Thus it appears that there is a certain amount of evidence for at least two, and possibly three, minor synclinal crossfolds—which, of course, infers the presence of their corresponding anticlinal crossfolds—on the eastern and the western limb of the central overturned structure within the major crossfolding system, between Childe Harold and Mt. Windarra. In all probability the axes of these minor crossfolds extend from west to east right across the area under consideration, but evidence in proof of this fact is very inconclusive. The "wave length" of these minor crossfolds, that is, the distance between any two points in the same phase, is approximately 8 miles.

Probably there is a great deal of still smaller-scale cross-buckling within these minor folds, but poor exposures and lack of underground workings make it almost impossible to obtain sufficient evidence for their elucidation.

THE RELATIONSHIP OF GOLD DEPOSITION TO GEOLOGICAL STRUCTURE.

Though mining activity in the Laverton, Morgans and Murrin Murrin districts has undergone a revival in the last few years, there are in existence very few new mines which have reached such a stage of development, that an underground examination might be expected to provide clues as to the minor structures in which they are situated. Most of the older centres such as Ida H., Childe Harold, Euro, Burtville and Mt. Margaret are almost deserted, and their underground workings inaccessible. Consequently, it is impossible to arrive at any specific conclusions as to the effects of isolated geological structures upon the production of gold bearing formations in the different mining centres.

However, a study of the distribution of the mining centres in relation to the geological structure of the area as it has been interpreted in Plate VIII., reveals one or two interesting facts.

Firstly, there appears to be a definite grouping of the mining centres along certain parallel lines which run in an approximate E.N.E.-W.S.W. direction, i.e., parallel to the axes of major and minor crossfolding. The actual position of the centres in relation to the axes of minor crossfolds varies considerably, but in some cases important mining centres appear to lie on or close to these axes. Very possibly the distribution of gold in many centres has been controlled by still smaller scale structural features which have not been revealed in Plate VIII.

Another interesting point that may be noted is that in many cases the mining centres appear to be associated with the jaspilite horizons in the Greenstone Complex.

It appears probable, then, that localisation of gold deposition in this area has been to a certain extent controlled by the crossfolding structures. As to whether the major crossfolds are those of prime importance, and if so, whether certain portions of these folds are more favourable for the introduction of gold solutions than others, it is as yet impossible to say. Similarly if the distribution of gold is controlled primarily by the minor crossfolds, it may later be possible to prove that certain phases of these folds, such as, some parts of the crests of anticlines, or the troughs of synclines, or certain portions of the limbs are the most favourable for the introduction of auriferous solutions.

Though a certain amount of field data has already been obtained, considerably more evidence, both in this and other goldfields, will be required to satisfy these very important questions.

NOTES ON THE BANDED JASPILITES OF THE MT. MORGANS-MT. MARGARET DISTRICT.

MT. MARGARET GOLDFIELD.

(K. R. Miles, B.Sc. (Hons.).)

To even the most disinterested traveller from Morgans to Laverton one of the noticeable features of this part of the Mt. Margaret Goldfield should certainly be the numerous low broken ranges and long ridges, frequently topped by ragged knife edges of naked rock, whose bare outlines stand out in marked relief from the flat red mulga-strewn plains, and the low rounded dull-brown, greenstone hills.

These ridges usually consist of one or two steeply dipping beds of a variety of banded iron-bearing quartzite, to which has been given the name of "Jaspilite" (better known on the goldfields as "Jasper"). The high content of quartz—a chemically inert mineral—in the jaspilite beds, and its fine texture, has generally resulted in these beds having resisted the agents of weathering far more successfully than the surrounding rocks.

Consequently they are usually to be found outcropping as long narrow sinuous ridges, which stand up above the general level of the country. Several of these long broken lines have been traced over distances of 20 miles and more.

Detailed mapping in the Laverton-Morgans district has established the fact that there are three, possibly four, distinct horizons of these jaspilite beds. These "horizons" are not usually represented by the one continuous bed of jaspilite, but more often consist of several separate bands or beds, which vary in thickness from 2-3 chains down to a few inches. A band may sometimes lens out, its place often being taken by another parallel band at some distance further along the general strike of the horizon. The bands are frequently tightly folded and contorted.

