a few reputable pedagogical mines has served to inspire hope as regards others whose only asset is proximity to the former. Hence the grave need of caution at the present time. The educational public would seem to need some public educational commissions similar to those recently inaugurated along financial lines to protect the ever too gullible public. The scientific development securities to which I directed your attention above do not promise the largest returns but they have withstood the severest test of the ages and hence they should be regarded as the soundest of all intellectual investments. Our students need to be trained to enjoy ideals as well as to utilize the real. Mathematics is the ideal science and there is more moving than improving in reforms.

G. A. Miller

University of Illinois

BANDED STRUCTURES OF THE ADIRONDACK SYENITE-GRANITE SERIES

The syenite-granite series constitutes the greatest bulk of Adirondack rock. It is younger than both the Grenville metamorphosed sedimentary series and the anorthosite, the former especially having been broken up and badly cut to pieces by the syenite-granite intrusion. In mineral composition the range is from syenite rich in microperthite, orthoclase, and hornblende or augite, together with some plagioclase; to granite rich in microperthite, quartz, orthoclase and microcline, together with some plagioclase, hornblende and biotite; to monzonitic and dioritic facies rich in plagioclase, orthoclase, pyroxene and hornblende. Medium grained rocks greatly predominate but there are many variations to fine and coarse grained and even porphyritic facies. Granulation is common, the feldspars especially being most notably crushed. In structure the syenite-granite series exhibits all sorts of variations from non-gneissoid to excessively gneissoid types, with a moderate degree of foliation prevalent. The color of the typical fresh syenite is greenish-gray, while the fresh granite varies from greenish-gray, to light gray, to light red.

In this paper the features of special interest in connection with the syenite-granite series are the comparatively sharp transitions from acidic to basic facies; from greenish-gray or gray to pink or red varieties; from coarser to finer grained types; from highly gneissoid to very slightly or moderately gneissoid facies; and from notably granulated to only moderately granulated varieties. The effect is to give bands or layers of varying composition, color, granularity, foliation and granulation, yet all clearly belonging to a single rock body. Such bands or layers usually vary in width from an inch to a hundred feet or more, and in length from a few feet or rods to a quarter of a mile. Banded structures of this sort are common throughout the Adirondack region, but it should be made clear that they are by no means universal. Large bodies of syenite or granite are often remarkably uniform and free from any notable variations or banding.

Bands of amphibolite which, in many places, cause the syenite or granite (more especially the latter) to exhibit a very pronounced banded structure are not considered in this paper. These present some puzzling features and data regarding their significance are now being gathered by the writer. Also, distinct inclusions of various types of undoubted Grenville gneisses which, in the form of lenses or layers, in many places produce a banded structure are not discussed except in so far as they throw light upon some banding of the syenite-granite which has resulted from magmatic assimilation of such inclusions.

Of the many hundreds of observed examples of banded structures considered to be essentially the result of magmatic differentiation, a few will be described in order to give a proper conception of the more common and characteristic variations.

On the mountain spurs, respectively one mile northeast and two miles east of Whitehouse (Lake Pleasant quadrangle), there are shown many facies of the syenite-granite series ranging from greenish-gray hornblende syenite and granite syenite to gray and pink granite and coarse, almost prophyritic, granite. Such rocks play back and forth upon each other by sharp transitions repeatedly for a distance of one half of a mile on each mountain spur where the almost barren ledges are conspicuously banded in layers usually from a few feet to a few rods wide and parallel to the foliation. These bands show many diffenences in foliation, granulation and granularity. Variations of this sort are perhaps the most abundant throughout the Adirondacks.

By the road one and one half miles southwest of Long Lake village (Blue Mountain quadrangle) a freshly blasted ledge finely exhibits bands of greenish-gray syenite, granitic syenite, and gray granite. One band of light gray hornblende granite two and one half feet wide passes by insensible gradations into greenish-gray pyroxene syenite on either side. The bands are parallel to the foliation which varies considerably.

