REPORT ON THE OIL-FIELDS OF TWINGOUNG AND BEME, BURMA.

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[With one plate and a map.]

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I.—GENERAL REMARKS.

1. *Position of the oil-fields.*—The oil-fields, generally but wrongly called oil-fields of Yenangyaung,[1] are situated at a distance of one mile and a half to east of that place near the villages of Twingoung[2] and Beme. Neither the names of these two villages nor the oil district is marked on the map of Burma (1 inch = 14 miles), but the position might be about where on the map the letter g of the word Yenangyaung stands, *i.e.*, lat. 29° 21′ N., long. 94° 56′ E.

2. *Topography.*—The map does not give the correct features of the country; a hill range, like the one marked on it, does not exist in this part of the country. The country forms a tolerably level and flat plateau, rising on the average to the height of 260 feet above the low level of the Irrawaddy at Yenangyaung; the highest point, the pagoda of Twingoung, being 313, the highest hill between Beme and Twingoung 293 feet above the same level. The whole country is intersected by numerous deep and narrow, irregular ravines, about which my map gives a very good idea. The whole country has obviously been originally one extended plateau, which has been eaten into by the action of the surface water, due to the composition of the strata forming the country and the irregularity of the rainfall during the year. The mechanical action of the water worked more in the direction of deepening and lengthening the water-courses than in widening them. By the eventual union of two opposite water-courses at their upper end into one a more or less extended piece of country was isolated, which took in time the form of a hill with flattened top and very steep slopes. On these latter of course the running water worked most energetically, notching them more or less.

Some parts of the country, especially the ferruginous, conglomeratic beds, resisted in a more energetic way the action of the surface water, which by washing away the surrounding softer strata modelled the harder ones to a kind of ridge, which was eventually eaten into a range of isolated hillocks or rocks. On the way from Yenangyaung to Beme or Kodaung we met with two of such ridges surmounting the surrounding plateau and running from S.S.E. to N.N.W. A closer examination proves that they are the remainders of a hard stratum of ferruginous conglomerate imbedded in the soft sandstones. The result of this process of the action of the water will be a country of rolling hills, with the tops generally on the same level, which are intersected by long, irregularly bent ravines, with steep, notched slopes. It is evident that a country like this is most difficult to cross, the roads being forced to accommodate themselves according to the run of the ravines. For instance, between Kodaung and Twingoung communication with carts is utterly impossible, the ravine between the two places preventing it. Therefore, a cart from Kodaung to Twingoung, a distance of 700 yards as the bird flies, had to go from either place *vid* Yenangyaung, that is to say, a good day's march, in order to reach its destination.

[1] Yenangyaung = creek of oil.
[2] Twingoung = hill of wells.

3. *Geology of the oil-fields.*—The strata forming the country between the Irrawaddy and the Pin creek belong chiefly to the tertiary formation. For reasons which I shall give in detail elsewhere I feel inclined to believe that they represent the upper part of the tertiary formation, of no later age than Miocene. Likely enough they are of the same age as the Siwalik formation in India. As a matter of fact, the fossils I collected point to younger tertiary. Over the tertiary strata there is spread, but not continuously, a layer of ferruginous red gravel abounding in large pebbles of white quartzite and fossil wood, belonging to the diluvial formation.

Tertiary.

The strata mostly consist of laminated and clayey sands, sometimes a little indurated, so as to form soft sandstones. Some of the beds are highly calcareous and abound in concretionary masses of sandy limestone in the most varied shapes, many looking exceedingly like organic structures and frequently being considered by people to be such. In other beds there are nodular concretions of a very hard quartzitic sandstone, sometimes of an immense size, intercalated and arranged in irregular layers. There occur a few pebbly beds, and occasionally a layer of ferruginous sand or gravel cemented into rather a hard bed of ferruginous conglomerate. These layers of peroxide of iron are not unfrequently to be met with. Of inferior importance are clays and shaly clays.

The colour of the sandstones varies from white or a light yellowish tint in all stages up to a dark red and blue colour. The clays and sand-clays have a bluish grey tint. The minerals, occasionally imbedded, are gypsum, pyrites, coal. Nitrate of lime is formed abundantly on the surface of the rocks.

Detailed sections of the tertiary strata.

I shall now proceed to describe in detail the sections which I noticed in different localities of the oil-fields followed by a record of strata noticed in native wells sunk down at the time of my stay at the oil-fields.

No. 1.—Section in Messrs. Finlay, Fleming and Co.'s bore No. 1 at Kodaung,[1] No. 1 bore being 260 feet above the level of the Irrawaddy at low water (see Plate 1, No. 1): [2]

Thickness of strata in feet.		Total depth from the top.
	In descending order—	
5	1.—Grey stuff, soft, which grows harder and becomes yellow (evidently decomposed rock, forming the soil).	5
15	2.—Yellow stuff, which changes in red sand and clay, a little softer. (In the upper part soft, yellow sandstone, the same as met with at the end of No. 1, followed by a stratum of soft clayey red sandstone.)	20
10	3.—Red sand and clay, which changes to grey sand and clay. [The red sandstone is followed by strata of grey (better bluish-grey) colour consisting of alternate beds of soft sandstone and clay.]	30
20	4.—Grey sand and clay, very hard, oily smell. (The same strata as met with at the end of No. 3; a thin bed of harder sandstone has been noticed between 30 and 50 feet.)	50

[1] Kodaung = pigeon hill.

[2] I give the record of the strata as it was communicated to me by the Engineer in charge. Though correct on the whole, the record is highly unsatisfactory in detail. My own opinion about the strata is put within parentheses.

Thickness of strata in feet.		Total depth from the top.
50	5.—Grey sandy clay, partly hard. (The same remarks as under 4) . .	100
40	6.—Grey sandy clay, 2 feet of hard rock at 108 feet. (The strata are the same as before, that is to say, a frequent change of soft clayey and sandy beds, in which a band of hard sandstone is intercalated.)	140
42	7.—Grey sandy clay; 9 feet of hard rock at 150 feet. (The same as said under 6.)	142
33	8.—Grey sandy clay till 200 feet; it changes in grey clunch. (The same group of strata extends therefore to the depth of 200 feet, then by a sudden change the sandy beds disappear and are followed by a thick bed of bluish grey clunch.)	215
27	9.—Grey clunch; at the depth of 218 feet signs of oil; it changes at 220 feet in a green sand. (The clunch of No. 8 is in the upper part prevailing, but suddenly the strata change to a green sand. At 218 feet the first signs of oil are discovered. Apparently the real oil-bearing strata have now been tapped. The green colour is due to the oil with which the sand or soft sandstone is charged.)	242
38	10.—Fine sandy clay of greenish colour, changes to clay at 260 feet, 4 feet of hard white (?) rock and 1 foot more; at 270 feet oil becomes better as the well gets deeper. (These brief remarks contain a lot of information about the strata the bore is now standing in. Evidently there is the same sand or soft sandstone prevalent, but it is obvious that it frequently changes with thin beds of clay, the colour of which is not mentioned, but I have no doubt it is the same colour as that of the clunch No. 8, this is to say, rather a dark bluish grey. Besides the clay-beds occur beds of hard rock (sandstone?) of, I should prefer to say, bright greyish colour.)	280
14	11.—Green sandy shale; there still appears to be oil. (I cannot exactly understand the meaning of sandy shale. I suppose the sandstone gets more indurated, changing with laminæ of shale.)	294
6	12.—Uncertain, but very hard rock of sandy nature (evidently a bed of sandstone from the same kind as formerly has been met with (No. 10, &c.) has been found).	300
40	13.—Sandy rock of light green colour (the same soft sandstone charged with oil, but apparently this bed only contains a small quantity of oil).	340
25	4.—Light green sand, in thehigher strata oil, which remains now at a depth of 130 feet from the top. (Strata the same as before, but some are more richly charged with oil than others. The oil stands apparently under pressure so as to push it up to the depth of 130 feet from the top.)	365
25	15.—Gravelly formation, mixed with gravels, just a little gas. [This notice is highly vague as it is impossible to find out the meaning of "gravelly formation mixed with gravels." There might be a conglomerate (but of what kind?), a conglomeratic sandstone, or even a bed of gravel.]	390
15	16.—The same as before, sandy, of a light greenish colour. (The same as said before.)	405

It was not easy to classify these, sometimes rather indistinct notes, but I believe the following scheme will give a fairly good section of strata:—

Thickness of the single beds in feet.		Total depth from the top.
	In descending order—	
3—4	Decomposed rock forming the soil	3—4
12—14	Soft, yellow sandstone	16—18
11	Soft red sandstone, probably a thin stratum of light bluish clay is imbedded .	29

Thickness of the single beds in feet.		Ttoal depth from the top.
79	Soft sandstone of bluish grey colour, thinly laminated, numerous beds of clay, sandy clay and sandstone alternating; occasionally thin beds of hard sandstone. The strata are feebly soaked with oil, up to 50 feet from the top.	108
2	Hard grey sandstone	110
40	Bluish grey sandstone, of the same quality as before mentioned	150
9	Hard grey sandstone	159
41	Bluish grey sandstone, the same quality as before mentioned, but probably at its base the clayey beds grow thicker.	200
20	Blue stiff clay (clunch).	220
60	Fine soft sand of greenish colour, frequently alternating with thin beds of dark bluish clunch, a thicker bed of which has been found in an uncertain depth, the sandstone soaked with oil.	260
4	Hard grey sandstone	264
6	Soft sandstone of greenish colour soaked with oil	270
1	Hard grey sandstone	271
14	Rather hard sandstone of greenish colour alternating with beds of shale	294
6	Hard grey (?) sandstone	300
65	Soft sandstone of light greenish colour, in beds, unequally charged with oil	365
40	Conglomeratic (?) sandstone, or conglomerate of light greenish colour soaked with oil.	405