The general characters and the mode of origin of the jaspilite beds in the different horizons are essentially the same, but it appears that some at least of the horizons show certain distinctive characteristics, while in all of them can be seen, in different places, variations in composition, structure, texture, granularity and degree of alteration or decomposition.

A most striking feature of the jaspilites is their remarkably uniform banding. This is usually due to parallel layers of dark (either brown, black or red) iron oxides alternating with white or grey bands of fine-granular quartz. These alternating layers, of widths varying from 1 inch down to fine hairlines, frequently show the remarkable continuity characteristic of "varve" structures in younger and less disturbed sedimentary deposits, and even in highly contorted and dragfolded portions of the jaspilite beds, contiguous individual layers are often traceable for many chains.

The jaspilites of this area may be divided into two groups: the Siliceous Jaspilites, or those which have a very low iron content; and the iron-bearing Jaspilites.

The former, of which the Mt. Crawford (JHR 15)-Lancefield lines (see structure-contour plan, Plate VIII.) are examples, consists essentially of a closely interlocking quartzite through which run narrow parallel pencil lines of darker material—probably finely divided graphite, or iron oxide. It frequently shows evidence of re-silicification, the result of intrusion by later quartz. This type has been seen to grade into the iron-bearing variety in a number of places, e.g., south of Mt. Crawford, at Mt. Weld (E 42), ½ mile south of the Gladiator G.M., etc.

In the iron-bearing jaspilites, which make up the bulk of the Jumbo (JHR 13)-Morgans, and Windarra (E 43)-Ajax (JHR 12) horizons, and portion of the Laverton-Euro line, the iron ore is usually present in the form of bands of either black, granular hematite, or brown-yellow amorphous limonite, the one often grading into the other.

At Mt. Windarra the iron-bearing bands are associated with a light-brown coloured platy mineral, probably an amphibole.

In two places jaspilite beds have been seen to grade, across the strike into pebble conglomerates.

At about one mile south of Mt. Windarra, the bed grades imperceptibly, eastward, into a coarse quartzite or grit containing narrow beds of highly sheared and lensed-out quartzite pebbles. At about 4 miles S.S.W. of Child Harold, where the Euro jaspilite line approaches Lake Carey, its eastern boundary passes into a coarse pebble rock of obviously sedimentary character.

Another rock type which is probably closely associated with the jaspilites of this district is a blue-grey graphitic slate, or phyllite, which frequently carries narrow lenses of banded quartzite very similar to a siliceous jaspilite. A well-marked horizon of this slate exists at about 1¼ miles west of the Morgans-Korong jaspilite line, and at Murrin Murrin, while numerous narrow belts occur in greenstone schist, both east and south of Laverton.

About one mile west of Mt. Korong (J.H.R. 34) the blue-grey slate horizon is cut off by intrusive granite, and close to the contact, the slate has been converted into a micaceous chiastolite-bearing rock.

The jaspilites were very probably laid down under shallow seas in early Pre-Cambrian times, in the form of impure sandy beds, the detrital material of which being derived from the denudation of ancient land surfaces consisting of predominantly basic rocks.

There were at least three periods of sedimentation and probably four, or more, separated by periods of volcanic activity during which thick layers of basic lavas, tuffs and later, agglomerates were deposited in succession over the thin sedimentary beds.

STANDARD SYMBOLS

As adopted by The Geological Survey of Western Australia, 1935.

(Reference Note by H. A. Ellis.)

In Plate No. IV. of this report will be found a reference table explaining the conventional signs which are in use on geological plans prepared by officers of the Geological Survey since the year 1935.

A number of these signs have been adopted from the published plans of other Geological Surveys, particularly those signs having reference to structural features.

While each geological plan is always accompanied by a legend in which an explanation of those conventional signs used in its compilation is given, it has been thought desirable to reproduce in one plate, all the signs used.