A hand specimen taken from a ledge by the lake shore near Adirondack village (Schroon Lake quadrangle) is distinctly foliated and granulated with a pink band especially rich in feldspar adjacent to a band very rich in quartz plus some garnets, these two bands having on either side gray granite consisting of quartz, feldspar, hornblende and some biotite. These very narrow bands, not sharply separated from each other, are parallel to the foliation. In the same quadrangle, one half of a mile north of Moxham pond, granite in a road metal quarry shows notable variations in coarseness of grain often within a foot or two.

The red hornblende granite of the northern portion of the Port Leyden quadrangle often contains bands of gray quartz syenite in subordinate amount parallel to the foliation. Good exposures are by the lower road crossing on Otter creek.

Professor Cushing, describing the granitic syenite of the Long Lake quadrangle, says:

> Much of the rock is alternately green and red, quite quartzose, and a rock distinctly intermediate between syenite and granite, often passing into granite. Much of it is uniformly red, and the rocks range from syenite to granite in composition.[1]

Professor Kemp, in his description of the syenite of the Elizabethtown-Port Henry quadrangles, says:

> The most acidic variety will quite sharply replace it (syenite); and in the same way a very basic variety may come in and constitute the section for 50 or 100 feet or more. Yet while the

[1] N. Y. State Mus. Bul. 115, p. 478.

transition is sharp there is no evidence of separate intrusive masses.[2]

The interbanding of syenite and granite above cited as occurring in the Long Lake and Elizabethtown quadrangles are by Cushing and Kemp, respectively, interpreted as being most likely due to some process of magmatic differentiation. Kemp says that one is not "justified in inferring more than a differentiation of an eruptive mass into layers or portions of contrasted composition." For most cases throughout the Adirondacks, especially the very common occurrence of banded variations like those illustrated in the above examples, the writer agrees with this interpretation since there appears to be no escape from the idea of some sort of differentiation of the magma into layers of varying composition. Transitions between layers range from sharp to very gradual, but in a typical case the whole body of rock is, as Cushing says, "manifestly bound together as a mass of eruptive material arising from a common magma." Whether or not the transitions are sharp, they are always marked by interlocking crystals.

But what were the physical conditions under which the differentiation occurred? Did the differentiation take place before, or after, or during the process of intrusion? The writer ventures to offer some suggestions by way of partial answers to these questions.

M. E. Wilson has discussed the banded gneisses of the Laurentian Highlands of Canada[3] which are essentially very similar to those of the Adirondacks. In his summary Wilson says: "As regards the origin of the folded, banded and foliated structure of the gneisses, it is concluded that these are all genetically related in the Laurentian mountain-building deformation which acted upon the magmatic axil mass during its consolidation" and "that the principal factor in bringing about the heterogeneity of the Laurentian complex was differentiation aided by (orogenic) deformation during its consolidation."

Now, in the main portion of the Adirondack region the banded syenite-granite series shows little, if any, folding due to orogenic pressure, and the foliation is essentially a magmatic flow-structure produced under moderate pressure, that is a pressure little or no greater than that which resulted from the shouldering action of the syenite-granite magma during its intrusion. Reasons for these conclusions are given at some length by the writer in a recent paper.[4] Such being the case, *orogenic* pressure was not a principal factor in the profeature of the whole central belt of Laurentian duction of the banded structures of the Adirondack syenite-granite series. Wilson states that the banding is a very persistent Highland gneisses, but in the Adirondacks the more localized developments of pronounced banded structures strongly oppose the idea that they were produced under general regional or orogenic pressure. The writer believes, therefore, that orogenic pressure has not been a necessary condition for the production of banded gneisses such as those described in this paper.

It may well be conceived, however, that, in those portions of the rising magma where the shouldering pressure was greater, the differentiation into layers of contrasting composition, color, texture and foliation proceeded more readily, while in other (often large) portions of the magma, where the shouldering pressure was relatively slight, the conditions for differentiation into contrasting bands were not so favorable. The influence of pressure in the production of the banding is thus recognized.