No. 2.—Section in the ravine between wells Nos. 5 and 118:—

In descending order—	Ft.	In.
(*a*) Soft sandstone of reddish colour in thick beds	10	0
(*b*) Soft light blue clay	2	0
(*c*) Soft sandstone coloured dark red	15	0
(*d*) Soft clayey sandstone of blue colour in beds of a few inches thickness, alternating with thin beds of dark red sandstone. The base is formed by a bed of hard red sandstone of 3 to 4 inches thickness	10	0
(*e*) Numerous thin beds of bluish-grey micaceous sandstone, alternating very regularly with thin beds of blue clay	8	0
(*f*) Hard grey sandstone	0	4
(*g*) Sandstone like (*c*), but less regularly bedded	15	0
(*h*) Hard grey sandstone	1	6
(*i*) Sandstone like (*g*)	15	0
TOTAL	75	10

No. 3.—Section in the eastern ravine:—

In descending order—	Ft.	In.
(*a*) Soft, light yellow coloured, a little clayish, sandstone in thin beds. Occasionally thin plates of gypsum are imbedded	15	0
(*b*) Soft dark red coloured sandstone	2	0
(*c*) Soft white sandstone in thick beds	13	0
(*d*) Soft light blue clay	8	0
(*e*) Soft dark red coloured sandstone	9	0

(*f*) Soft light blue clay	5	0
(*g*) Soft light yellowish coloured sandstone in thick beds	15	0
(*h*) Numerous thin beds of bluish-grey sandstone, alternating with thin beds of blue clay	24	0
(*i*) Hard grey sandstone	0	4
(*j*) Soft bluish grey sandstone like (*g*)	9	0
TOTAL	100	4

No. 4.—Well No. 75. The well is situated on the top of the hill, and had, at the time I examined it, just passed the depth of 160 feet. I was informed that at the depth of 160 feet a bed of a very hard rock gave a good deal of trouble in breaking. Large fragments of the said rock amongst the refuse proved to be a hard quartzitic sandstone of grey colour, which formed a bed of not less than 4 feet thickness. Below this bed a soft, rather coarse sandstone of a light greenish colour and a strong oily smell was found. Remaining several days under the influence of the sun the colour faded, clearly proving that it was solely due to the oil the sandstone was charged with. The sandstone then resulting was of light bluish-grey colour, consisting of rather coarse grains of milk or light blue coloured quartzite, mixed with grains of a black mineral the nature of which I could not ascertain. Small leaves of mica were not unfrequent. Breaking a larger lump, the centre still had the greenish colour, while the peripheral parts were of the colour just described.

No. 5.—Well No. 102. At the time I examined this well it had arrived at the depth of 151 feet. It was then standing in a coarse soft sandstone of greenish colour.

No. 6.—Well No. 150. The well had the depth of 265 feet and yielded 120 viss of oil a day. For some reason the owner started further digging, and the refuse brought out proved to be a dark blue clunch, which was superficially covered with oil, but did not contain oil itself.

No. 7.—Well No. 159. In depth of 183 feet, a soft green coloured sandstone was found, which alternated with thin layers of a dark blue coloured clay without oil.

No. 8.—Well No. 173. Notwithstanding the depth, 240 feet, this well yielded daily only 30 viss of oil. The strata at that depth consisted of rather a hard, thin-bedded sandstone of dark bluish-grey colour, alternating with thin layers of a blue clay. The refuse was superficially soaked with oil, but the interior proved to be without oil. It is obvious that the oil trickles out from a higher bed.

No. 9.—Well No. 174. After a careful inquiry the workmen stated that they met at 166 feet (100 attoung) depth with the hard grey sandstone, big lumps of which were among the refuse. When I visited this well it had reached the depth of 212 feet, the rock being a fine, thin-bedded sandstone of bluish-grey colour, sparsely alternating with beds of blue clay. The well yields a small quantity of oil which certainly does not ooze out from this bed.

No. 10.—Well No. 175. The well had reached the depth of 160 feet, and there a bed of a hard sandstone gave immense trouble to native workmen. To such an extent was this the case that work was several times given up, the men being unable to remove the obstacle without blasting. Above that bed the sandstone was softer and coarse, numerous imbedded quartzite pebbles rendering it somewhat conglomeratic while it was poorly soaked with oil.

No. 11.—Well No. 195. At 200 feet depth a soft, coarse sandstone of greenish colour.

No. 12.—Well No. 212. At 239 feet depth dark blue coloured stiff clunch; containing paper-thin layers of green sand imbedded.

No. 13.—Well No. 239. At a depth of 247 feet soft fine sandstone of green colour richly soaked with oil.

No. 14.—Well No. 242. The native workmen stated that at 117 feet depth they met with a hard grey sandstone; the well had now reached the depth of 150 feet. There the sandstone was soft, of light green colour, which after having been exposed for some time to the sun quickly changed into dark brown.

No. 15.—Well No. 266. It is stated that at 117 feet depth a bed of grey hard sandstone was found; the well is now at 130 feet; the strata consist of a soft, thin, laminated sandstone of bluish-grey colour alternating with thin beds of bluish-grey clay.

No. 16.—Well No. 278. The natives state that they met with two beds of hard grey sandstone, from which big lumps are amongst the refuse, at 133 and 183 feet depth. At present the well stands at 200 feet depth in soft green sandstone, poorly soaked with oil.

No. 17.—Well No. 298. The well had reached the depth of 156 feet; the strata consist of soft, coarse sandstone of light greenish colour in which a layer of 6-inch thickness of a fossil-bearing conglomerate is imbedded. The conglomerate consists of white and black quartzite pebbles, and rolled fragments of bones cemented by a soft clayish cement of greyish colour. Crystals of pyrites are frequent.

This conglomerate is highly interesting from the numerous fossils it contains. Unfortunately the larger specimens are all broken or deformed by the rolling, but smaller specimens are well preserved. I collected—

(1) a fragment of shinbone of a huge animal (*Elephas ?*).
(2) a well-preserved tooth of a big carnivore.
(3) a tooth of a herbivorous animal (*Cervus ?*)
(4) *Crocodilus sp.*, several teeth.
(5) *Turtle bones.*
(6) *Carcharias sp.*, many teeth.
(7) *Odontaspis sp.*, many teeth.
(8) *Myliobatis sp.*, teeth.
(9) *Teleostii gen. et sp. div.*, many fragments.
(10) *Gastropoda gen. div.*
(11) *Pecten sp.*
(12) *Arca sp.*
(13) *Cardium sp.*
(14) *Venus sp.*
(15) *Teredo sp.*
(16) *Corallium gen. div.*
(17) fossil wood frequently changed into coal.

No. 18.—Well No. 321. The well, which has now the depth of 253 feet, stands in coarse soft sandstone of green colour, fairly soaked with oil. According to native

statements, the beds of hard grey sandstone were met with at 100, 117, and 166 feet depth.

No. 19.—Well No. 328. At the depth of 225 feet a bed of blue stiff clunch containing thin layers of green sandstone. The strata above this bed consist of light green coloured, soft sandstone.

No. 20.—Beme Well No. 38. The well, which is only a few feet above the bottom of the ravine, had arrived at the depth of 145 feet; the strata consisted of a blue stiff clunch in which occasionally thin beds of green sandstone were imbedded.

I must add that in this record I only put down statements on strata actually brought out from the well at the time of my presence and examined by myself. I might have guessed about the strata formerly found from the nature of the refuse around the well, but being more or less speculative, I preferred to omit this part in the record as well as in the sketch. In special cases only, when after thorough inquiry I might feel convinced that at a certain depth a certain bed had been found, I put down a note of it in both record and table.

With the view of giving a more conspicuous summary of the details here mentioned I have compiled them on the annexed plate. In designing it I had of course the difference in the level of the wells to take into consideration, but being practically very small (all the wells here mentioned are situated on the top of the hill), I considered no harm would be done in neglecting it and in drawing the section of the wells, as being all on the same level. Besides, I should hardly have been able to state the exact difference in the level of the wells as I had only a small barometer for levelling, which, well adjusted as it otherwise proved to be, hardly admitted of noting differences in levels of less than 10 feet.

Although my observations have been few, still, when viewed together, they are sufficient to warrant certain conclusions being drawn relative to the series of superincumbent strata and oil-bearing beds. The record of strata so obtained might be considered in its details correct from 0 to 100 feet depth, fairly correct up to 220—225 feet, and doubtful in details, but correct as a whole in greater depths according to the better information I was able to gather.

Groups into which the tertiary strata may be divided.

In descending order we can distinguish four groups of strata:—

(*a*) *The upper group.*—Consisting chiefly of sandstones of brown and yellow colour followed by similar beds of dark red and yellowish white colour. The sandstones are soft, deposited in thin beds in the upper, in thick beds in the lower parts of the group. Gypsum in thin plates is not scarce in the upper brown sandstones; fossil wood in doubtful, highly decomposed logs in the lower sandstones. Interstratified are beds of light blue soft clay varying very much in thickness. The thickness of the whole of this group is about 20—30 feet in the centre of the field, but it rapidly increases in both directions towards west and east, for reasons which will be explained later on in section 5.

