tunity to study the geological characteristics of the deposits. Anyone who reads the paper and discussion must conclude that one or other is incorrect in his statements or illogical in his conclusions. Those who have made a special study of the geology of pre-Cambrian ore deposits will, however, not be as much surprised as others. It seems but another illustration of the danger of applying to a whole district conclusions drawn from the study of widely separated outcrops.

Mr. Tyrrell takes the Swastika district as a type to illustrate the occurrence of gold in Northern Ontario. To this we raise the objection that the Swastika district is not typical and that moreover there is considerable variety in the narrow limits of the Swastika district itself.

Compare the Tough-Oakes deposit with the Hollinger. Are they similar? In a few respects, yes; but in most respects, decidedly no.

At the Hollinger there is a system of large quartz veins standing nearly vertical and parallel to one another and enclosed partly in a massive rock whose chief constituents are quartz, carbonates, and sericite, and partly in greenstone containing these minerals. The veins are several feet in thickness and composed largely of white quartz with a little pyrite and small quantities of several secondary minerals. The gold is in the form of native gold. The ore is a remarkably simple, easily-treated, pyritic, gold quartz. The country rock of the main vein was probably originally a rather siliceous porphyry.

At the Tough-Oakes the ore and enclosing rock are of very different character. The vein matter exposed will average only a few inches in thickness. The enclosing rock is a conglomerate. The vein where opened up is but a few feet from the contact with a mass of feldspar-porphyry. The ore contains tellurides as well as native gold, and is frequently accompanied by a black substance which is known to be partly molybdenite. Minute crystals of pyrite are very abundant. The rock is much fractured, and there are numerous seams of distinctly secondary quartz. The conglomerate undelies the porphyry and the vein dips towards the contact.

Dr. J. M. Bell, in discussing Mr. Tyrrell's paper, suggests that the Porcupine gold deposits are more typical of others in Ontario. He goes on to say, however, that both at the Dome and Hollinger the gold occurs in the schist as well as in the quartz. There is some gold in the schist at both mines; but it has been distinctly pointed out by Mr. P. A. Robbins that most of the gold at the Hollinger occurs in the quartz and that the portions of the schist which contain much gold are characterized by quartz veinlets. Dr. Bell's statement is true enough; but it does not make clear the fact that most of the gold is in quartz.

Mr. Tyrrell and those who have discussed his paper do not give a very satisfactory account of the black substance which is so characteristic of the Tough-Oakes deposits. This is probably because of the fact that it occurs commonly as a thin film made of an aggregate of minute particles which cannot readily be separated for examination. Mr. C. A. Foster had some of this material analyzed and it was found to be partly molybdenite. Some of it contains no molybdenum. It would be interesting if those who have had analyses made would publish them. Apparently it is a mixture of minerals. In an article published in our July 15, 1913, issue we called the material graphite. Mr. Foster having found some of it to be molybdenite the interest in determining the nature of the substance seems to have dropped. It is to be hoped that some chemist will be induced to make an investigation of the substance. In the meantime we can only refer to it as molybdenite, knowing that to be one of the minerals present.

Another feature of the Kirkland Lake deposits which should prove interesting to the chemist is the presence of tellurides. A few qualitative and a very few quantitative tests have been made to determine the character of these minerals. The information so far available concerning the tellurides is anything but satisfactory.

Mr. S. J. Lett has asked whether the gold at the Tough-Oakes is commonly associated with secondary quartz, calcite and sericite. The answer is yes, so far as visible gold is concerned. The Tough-Oakes deposit shows much more evidence of secondary changes in the vein matter than do the Porcupine deposits. In places coarse gold is abundant on the fractured surfaces.

Mr. Lett asks what the sericite was derived from if the feldspars are soda-lime feldspars. The answer is that there is potash in the rocks and that sericite can be, and often is, formed in other ways than by the simple decomposition of feldspars. Moreover, it is a distinct characteristic of most Northern Ontario gold deposits that the gold quartz is enclosed by altered rock of which quartz, carbonates, and sericite are common constituents. This is the case whether the enclosed rock is siliceous or basic, igneous or sedimentary. The significance of this feature has already been pointed out in a paper on the origin of the Porcupine gold deposits.

Mr. Lett quotes Dr. Baelz as stating that the gold-bearing magma is directly connected with great granite intrusions. That is a remarkable discovery, but without any argument on which to base the statement, the conclusion doesn't seem to have any great value. What information did Dr. Baelz hope to convey by such a statement?

Mr. Tyrrell, in replying to Dr. Bell, states that the Kirkland Lake and Porcupine deposits are to be regarded as similar because they are "associated with porphyries rich in soda-lime feldspar." But is that conclusion justified by the facts, and is it an important characteristic even if true? Most porphyries are rich in soda-lime feldspars, and it is not remarkable that many of those associated with the gold deposits should be. Many of them are. Some, including those at the Tough-Oakes and Teck-Hughes, are rich in alkali feldspars. Possibly a continuation of the study which Mr. Tyrrell has undertaken will show that a narrower limit may be set on the variety of rocks which are to be con-