It is further believed that the syenite-granite magma rose very slowly and irregularly, and that there was differential magmatic flowage, especially in those portions where the contrasting bands were developing. Many of the bands are not considered to have consolidated simultaneously since alternating bands showing sharp differences in degree of magmatic flow-structure foliation prove that some of the layers were more fluid and continued to flow after adjacent layers were wholly or nearly consolidated. Accordingly, where the banded structures are well developed we may picture not only the slow intrusion of the

[2] N. Y. State Mus. Bull. 138, p. 48.

[3] *Am. Jour. Sci.*, Vol. 36, pp. 109–122.

[4] *Jour. Geol.*, Vol. 24, pp. 587–619.

heterogeneous syenite-granite magma split up into layers, but also differential movements of the layers, at least during late stages of magma solidification. This conception does not, however, preclude the possibility of some differentiation after portions of the magma came to rest, or even before the intrusion began. In fact it is reasonable to suppose that the commonly occurring large-scale, irregular, gradual transitions from granite and granite porphyry to syenite and even diorite may have resulted from differentiation of the syenite-granite magma before, or during an early stage of, the intrusive process.

Another explanation, supported by field evidence, to account for at least some cases of banded structure should be mentioned. Thus at a number of localities gray or greenish-gray basic syenite or even diorite bands occur in the syenite-granite series where dark Grenville gneiss or amphibolite inclusions are also common. Both igneous-looking bands and inclusions lie parallel to the foliation of the country rock. Sometimes the boundaries of the inclusions are very sharp, but in other cases they are not, and plainly more or less fusion of the inclusions has taken place. All stages from thoroughly fused and absorbed inclusions to others where little or no fusion has taken place may be seen. The thoroughly fused inclusions have a distinctly igneous appearance and their boundaries of course merge into the enclosing rock yielding a more or less well developed banded structure. Some typical cases of this kind of magmatic assimilation are described by the writer in a recent paper,[5] and still others in various New York State Museum bulletins by the writer. Of the large number of cases which have come under the writer's observation, nearly all are of very minor extent, and usually such banding is definitely recognizable as having resulted from assimilation rather than pure differentiation. There is no positive evidence that large bodies of the syenite or granite have been appreciably changed in composition due to the incorporation or assimilation of Grenville rocks. Thus, while it seems certain that assimilation has played a minor rôle in the production of banding of the syenite-granite series, the actual quantitative importance of assimilation as compared with differentiation is by no means definitely known.

WILLIAM J. MILLER
SMITH COLLEGE

[5] *Geol. Soc. Amer. Bull.*, Vol. 25, pp. 254–260.

PROCEEDINGS AND RESOLUTIONS OF THE THIRD RESUSCITATION COMMISSION[1]

THE Commission met in New York at the Rockefeller Institute on Friday, May 17, 1918. There were present at the meeting: Passed Assistant Surgeon E. F. DuBois, U. S. N. R. F., of the Bureau of Medicine and Surgery, Navy Department; Dr. D. L. Edsall, professor of medicine and dean, Harvard Medical School; Mr. W. C. L. Eglin, chairman of committee on safety rules and accident prevention of the N. E. L. A.; Dr. Yandell Henderson, professor of physiology, Yale University and consulting physiologist of the Bureau of Mines; Dr. Wm. H. Howell, professor of physiology and assistant director of the school of hygiene and public health, Johns Hopkins University, member of the National Academy of Sciences; Dr. Reid Hunt, professor of pharmacology, Harvard Medical School, Secretary of Commission; Professor A. E. Kennelly, professor of electrical engineering at Harvard University and the Massachusetts Institute of Technology; Dr. Charles A. Lauffer, medical director of the Westinghouse Electric Co., Pittsburgh, Pa.; Dr. S. J. Meltzer, Rockefeller Institute, chairman of the commission, member of the National Academy of Sciences; Dr. Joseph Schereschewsky, Assistant Surgeon General, U. S. Public Health Service; Dr. G. N. Stewart, professor of experimental medicine, Western Reserve University, Cleveland; Professor Elihu Thomson, General Electric Co., West Lynn, Mass., member of the National Academy of Sciences; Lieutenant Colonel Edward B. Vedder, of the Army Medical

[1] Held under the auspices of the Committee on Safety Rules and Accident Prevention of the National Electric Light Association. Edited by Professors Howell, Stewart and Thomson.