(*b*) *The second group.*—Consisting chiefly of bluish-grey sandstones and

clays alternating in innumerable beds very regularly in the upper less regularly in the lower parts. At the depths of 80 and 125 feet from the top (120 and 160 feet from the surface) occur beds of hard grey sandstone of sometimes more than 4 feet thickness. Concretions of hard nodules of sandstone in irregular layers are sometimes to be found as well as occasionally small fragments, and even small seams of coal, besides a small number of interesting fossils, being a mixture of terrestrial and marine animals of late tertiary age. The thickness of this group might be considered of not less than 170 feet. The lower part of this group is fairly soaked with oil which actually oozes out from the strata at numerous places in the ravines. Notwithstanding the rather considerable amount of oil with which the lower part is soaked, this group cannot be considered as the oil-bearing formation proper as is proved by the wells of less than 200 feet in depth, which never yield large quantities of oil. The strata were, apparently enough, originally not charged with oil. The oil they contain originated from deeper strata and rising by cracks gradually charged the soft sandstones. At the various outcrops of this group the oil may be seen leaking through to the surface, a circumstance which accounts for the original wells sunk by the natives.

(*c*) *The third group.*—Consists of a stiff clunch of dark blue colour, having imbedded in its lower part irregular thin beds of green sandstone. Thickness 20—25 feet.

The "blue clunch," as we may call this group, forms an extremely regular bed amongst the various strata composing the tertiary strata of Twingoung. There is not a single well in the two fields deeper than 200 feet which had not to break through this bed before reaching the oil-bearing strata proper. The blue clunch forms the boundary bed between the upper strata and the oil-bearing sandstone of which it forms a hermetical covering, thus preventing the oil from escaping. The blue clunch wherever it is found may be regarded as the first sign of the presence of the oil-bearing strata, which will be met with immediately underneath. Of course the depth in which the blue clunch might be found elsewhere depends upon local conditions, but within the limits of the Twingoung and Beme oil-fields it may be said that it will be generally found at *an average depth of 200 feet when the well is on the top of the hill and of 100 feet when in the ravine.*

d) *The fourth group, or oil-bearing sandstone*—The strata composing this group do not differ in any way from the constituents of the (*b*) group. They are more or less soft, coarse or fine micaceous sandstones, of bluish-grey colour, which is of course invariably changed into a more or less yellowish-green, according to the amount of oil the sandstone is saturated with. There are beds of hard sandstone and besides layers of greater or smaller thickness of blue clunch. In short, petrographically speaking, the (*d*) group is exactly the same as the (*b*) group, and these two, together with

the (*c*) group, belong to one geological system of strata; it is only from practical considerations that I have subdivided them. Unfortunately nearly all and everything is lacking on which to form a judgment regarding the constitution of this important complex of strata. The scanty data I was able to collect are by no means sufficient for the purpose. It is very likely that in the upper parts the (*d*) group forms a complex of beds of sandstone varying exceedingly in thickness, probably as well in vertical as in horizontal direction, which are separated by layers of blue clunch impenetrable to oil.

If I interpret in a correct way the data yielded by No. 1 bore of Messrs. Finlay, Fleming and Co., the separating clay beds thin out as the depth increases where the beds of sandstone grow thicker. The eminent importance of such a condition, if correct, will immediately be seen. Provided that the data above referred to are correct, it seems that from 300 up to the depth of 366 feet there is a bed of sandstone uninterrupted by any other beds, either clay or hard sandstone.

It further seems that from the depth of 366 feet downwards series of conglomerates or conglomeratic sandstones begin. Unfortunately I have not seen any samples of these strata, which the Managing Engineer called "gravelly formation," so I am only able to interpret his notes as a kind of conglomerate. But whether these strata are separated by beds of another constitution or whether they form an uninterrupted complex of coarse conglomerates I am not able to say.

This group is so far known to have a thickness of not less than 180—185 feet,[1] but I have no doubt that the thickness is a considerably larger one.

4. *Occurrence and origin of the oil.*—(*a*) *Occurrence of the oil.*—The (*d*) group is especially distinguished in containing a large amount of oil, and it must be considered as the oil-bearing strata proper. The oil is only to be found in soft *sandy* beds more or less richly soaked with oil, from which it slowly exfiltrates into the well or bore sunk in these beds. From the geological constitution of the strata I doubt the existence of natural reservoirs filled with oil and I never noticed the clayey beds or hard sandstones charged with oil. Therefore we have to consider the soft sandstones to be the valuable beds and accordingly to deduct from the total thickness the thickness of numerous beds of clay and hard sandstone in estimating the total thickness of the valuable oil-bearing sandstone.

(*b*) *Total thickness of the oil-bearing sandstone.*—I should think the total thickness of the useless strata is not exaggerated by estimating it at 50 feet; the present known thickness of the oil-bearing sandstone would therefore be not less than 130—135 feet. But there is more than one reason to believe that the oil is not equally diffused throughout the sandstone, that is to say, that the different beds are equally soaked with oil. On the contrary, there are several proofs that two beds of sandstone at different levels differ highly in the quantity of oil they

Difference in the production of wells of same and different depth and explanation.

[1] There is some uncertainty about the depth of bore No. 1 from which I got these data. The Engineer in charge told me at first the bore had reached the depth of 425 feet; afterwards he restricted his statements to 400—405 feet depth. According to measurements lately takes the bore has only the depth of 392 feet.

contain (see Section 3), and it is not necessary that a certain lower bed should be more richly charged with oil than an upper one. Not only do beds, different in level, differ in quantity of oil, but we also notice that wells of exactly the same depth and closely situated to each other differ highly in the production; in other words, that if at one place at a certain depth the sandstone is rich in oil, at another place close by at the same depth hardly any oil is found. The best instance are wells No. 253 and No. 244, which are only a few feet distant from each other, and yet well No. 244, which is even deeper than No. 253, yields only 50 viss per diem, while No. 253 yields 450 viss a day.

One should certainly think that the deeper well ought to have struck the beds rich in oil in sinking down, but it did not. How is this matter to be explained which puzzled everybody acquainted with the oil-fields?

There is only one solution of the problem. I stated above that in the upper parts of the (*d*) group a frequent change of beds of clay and sandstone must be supposed, and from samples I have seen it may be expected that the change is rather an irregular one; the same bed may rapidly swell at one place and likewise thin way, even perfectly die out, at another one close by. Two formerly thin beds may unite into a thick one by the disappearing of the separating medium, or a bed of clay may suddenly divide for a short distance, enclosing between the two branches a lenticular mass of sandstone which may be richly soaked with oil, while the sandstone above and below the clay is only poorly charged with oil. In Fig. 1 of plate, (*A*) well will by accident as it were strike the spot where the rich bed is enclosed, and will therefore yield a large quantity of oil, while (*B*) well, which is close by, only meets with poor sandstone. (*B*) well may be sunk to any depth, but it will never meet with the same beds supplying (*A*) well so extensively with oil.

As nearly all the native wells work the upper part of the (*d*) group, where geological conditions as described are prevalent, the large difference in production of wells of the same depth, and the fact that a well producing more oil than another one is less deep than the latter, is now easily explained.

It is obvious that under these circumstances no opinion can be formed as to the depth at which the richest beds are to be found. In fact none but the vaguest speculations could be formed. All we know at present is that the separating useless beds of clay diminish in number with the depth, so that the thickness of the valuable sandstone beds increases; but even this statement requires further confirmation. A bore of 400 feet in depth has accordingly more chance of reaching productive beds, promising a fair supply for years, than a bore of 250 feet, which might or might not instantaneously yield a great quantity of oil, but the duration of which could not be counted on because the deeper bore certainly drains the larger volume of sandstone.

Difficulty in stating the depth where the richest strata may be found.

In Section 3 I have stated that, according to the data of No. 1 bore, the top of the (*d*) group has been met with at a depth of 220 feet, the mouth of the shaft being 260 feet above the level of the Irrawaddy at low water. The top of the (*d*) group is therefore 40 feet above the level of the Irrawaddy and not more than 120 feet below the bottom

Reasons why no high pressure of gas can be expected.

of the ravine north of Kodaung. Conditions being nearly the same all over Twingoung and Beme oil-fields, as will be seen in Section 5, the highly important fact results that *the oil-bearing strata are extremely near to the surface*, and that in consequence no *high pressure of gas might be expected anywhere over the said area.* It will easily be understood that even if the oil-bearing strata were under high pressure elsewhere at a place where they are so near the surface, the pressure must rapidly decrease, owing to the intense escape of gas through cracks in the strata.

A small pressure yet existing.

There is still a small pressure proved by the experience of No. I bore at Kodaung. The oil there is said to have been pushed up to the depth of 130 feet from the surface; the top of the oil-bearing sandstone being 220 feet from the surface; the pressure is therefore high enough to push up the level of the oil through a height of 90 feet, supposing the oil to ooze out from the uppermost strata. This likely enough is not the case, but the oil originates, on the contrary, from deeper strata, and hence the pressure may be considered to be stronger than one sufficient only to push up the oil 90 feet above its level. The prospects for a high pressure at places where the oil-bearing strata are not so superficially situated, are therefore not so bad. Even flowing wells might be expected in places where the oil-bearing strata are of insufficient depth to prevent too extensive an escape of gas.

Origin of the oil.

I have no doubt that the oil-bearing sandstone is the oil-producing formation too, if not in its upper parts. I admit it is difficult to prove this statement at present owing to the very incomplete knowledge we have about the oil-bearing sandstone itself. But I may quote some facts. Samples of sandstone from greater depths are so richly soaked with oil that it is difficult to understand how the oil originating from lower strata was able to penetrate upper strata in such considerable amount and to soak them so intensely. Far more important, as supporting this theory, is the frequent occurrence of lumps of coal in the oil-bearing sandstone. I venture to think that by some chemical process, the nature of which is unknown, whether we call it dry distillation or decomposition, seams of coal formerly and partly still existing were changed into oil. Bores of greater depth are certain to give further and more exact information about this matter.

Physical and chemical qualities of the oil.

To examine the oil as regards both its physical and chemical qualities a well-assorted laboratory and special instruments are required, as examinations of this kind cannot be done in the field. I had to drop the matter, which is but of little importance, as a sufficient supply of samples for such an examination is easily to be got at any time and can be examined everywhere.

5. *Stratigraphical part.*—The study of the architecture of strata forming a certain tract is the foundation of every speculation based on it. From the facts we notice on the surface we may guess the features of the country underneath, for ever concealed to our eye, and, based on careful observations, conclusions so drawn may be very correct. The features of the country in the Yenangyaung district are extremely simple. In marching from the river towards the east on the road to Twingoung and from there to the Pin creek, we notice the following conditions of dip

and strike, of which the most important observations are shown in the subjoined table :—

No.	Locality.	Dipping.	Striking.
1	Bank of the Irrawaddy at Yenangyaung	35° S. W.	N. 40° E.
2	Road between Yenangyaung and Kodaung (foot path) .	32° S. W.	N. 40° E.
3	Near Enausu	18° S. W.	N. 40° E.
4	East of Twingoung	13° N. E.	N. 40° E.
5	Near Myausu[1]	27° N. E.	N. 40° E.
6	Pin creek, near Naka-u	34° N. E.	N. 30° E.

I only mention the principal localities; the great number of intermediate places where I observed the two constituents of geological architecture are of no interest as they yield exactly the same data.

From the above-mentioned principal data we see that, by moving in a straight line from the Irrawaddy eastwards, the dipping of the strata suddenly turns from south-west to north-east; we notice at the same time that in leaving the river the angle of dipping gradually decreases, and with the reversion of the dipping gradually increases until it has reached its former amount near the Pin creek.

I designed on Plate 1 a section illustrating this architecture of the country; the heights had of course to be exaggerated at the scale of 1 : 6·6.

Anticline formed by the strata.

The strata form therefore an anticline, on the centre or top of which the oil-fields of Beme and Twingoung are situated. The axis of the anticline agrees with the striking, *i.e.*, No. 40° E. The centre of the anticline is situated between the villages of Twingoung and Enausu, and owing to the special structure of the anticline, the strata are here horizontal, or nearly horizontal, as may be seen in the ravine north of Kodaung. Leaving the centre the strata gradually begin to dip to either side. In the beginning the angle of dipping is only small; we notice angles of 5—8° in the ravine north of Kodaung, but dipping quickly increases. We already notice angles of 27° and 32° in the ravines bordering the oil-field; the angle increases later on only at a small rate up to 34° and 35°.

It is the characteristic feature of the anticline that in its centre, strata which are elsewhere far below, are brought near to the surface. At the same time we find in its centre the oldest strata, and removing from it in either direction are constantly meeting with younger strata, being exactly the same on both sides of the anticline. For instance, we meet at the banks of the Pin creek again with the same soft sands abounding in numberless concretionary masses of sandy limestone as we noticed on the bank of the Irrawaddy.

The special architecture of the country will now easily explain why just on that very spot the oil industry has developed. The mechanical action which produced the anticline resulted in bringing those strata extremely near to the surface, which would else be far down below the surface at the spot where we notice them now. By the action of the surface-water deep ravines were eaten in, which considerably

[1] Myausu = southern village.

reduced the distance from the surface to the oil-bearing strata, allowing the oil now to ooze out from the strata at many spots in the ravines where cracks or fissures afford it an easy road.

Shape of the oil-fields depends on the geological structure of the strata.

The same architecture of the country will also explain the quaint oblong shape of the oil district. The map shows that the oil district considered in the whole, as well as in single parts, forms an oblong with two very long and two very short sides. How is this shape, which is certainly not accidental, to be explained? The study of the architecture of the country will answer this question. I must mention beforehand that the Burmans are not able to dig wells of a greater depth than 310 feet. The section on the plate shows however that, in consequence of the dipping on each side, the oil-bearing strata at but a short distance from the centre of the anticline are far beyond the reach of Burmese art. Consequently the Burmans moved, one would almost say instinctively, on the top of the anticline, digging wells on each side as far as the dipping of the strata allowed them to do so.

The axis of the oil district Twingoung-Beme agrees therefore, or nearly agrees, with the axis of the anticline and the strike, and its longitudinal boundaries were dependent on the dipping of the strata.

I fail to understand why the Burmans never tried to sink wells on the area between the Twingoung and Beme oil-field, and why they never tried to extend the oil-fields further north or south. I suppose it is a good deal due to the tradition which taught them that if they dug a well within the boundaries of the before said oil-fields they would get oil, while elsewhere no oil was to be got. Probably the failures of wells sunk at many places, as, for instance, the old wells east of the Twingoung oil-field, confirmed their belief. So I was told that the Burmans foresaw an absolute failure of the bores at Kodaung and subsequently were highly astonished when they learnt that the bore yielded oil. On the other hand, there is certainly a good deal of superstition which prevents them from digging wells at certain places. When I pointed out a place south of the oil-fields of Beme to a Burman, and asked him why people did not sink wells on that spot, he had any amount of subterfuges explaining why it was impossible to dig a well, at this place, which he admitted to be a good one. Several men had already tried there to dig wells, but nobody had succeeded in doing so. But evidently he concealed the true reason of the dislike of digging a well at this place, and so I am inclined to believe that some superstition was the true reason preventing people from digging.

Depth of the oil-bearing strata some distance from the oil-fields.

The theory I have thus arrived at regarding the geological structure of the country gives the means of answering the highly important question as to where we shall meet with the oil-bearing strata—

(*a*) in $\frac{1}{2}$ mile, or 1 mile, distance or any other distance in an eastern or western direction;

(*b*) in $\frac{1}{2}$ mile, or 1 mile, or any other distance in a northern or southern direction;

from the line I fixed as axis of the anticline.

In answering question (*a*) we have to keep in mind that in moving in a line perpendicular to the axis of the anticline, *i.e.*, in the direction of the dipping, the vertical

depth from the surface of a certain stratum or bed in a given horizontal distance from a starting point is only dependent on the angle of dipping. In Section 5 I stated that the angle of dipping gradually increases with the distance from the centre up to 34° and 35° at the banks of the Pin creek or Irrawaddy. Taking 35° as basis of the calculation, the top of the (*b*) group would be found—

	Ft.
At ½ mile distance from the centre in	1,890
At 1 mile distance from the centre in	3,750

The top of the (*d*) group would be found—

At ½ mile distance from the centre in	2,080
At 1 mile distance from the centre in	3,940

The centre of the anticline being not a mathematical line, a certain allowance must of course be admitted as to the real and the supposed centre; a range of four chains might be considered a fair one. The probable mistake in the vertical distance might therefore be estimated 3·5 per cent. of the horizontal distance at 1 mile, 7 per cent. of the horizontal distance at ½ mile.

As bores of 3,000 feet afford under normal conditions no especial difficulties, a bore sunk at a distance of ½ mile from the centre could still drain 800—900 feet of the oil-bearing strata in a vertical direction. At a distance of 1 mile the difficulties would be considerably greater as regards the oil-bearing strata, which would not be reached under 4,000 feet deep.

Question (*c*) is easy to answer if one considers that the N.-S. direction nearly corresponds to the strike of the strata; therefore, in moving from the oil-fields in that direction, the depth in which the oil-bearing strata are to be found will be everywhere the same as it is at Twingoung and Beme as far as the tertiary strata extend in either direction.

II.—The Oil-field of Twingoung.

6. *Area of the Twingoung oil-field.*—The area on which between the villages of Twingoung and Enausu[1] the oil-wells are situated forms an oblong the length of which is nearly three times its breadth, being 50 chains and 15—20 chains respectively. Narrow deep nullas with steep slopes form the boundary lines. The S.E. side forms part of a ravine, which continuing westwards reaches the Irrawaddy north of the police station of Yenangyang; the opposite N. W. side is formed by a ravine, the continuation of which I did not examine. The S. W. side is formed by two ravines, which beginning near Enausu on the top of the plateau run in opposite directions towards S. S. E. and N. N. W., eventually joining the north and south ravine respectively. We notice the same conditions on the eastern side formed by two ravines, which, commencing close together at a point east of the village of Twingoung, carry the water away thence in opposite directions. As I have already mentioned in Section 1, this main ravine is notched and scored by smaller ones.

The superficial area of the Twingoung oil-field within the limits just described is some 90 acres. In this area are situated the whole of the productive oil-wells of

[1] Enausu = western village.

the Twingoung district. There are on the eastern and western sides a small number of wells, outside these limits, but not a single one is productive.

The western group consists of not more than four wells, Nos. 92 to 95, of which three have fallen into disuse; only No. 95 shows any signs of being worked, but I am sure that it does not happen very often.

The eastern group, situated on both the slopes of a ravine east from Twingoung, contains only ruined wells. I could not get any information whether these wells ever yielded oil, or whether they were given up as fruitless experiments in early stages of the digging. However, some of them are of a considerable depth. Being therefore quite unimportant, these two groups of wells may remain out of consideration. They only are of use as demonstrating the architecture of the country, as pointed out in Section 5. The oil-bearing strata at these two places are at such a depth that they are beyond the reach of Burmese digging.

The oil-fields of Twingoung afford a highly interesting and characteristic view. On every side a feverish unceasing industry is apparent, unaffected either by the scorching rays of the mid-day sun or the blackness of night. Devoid, however, of all system or method, the bountiful soil is robbed of its riches in an aimless fitful manner, without thought for the future, or with any object beyond the rapid achievement of a momentary success.

Characteristics of the oil-fields.

Here we notice a well just stopped in the very commencement of digging years ago; there an old well, probably disused for years, undergoing resuscitation. Why? I am sure even the man who works it does not know it himself. Very likely the well yielded in former times a large quantity of oil and he hopes now to tap again the rich vein which grants him a high rent without much trouble. Here we see a black soil so richly soaked with oil that it stands in small pools, while the worn-out cylinder of the cross-beam proves that the well is worked at high pressure and yields probably a fair quantity of oil, while close to it the rotten cross-beam, partly eaten by the ants, and the broken walls, show us the inevitable end; the walls of the well quietly slide down until a funnel-shaped hole results, partly hidden by quickly-growiug plants, and constituting a serious peril to the stranger. Here a well which slacked in the production is cleaned and deepened, and there a new well is busily starting; everywhere work, but unreasonable, either overhasty or neglected work! The oil-wells are a striking instance of the Burman's love for gambling. He knows he will find oil at that place; his friend probably owns a well which yields 300 viss a day. Why should he not harvest the same crop? And so he starts digging as close as possible to his friend's well; but his work proves to be a failure, or his money runs short: at any rate the well is given up and quickly breaks down; if not, another one takes up the work with probably a better success.

7. *Number of the wells. Productive and unproductive wells.*—In making an exact record of the wells I had at first to design a map of the oil district and to put down on it the wells. Having no other instruments for this purpose but a prismatic compass, and having to depend on pacing for the distances, my map cannot be expected to be absolutely correct. But it is more than sufficient to illustrate this report, and having put down the features of the country as correctly as possible, it will not be difficult to identify any well.

With regard to the record I had to number the wells, and I considered a separate numbering of each oil-field preferable to a continuous numbering of the two fields.

In the Twingoung field I began with the wells of the southern ravine, and continuing westwards along the slope to the northern end of the western boundary I turned then back in a southern direction across the plateau, and on arrival at the southern ravine I again turned eastwards and followed the slope of the eastern ravine across the plateau near Twingoung, keeping as much as possible to the course of the ravine, finishing up near the village of Enausu.

In the Beme field numbering commenced at its northern corner and running thence along the slopes of the hill finished on the southern slope of the hill facing the Minling creek.

There exists an older numbering and which, if it could have been accepted, would have simplified matters, but such evident confusion existed in these numbers in addition to some being wanting that to do so was impossible. However, I always put down in the record the older numbers where I could ascertain them, and I am at least able to trace the course of the older numbers. Numbering commenced at the north-western corner of the Twingoung field on the slope and ran straight to the Beme field, including in one continual rotation the wells of the two fields. The general course of it will be seen from the table appended to the record, with the help of which it is easy enough to identify the older numbers corresponding to mine. There are unfortunately enough many gaps in the wheels, with which the wells were worked, of the labels bearing their former numbers and confusion often occurs, two wheels bearing the same number.

I was not able to ascertain the time when the wells were thus numbered. Some of the natives told me that it was done under the Burmese Government, others stated that it was done immediately after the annexation. However, the wooden labels on which the numbers are marked are so rotten in many cases that I should incline to the opinion that the numbering must have been done previously to 1886.

The total number of wells in the oil-fields of Twingoung amounts to 375. According to the older numbering there were 396 wells; at least No. 396 was the highest amongst the old numbers. The older and the more recent counting of the wells therefore agree very well, as the small difference of 21 wells is of no importance. I venture to think that my counting is the exacter of the two, as three repeated countings gave always the same result, and so I shall consider 375 as the real total number of wells in April 1888. And even if I should have actually overlooked some wells, they were certainly not productive wells, but old, disused ones, hidden by the vegetation. In any case the number accepted, whether it be 375 or 396, does not mean only "productive wells." It contains wells of all kinds, new and old ones, wells where digging is still going on, and wells where it has been stopped years ago.

Unproductive wells.

Amongst the 375 wells there are 166 (44·3 per cent.) which are utterly unproductive (U. P. W.); the greater portion have fallen in and will never be repaired; those in which digging had ceased at early stages of their existence are but few in number. Work might be again taken up later on, but at present they must rank amongst the unproductive.

Productive wells.

The remainder, 209 (55·7 per cent.), we may call productive wells, but we have again to distinguish between wells from which oil is regularly drawn up and those from which it is only occasionally drawn. In those belonging to the latter category two causes may be at work, namely, either they are old and nearly exhausted, or they are new wells in which the work of digging is not yet completed, from which oil is only drawn when a small quantity has collected during a few days' cessation of work. Of the first class, *productive wells* (P. W.), there are 120 (32·0 per cent. of the total number); of the second class *scarcely productive wells* (S. P. W.), there are 89 (23·7 per cent. of the total number). Of the total of productive wells the P. W. would be 57·4 per cent., the S. P. W. 42·5 per cent. There could not be better illustrations of the meagre proportion of the Burmese oil industry than these few data. Of a total number of 375 existing, only 32 per cent., that is to say, hardly a third, supply the oil trade.

8. *Depth of the wells.*—I considered it as one of the most important parts of my work to ascertain the depth of the wells, because several essential questions, as, for instance, whether the quantity of oil increases with the depth, might so be answered. I therefore carefully measured the depth of all wells as far as they were accessible. Wells the depth of which was not measured, as will be seen from column 4 of the record, were only old, disused wells, to measure the depth of which was of no sort of use. Besides my own measurements I inquired the depth of each well according to native statements (column 5 of the record). Comparing the two data I was able to judge of the trustworthiness of native statements. The difference between the two data I put down in column 6 of the record, and marked it with + if the native statement was larger than my own measuring, with — if smaller. Mostly both measurements agreed fairly, but in single cases I had to notice a large difference. In such cases I ascertained the depth by repeated measurements; my results may therefore be taken as reliable. The incorrectness of the native statements was certainly due in most cases to the ignorance of the labourers, who always considered an incorrect statement preferable to none at all.

The greatest depth reached by a Burmese well is 310 feet (No. 129), the next is No. 135 with 305 feet, but none of the others reach depths of more than 300 feet.

I measured the depth of 236 wells, that is to say, of all the productive wells, besides a small number of unproductive ones, and these I have divided into five classes according to their depth:—

Table No. 2.

Well.	Class.	Total number.	B. W.	S. P. W.	U. P. W.
Wells up to 150 feet depth . .	V	26	3	11	12
Wells up to 200 feet depth . .	IV	66	28	27	11
Wells up to 250 feet depth . .	III	111	66	41	4
Wells up to 300 feet depth . .	II	30	20	10	...
Wells of more than 300 feet depth .	I	3	...	...	...

In the above table the first and second columns show the class of depth; the 3rd the total number of wells in each class; the 4th, the number of productive; the

5th, that of scarcely productive; and the 6th, that of unproductive wells in each class.

The table is highly instructive in several respects. It shows that the total number of wells increases from the V to the III class, where the maximum is reached, and then in the II and I classes rapidly decreases. The bulk of the wells of the V class digging is not yet completed; they have not yet reached the oil-bearing strata, so they can hardly be expected to be productive, a supposition which is proved by the next three columns; but in a short time, as soon as the work of digging is finished, a good number of these wells will rank amongst the productive ones. The wells of the IV class have, with the exception of a few wells which were sunk in the ravines, not reached the oil-bearing sandstone; they only drain the lower parts of the (*c*) group. The greatest number of wells belongs to the III class; the wells stand in the upper part of the (*d*) group, but they hardly drain more than 30 feet of it. We notice in the II class not more than 30 wells, a rapid decrease after the 111 wells in the III class and still more rapid decrease in the I class.

There could hardly be a better illustration to prove the unreasonable style of Burmese working. Beyond 250 feet the difficulties of digging increased so greatly that they could hardly be vanquished. Only 33 wells out of a total of 209 wells could be sunk beyond that limit.

I pointed out in Section 3 that the (*d*) group, the oil-bearing sandstone, is known to have a thickness of at least 200 feet; therefore those wells which we have to consider as being the main oil-producers do not drain more than 30 feet of the upper and worst part of the oil-bearing sandstone, and only 33 wells drain the oil-bearing sandstone up to about 80 feet. To work to a greater depth is impossible for the Burmese style of working. Therefore all over the place where the Burmese wells are situated nearly 100 feet of oil-bearing sandstone remain untouched and its wealth of oil measuring millions of viss unraised.

9. *Production of oil.*—As the data given by former examiners relative to the production of oil differ considerably from one another, I paid special attention to this part of my work by collecting as many authentic data about it as possible. I tried to find out the total daily production of oil by inquiring of the owners or labourers working the wells, the daily yield of each well and summing up the data thus obtained.

Difficulty in getting exact data.

But matters proved more difficult than I expected for the following reasons:—

(1) The production, not being a regular one at present, depends on the demand. Hence it happens that for days the production of oil is nearly stopped. At another time, if there is demand for oil, the hardest working goes on. Keeping in mind what I pointed out in Section 4, it is therefore quite intelligible that after three days' rest, the production of the fourth day is higher than the daily average if worked for four consecutive days. Therefore the data regarding the daily production must be expected to differ, especially as there does not exist a written record about the production of a single well.

(2) It is highly difficult, if not impossible, to control data given by the natives, provided even that they do their best to tell the truth.

But for reasons easily intelligible a native will state the daily production of his well rather too low than too high.

Accordingly, my statements about the daily production of oil must be read in the light of the above-mentioned facts, and by summing up the single data, the total production at least may be expected to be lower than it is in fact.

I succeeded in getting data about the production of 144 wells, but the total number of productive wells being 209, those regarding 65 wells are wanting. This last fact will not however, in my opinion, affect in any sensible degree the general results obtained, as the bulk of these wells belong to that class from which oil is only drawn at greater or less intervals.

Productive and scarcely productive wells.

I divided in Section 7 the productive wells into two classes, namely,—

(*a*) wells yielding less than 20 viss per diem = S. P. W. = scarcely productive wells ;

(*b*) wells yielding from 20 viss upwards der diem = P. W. = productive wells.

Wells belonging to class (*a*) I do not consider as exercising any essential influence on the total daily production. Most of them prove by their rotten condition that they are not regularly worked, but that oil is occasionally drawn up only on account of the existence of the well. They are hardly worked oftener than once a month, some of them even only every two months, and, calculated per diem, the production would hardly reach the amount of 10 viss. I need not mention that any data collected regarding these wells cannot but be more or less unreliable.

There are 89 wells of this class, but I only succeeded in getting data regarding 26 of them ; of the remainder 63 wells, I was unable to obtain any information. Of course the S. P. wells are to be found at all depths (Table No. 2, Section 8). The bulk of them might be considered as exhausted wells, *i.e.*, wells that have exhausted the possible draining area at a certain depth. Only very few belong to that class which in the process of digging have not reached the oil-bearing sandstone, but which daily yield a small quantity of oil.

The 26 wells have a daily total production of 206 viss, the daily average therefore being hardly 8 viss. Admitted the daily average per well being 10 viss, that is, about one of the small pots in use, the total production of the S. P. wells [class (*a*)] would therefore be 890 viss, say 1,000 viss.

Total production.

Of class (*b*), there are 120 wells which yield according to my enquiries 10,384 viss per diem, that is, a daily average of 86·5 viss per well. The daily total, therefore, would amount to 11,274 viss, say 12,000 viss, which we might consider as the present minimum daily production, as according to information otherwise obtained, the average daily total production amounts to 15,000 viss, recently even to 17,000 viss.

Daily average.

Taking the other two data as bases of the calculation, the daily average of the P. wells [class (*b*)] after deducting 1,000 viss for the S. P. wells [class (*a*)] would be—

	Viss.
(1) At the rate of 15,000 viss = ...	117
(2) At the rate of 17,000 viss = ...	133

We therefore might estimate the average daily yielding of a well [class(b)] at not less than 87 viss, but more probably as between 117 and 133 viss, estimations which will be fairly correct.

Taking the wells as a whole, *i.e.*, 209, the average yield per well per diem would be—

	Viss.
(1) At the rate of 12,000 viss =	57·4
(2) At the rate of 15,000 viss =	71·7
(3) At the rate of 17,000 viss =	81·3

The lowering influence of the S. P. wells is evident when compared with the data before mentioned, and it would be a great mistake to take these wells, which are hardly of any importance as regards the production of oil, into consideration. It further results that Oldham, in estimating the number of wells as correctly as possible, so far overestimated their average yield as to place it two or three times higher than it is in fact.

Relation between depth and quantity of oil.

In Section 8 I classified the wells in five classes according to depth. It is a matter of the highest importance to know whether there is any relation between quantity of production and depth. It will, therefore, be necessary to arrange the wells according to their depth, and to take the average production of each class as it is shown in the appended table :—

Table No. 3.

Depth.	Class.	Number of wells of each class.	Total daily production in viss.	Daily average per well in viss.
0—150 feet	V	3	80	26
150—200 feet	IV	28	1,857	66
200—250 feet	III	66	5,802	88
250—300 feet	II	20	2,290	115
300 feet and more	I	3	365	121

It is obvious that the lower strata of the oil-bearing formation produce more oil than the upper ones, a fact which the geological consideration that I adduced in Section 4 might have led us to expect. Of course it must be borne in mind that this rule does not mean that well (*a*), for instance, which is deeper than well (*b*), but less than well (*c*), must consequently yield more oil than well (*b*) and less than well (*c*). Such a conclusion would be quite wrong, as very likely exactly the contrary might occur as will be seen from the record in many instances. These average rates *only prove the fact that at a greater depth the strata as a whole are richer in oil;* therefore the same number of wells of say 250 feet depth will produce more oil than the same number of wells of only 200 feet depth. The truth of this rule, that the production is in direct proportion to the depth, is a fact of considerable importance in its bearing on the further development of the oil industry of the Twingoung oil-fields. Unfortunately the total absence of the necessary data precludes its being tested for depths greater than 300 feet.

The table above shows that the increase in the yield of oil between depths of 150 and 200 feet is rapid, amounting to 154 per cent. The next 50 feet show an increase of 33·3 per cent., the next 50 feet 30·6 per cent., and greater depths only 6 per cent.

The conclusion therefore might not be utterly wrong, that further increase of oil with that of depth might be expected, but assuredly at a lower rate than in the upper parts of the strata.

The highest daily production of a single well was 500 viss (well No. 253).

Rich and poor wells.

There being no greater production at present, we can again divide them into three classes according to the daily yield of the wells:—

Table No. 4.

(I) Poor wells, yielding less than 20 viss per day	89
(II) Fairly rich wells—	
(*a*) from 20 to 100 viss = 74	
(*b*) from 100 to 200 viss = 31	105
(III) Rich wells—	
(*a*) from 200 to 300 viss = 10	
(*c*) more than 300 viss = 5	15
TOTAL	209

It is obvious from this table how poor the native wells are. Wells yielding less than 100 viss a day are 163, or 77·9 per cent. of the whole number; of wells yielding more than 100, but less than 200, there are only 31, or 14·8 per cent.; and of wells yielding more than 200 viss, not more than 15 or 7·1 per cent.

Therefore in sinking a new well, the odds of obtaining a daily yield of more than 100 viss would be 1 to 5, of more than 200 viss 1 to 11.

There is another question to be answered which is of the highest importance as regards the future development of the oil-fields. It is this, *Is there any regularity in the decrease in the production of oil from a single well within a given space of time?*

Annual decrease of the production.

It is obvious that there must be a decrease in the production after a certain time; any mine will be exhausted in time, and likewise the wealth of the oil-bearing sandstone must similarly become exhausted, and the production necessarily diminish. But it is important to know whether the decrease is *a rapid irregular one* or *a regular gradual one*. It would hardly be worth while to start an extensive working of the oil-bearing strata with the prospects that a bore might for instance yield this year 500 viss, and the next year only 50 viss or *nil*.

I am sorry to say that I could get but very scanty data, by no means sufficient to answer the question in a satisfactory way, as it is difficult to say how far they are reliable.

These data are summarized in the appended table:—

Table No. 5.

Consecutive number of the well.	Depth in feet.	Present daily production in viss.	Former daily production in viss.	Time of former production in years.	Annual rate of decrease in viss.	Annual rate of decrease per cent.
21	201	9	200	5	38	19
25	235	80	200	4	30	15
41	215	140	190	1	50	26
51	203	200	800	15	40	5

Consecutive number of the well.	Depth in feet.	Present daily production in viss.	Former daily production in viss.	Time of former production in years.	Annual rate of decrease in viss.	Annual rate of decrease per cent.
81	245	140	180	2	40	22
84	263	90	300	2	105	35
103	183	150	260	6	18·3	7
126	263	100	200	10	10	5
129	310	160	180	1	20	11
138	260	60	80	1	20	25
195	200	50	200	8	18	9
253	233	450	1,000	4	137	13·7
295	251	270	1,000	4	182	18·2
314	196	120	160	1	40	25
			Beme.			
108	?	*Nil*	2,000	60	33·3	1·6
151	?	*Nil*	1,000	30	33·3	1·6

All the wells in the above table occur at the level of the (*d*) group, as according to the place where they have been started, a certain allowance in the height must be admitted. Provided the data are correct, it would appear that in the first year the decrease is a rapid one, amounting to 25 per cent. of the original quantity. If the figures in the case of No. 84 are correct, the decrease would be even higher still, namely, 35 per cent. Later on the decrease goes on more slowly. Within a space of four, five, and six years we notice an average yearly decrease of 19 per cent., 7 per cent.; within 10 to 15 years the average is 5 per cent. per year.

Therefore all I am at present able to say is that in the first two years a rapid decrease of the daily production will be noticed amounting to not less than 25 per cent.; later on the decrease goes on very slowly, so that after 10 or even 15 years' existence the yearly rate is not more than 5 per cent. of the original production. It may even become so small as hardly to be noticed for some time; at least so I understand the statements of natives, who absolutely deny any decrease in the production of numerous wells within recent years.

The statements about the two Beme wells I only mention as curiosities as I do not believe them to be correct, but the headman of Beme, whose statements I have reason to believe are fairly reliable, assured me that they are correct. I asked him no particulars regarding these two wells because they are at present only funnel-shaped holes, but when we passed them, the headman volunteered the information as to their exceedingly rich production. No. 108 is said to be 80 years old, and has now been disused some 20 years; the life of the well therefore would appear to have been 60 years with an average yearly decrease of 1·6 per cent.

10. *Age of the wells.*—One should anticipate that the age of a single well would yield useful hints as regards the intricate matter I discussed in Section 9. This would certainly be the case, provided that the well remained all the time at the same depth at which digging ceased, and thus drained the same bed or beds of oil-bearing strata; but this is by no means the case, as the native at once commences to deepen the well if he sees any chance of success. The age of the well therefore means in plain English only the age of the shaft. Of course there are wells which have evidently remained for a good many years at the same depth, but sooner

or later their time will arrive for deepening. The highest age of any of the Twingoung wells is said to be 70 years, but the bulk of them are much younger. As a matter of fact the Twingoung wells are younger than the Beme wells; the first mentioned oil-field has as a whole been certainly later started than the Beme field.

11. *Digging of wells.*—As soon as a native has made up his mind where he is going to have a new well, the workmen, usually four in number, begin to dig a square shaft, the sides of which measure between 4 and $4\frac{1}{2}$ feet.

Tools used for digging the wells and hauling up oil, &c.

Over the well a cross-beam supported on stanchions at either side is placed, and in the centre of this is a small wooden drum[1] or cylinder; the drum and its axis are made of a single piece of wood; the axis runs on coarse, naturally grown, fork-shaped supports. The leather rope used in hauling up the oil passes over the drum, and on it is fastened the workman who is going to be lowered down as well as the common earthenware pot called yenanoie[2] in which the oil is drawn up. If possible, the well is so placed that the men or women who are drawing up either the pot filled with oil or the workmen walk down an inclined plane along the slope of the hill.

The instruments used for digging are extremely simple and chiefly consist of a tool called *tayuwen*. The instrument, the shape of which is shown in the Fig. 2, Plate 1, is about $4\frac{1}{2}$ feet in length; it consists of a wooden handle and an iron shoe; the handle is club-shaped, flattened on the top and deeply notched 6 inches below the top; a conical iron tube, which ends in a two-pointed edge, is fixed to it. In working, the man grasps with his two hands the wooden handle at a little above the iron shoe, and, leaning the notch against his shoulder, forces the tool into the ground with all his strength; he loosens small pieces of the rock, which are brought out in a basket from the bottom of the shaft. It is obvious that a tool such as this can only be used with success in soft strata, while hard ones are a nearly invincible obstacle.

Timber.

To support the walls timber is freely used, and the shaft is throughout lined with it. The timber consists of clumsy beams, corresponding in length to the breadth of the well, of 3 to 4 inches breadth and 1 inch in thickness. The beams are notched at both ends with the object of admitting of no movement after once being fixed. This wooden wall has considerable strength, but it has to be frequently repaired, and permanently to be kept under supervision lest it should give way. It may be mentioned here that every well wants permanently to be looked after; cleaning and repairing take a good deal of time if the well is to remain in good condition.

Digging the wells.

The lowering of the workmen is rather ingenious. The man sits on two slings formed of strong rope running between his legs and knotted over his left shoulder. To prevent sliding, a thin rope runs down from the knot across the breast underneath the right shoulder to the back, where it is fastened to the rope forming the slings; a second rope for the same purpose is fastened round the hips. On account of the explosive gas filling the shaft, no light can be taken down; the workman is therefore obliged to tie up his eyes previously to descending to enable him to see during the short time he is down in the well. Without this simple device, it would take more time to accustom his eyes

[1] Gyin. [2] Yenanoie = oil-pot.

to the dark than he is able to stay down. The gas, which renders breathing a difficult matter, prevents his staying below for any time. I made several notes regarding the time occupied in the descent, staying below, and the subsequent ascent, and give these observations in Table No. 6 (time in seconds).

Table No. 6.

	Well No. 228, depth 227 feet.	Well No. 262, depth 210 feet.		Well No. 278, depth 195 feet.	Well No. 321, depth 253 feet.	
		First observation	Second observation.		First observation.	Second observation.
Descent . .	45	44	44	43	47	47
Ascent . .	80	91	89	62	121	120
Period below .	280	257	180	118	60	89

Further observations are needless, these few data clearly demonstrating how disproportional to the profit gained is the amount of labour and money expended in the Burmese method of working. The time usefully spent is hardly 25 per cent. of the total working time. Of course the time of staying down depends to a considerable degree on the quantity of gas which is developed, and the physical strength of the labourer. A young man will stay longer than a weak, old one, and in cases where the development of gas is great, the stay must be shorter compared with one where gas is not so rapidly developed. However, I never saw even a young and strong man able to stay down longer than 290 seconds, which I consider to be the longest time a man may remain in a well without becoming unconscious.

It hardly needs mention that in the upper parts of the well, where the development of gas is *nil* or nearly *nil*, the workmen are not troubled by it, consequently remain down in the well for a longer time.

Natural difficulties limiting the depth of the wells.

From the facts I stated above, it is obvious that the digging of wells after the Burmese fashion is costly and takes a good deal of time owing to the primitive tools and the natural difficulties. It further results that with increasing depth, the difficulties increase tremendously until they become invincible, forming thus a natural limit of depth for Burmese wells. This limit is about 310 feet, but I noticed that the Burmans dislike to going deeper than 250 feet as is clear from Table 2, Section 8.

The drawing up of the oil is as primitive as everything else; the rope is fastened round the neck of the ball-shaped pot, and being lowered is allowed to fill by sinking in the oil below. The oil thus raised is poured into another pot of the same shape containing from 10 to 16 viss of oil, 12 of which are packed on each country cart.

12. *Wages paid for digging.*—The wages for digging a well are paid according to the depth on a scale which will be seen from Table 7:—

Table No. 7.

Depth in attaung.	Rupees per attaung.
From 0 to 80 attaungs . . .	From ₹1-5-0 to ₹1-8-0.
From 80 to 90 attaungs . . .	From ₹3-8-0 to ₹4-8-0.
From 90 to 100 attaungs . . .	From ₹5-8-0 to ₹7.
From 101 per each additional attaung .	From ₹10 to ₹20.

As a rule the digging is paid in the following way. According to previous agreement, for the first 80 attaungs ₹105 to ₹120 are paid; for the next 10 attaungs are paid ₹35—45; from 90 attaungs (150 feet) the price increases largely as for the next 10 attaungs between ₹55 and ₹70 are paid; generally from 100 attaungs (166 feet) digging is paid per attaung and varies according to the difficulty of the work, and the greater or less development of gas, from ₹10 to ₹20.

13. *Value and interest of oil-wells.*—Referring to the rates paid for digging in Section 12, it is not difficult to estimate the total expenses of a well.

Taking for instance a well of 250 feet depth, without any special difficulties, the expenses for digging would amount to ₹970. For timber and wages for the men serving as draught-horses, ₹500 would not be too high an estimate. The total expenses of this well would therefore amount to ₹1,470, say ₹1,500. I do not think that this estimate is too high. In special instances, the total expenses are considerably higher. Calculating the expenses of the deepest well, No. 129—

	₹
The wages for digging would amount to	2,170
The expenses for timber and other items	750
TOTAL .	2,920

or ₹3,000.

I never succeeded in getting exact data as to the total expenses of a well from natives; either they did not want to tell me the truth or they did not know it themselves. Such data as I received were vague and often enough highly exaggerated, as a Burman once smilingly admitted when I told him that his statements were exceedingly exaggerated.

The estimates that I have given here have, however, been calculated on the basis of certain well-established facts, and so should preferentially be adopted in further investigations of this nature.

Admitting a rate of interest of 10 per cent. and the same for amortization, the total annual interest of a well of medium size (₹1,500) would amount to ₹300. The expenses being between ₹2,000 and ₹3,000, an annual interest of ₹400—600 would be required, or a monthly revenue of at least ₹25—50 would be required to cover interest and amortization of the invested capital after ten years.

At present for 10 viss crude oil 4 annas are paid; therefore to cover interest and amortization a monthly production of 1,000—2,000 viss, or a minimum daily production of 33·3—66·6 viss is required.

From the data given in Section 9 it clearly results that even the lowest daily average of 57·4 viss would cover the interest on wells of ₹1,500 and ₹2,000 value, and would still yield a small surplus. A well, however, of the value of ₹3,000 would not be covered by such a production. We may, however, take it as pretty well certain that the number of wells at the rate of ₹3,000 is a very small one; and, on the other hand, we know the daily average of 57·4 viss is at the least a low estimate.

I stated that the probable daily average is between 87 and 133 viss, but 117 to 133 viss would probably be nearer the mark.

From these data it is obvious that an oil-well is a source of gold for its proprietor yielding him yearly a considerable revenue; and, considered as an investment of

capital, it pays as high an interest as almost any other mining industry. An instance will render this statement more conspicuous.

I estimated in Section 12 the capital invested in well No. 129 to be R3,000. It would be required to pay—

	Viss.
(1) Interest and amortization per month . . .	2,000
(2) Loss, breakage, holidays, 15 per cent. of the monthly production	720
(3) Wages and other necessary expenses, 15 per cent. of the mothly production	720
TOTAL .	3,440

The well has a daily production of 160 viss, or 4,800 viss per mensem. Deducting 3,440 viss as calculated above, there remain 1,360 viss as a net monthly revenue; they would sell for R34, which would mean a net interest of 13·6 per cent., and in the case that the owner of the well is the owner of the capital, a total interest of 23·6 per cent., with amortization of the invested capital after ten years. Certainly not a bad investment of capital, and one which would be still better supposing the invested capital lower and the production better.

14. *Proprietors of the wells.*—The bulk of the wells is owned by natives, but there are a few which were confiscated from the former private owners by the Burmese Kings and now belong to the British Government.

Examining these Government wells, the remarkable fact is to be noticed, that only a small number are productive; the rest are unproductive disused wells. This apparently strange fact is susceptible of easy explanation. Whenever one asks who the owner of a mined well is, the invariable answer is "the Government," as in the eyes of a Burman it seems only right as doing no one any harm to put down the ownership of an utterly useless hole to Government. Such few of the "productive wells" as are recognized as Government wells yield but very little oil.

III.—THE OIL-FIELD OF BEME.

15. *Topography.*—The outlines of the Beme oil-field are much less marked than those of the Twingoung field. The bulk of the wells is situated on the north and south slope of a hill east of the Beme village, the top of which rises to 250 feet above the level of the Irrawaddy. In general its slopes are less steep than those of the Twingoung oil-field, but deeply notched on the southern side, producing thus a number of sharp spurs. The two water-courses on either side of the hill run east and west, joining a somewhat larger one running north-east and south-west, which after a sharp turn north of Beme joins the creek coming down from the Minling hill which reaches the Irrawaddy south of the police station of Yenangyaung. There are two smaller groups of wells north and south of the main group.

As a whole the Beme oil-field covers an area of about 35 acres, and its length in a N. S. direction is something like 27 chains, its breadth 20 chains.

16. *Geology.*—I have nothing to add to the geological remarks in Section 3 as being pecular to the Beme field. There are the same strata and there is the same geological architecture. I will only describe the position of the oil-field with regard to the anticline. In the western part of the field, the strata show a dipping towards the south-west gradually increasing from 11° to 23.° The same bed of blue clay, which is noticed on the top of the main hill, is found on the opposite slope of the water-course only a few feet above the bottom of the ravine. The angle of dip gradually decreases towards east, and at a small distance beyond the upper end of the southern ravine the change in the direction of the dip towards the north-east is again noticed. The position of the oil-field is therefore exactly the same as that of the Twingoung oil-field, only that the wells of Beme are situated on the top and western side of the anticline.

17. *Number of wells.*—The number of wells is considerably smaller than that of Twingoung as there are on the whole not more than 151. Amongst these there are not more than 72 (47·6 per cent.) productive wells, and the rest 79 (52·3 per cent.) are unproductive old wells which are mostly mere holes.

Amongst the 72 productive wells, there are 50 or 33 per cent. of the total number of wells which yield more than 20 viss a day, and 22 or 14·6 per cent., the production of which is less than 20 viss per diem.

18. *Depth of the wells.*—The Beme wells are more favourably situated than the Twingoung wells; their depth in general is therefore smaller than that of the Twingoung wells, the deepest well being not more than 270 feet (wells Nos. 41 and 89). I measured the depth of 78 wells, half of them ranging amongst the V and IV classes,—a fact which is easy to understand if we keep in mind that on account of their situation on the slope the oil-bearing strata were earlier reached.

The appended table shows the wells classed according to depth and the number of productive, scarcely productive, and unproductive wells. We notice exactly the same facts as I stated in Section 8, namely, the greatest number of wells in the III class, and the increase of productive and decrease of unproductive wells in proportion to the depth.

Table No. 8.

Depth.	Class.	Total number.	P. W.	S. P. W.	U. P. W.
Up to 150 feet	V	23	8	9	6
Up to 200 feet	IV	12	5	7	...
Up to 250 feet	III	36	31	5	...
Up to 300 feet	II	7	6	1	...
More than 300 feet	I	...	...	...	...

19. *Production of oil.*—The oil-production of the Beme field is much smaller than that of the Twingoung field, being not more than 3,658 viss,—that is, exactly one-third of the total production of the oil-fields. Those wells yielding more than 20 viss a day are not above 50 in number with a total production of 3,437, which

means a daily average of 68·7 viss per well; the remaining 22, "scarcely productive" wells, yield not more than 221 viss per diem; the average is therefore not more than 10 viss. The total average of the 72 wells is therefore 50·8 viss per diem.

If the wells be arranged according to depth and the average calculated for every range, we find exactly the same fact proved as stated in Section 9, *i.e.*, the *increase of the quantity of oil in lower strata* notwithstanding the seeming exception that the wells of the III class give a smaller average than those of the IV class.

Table No. 9.

Depth.	Class.	Number of productive wells in each class.	Total daily production in viss.	Average daily production per well in viss.
Up to 150 feet	V	8	505	63
Up to 200 feet	IV	5	365	72
Up to 250 feet	III	31	2,080	70
Up to 300 feet	II	6	487	81
More than 300 feet	I	...	...	...

The Beme wells have a considerably smaller yield than the Twingoung wells; there is not a single well producing more than 165 viss per diem; and even wells producing more than 100 viss are scarce, there not being more than nine.

It is difficult to say whether the wells on the whole are really poorer, or whether this smaller production is only due to the age of the wells. I incline to the latter opinion being the more probable because all the wells are of considerable age, and because no decrease has been noticed for a long time in the bulk of the wells. The Beme wells have now arrived at a stage where the decrease in the production is a very small one and hardly perceptible in a few years.

The data regarding the decrease of the Beme wells are even more vague than those of the Twingoung wells. However there is no reason to doubt the truth of the conclusions arrived at in Section 9.

20. *Age of the wells.*—Passing through the records we notice that there are a good many wells which are said to have an age of 100 years and not a few too between 70 and 80 years of age. I do not know whether these data are reliable or not; they prove, however, that the Beme field is of great age and is certainly older than the Twingoung field.

21. *Proprietors of the wells.*—There are also some wells which are owned by the Government, the number of which amounts to 28; but of these only nine are productive wells, yeilding 261 viss per diem. All the other wells are owned by natives.

22. *Digging, wages, value of the wells.*—Conditions here are exactly the same as at the Twingoung fields, and are described under Sections 11, 12, and 13.

IV.—Comparison of the Twingoung and Beme Oil-fields.

A comparison of the two oil-fields, not uninteresting in some ways, proves that as a whole the character of the two fields is exactly the same without any especially remarkable difference in either.

There are 526 wells in the whole oil-district, but only 281 (53·4 per cent.) of them produce oil, and of these some 170 (32·3 per cent.) account for nearly the total production of oil, their production being 92·5 per cent. of the whole.

These few data speak volumes. The entire oil industry is supplied by not more than one-third of the existing wells. Two-thirds are either utterly unproductive or their production is so exceedingly small that it is not more than 7·5 per cent. of the whole. What a waste of labour!

According to my notes, the total daily production amounts to 14,932 viss, of which the Twingoung oil-field supplies two-thirds, the Beme oil-field one-third. For reasons I mentioned in Section 9 my calculations are probably below the mark; still they may be taken as fairly correct, or at least as showing the minimum daily production of the oil-fields.

If the other data regarding the production are correct, the production of the two fields would amount from 18,658 to 20,658 viss per diem. It is not uninteresting to notice the very equal conditions of the two oil-fields, which might of course be anticipated from the geological conditions. The productive wells of both the oil-fields amount to nearly the half of the existing wells, and the wells which may be considered as the really productive ones amount to almost exactly one-third of the whole number. In the Beme field the unproductive wells surpass a little the productive ones, which points obviously to the higher age of the Beme field.

In both the fields the share of the production of the P. W. is nearly the same, being 92·1 and 93·9 per cent. of the total production; but remarkably enough the average per well is considerably lower in the Beme field (68·7 viss per diem) than in the Twingoung field, where it is 86·5 viss per diem, which again points to the higher age of the Beme field. The S. P. W. have in both the fields the same daily average of 10 viss.

Regarding the depth, the distribution of the wells is exactly the same in both the fields as will be seen from Table 12.

The relation between quantity of oil and depth is explained in Table 13. There is no doubt that, notwithstanding the exception of the III class wells of the Beme field, which have a lower average than the IV class wells, in both fields an increase of the quantity of oil with the depth is proved.

It seems strange that the average of the V class wells of the the Beme field exceeds considerably the average of the same class of the Twingoung field. But this is easily explained if we keep in mind that most of the Beme V class wells, situated on the slope, are in fact equal to IV class wells of Twingoung,—that is to say, if both the wells had been commenced at the same level on the top of the hill, the V class Beme wells would range amongst wells of the IV class.

If we sum up the most striking features of the two oil-fields, we may thus characterize them in a few words:—

The Beme field is at the end of its production, which has been in the past.

The Twingoung field is at the height of its production with a prospect of a small increase in the future.

Table No. 10.

Showing the number of Productive and Unproductive Wells in the Oil-fields of Twingoung and Beme.

	Total number of wells.	Unproductive wells.		Productive wells.		Wells producing more than 20 viss per diem.			Wells producing less than 20 viss per diem.		
		Number.	In per cent. of the total number.	Number.	In per cent. of the total number.	Number.	In per cent. of the total number.	In per cent. of the productive wells.	Number.	In per cent. of the total number.	In per cent. of the productive wells.
Twingoung .	375	166	44·3	209	55·7	120	32	57·4	89	2 ·7	42·6
Beme . .	151	79	52·3	72	47·6	50	33	69·5	22	14·6	30·5
Total of the two oil-fields	526	245	46·5	281	53·4	170	32·3	60·5	111	21·1	39·5

Table No. 11.

Showing the daily production of Oil of the Oil-fields of Twingoung and Beme.

	Daily production of oil in viss at 3·65 lbs.								Average daily production per well in viss at 3·65 lbs.		
	Total.		Of productive wells.			Of scarcely productive wells.					
	Viss.	In per cent. of the total number.	Viss.	In per cent. of the total number.	In per cent of the special number.	Viss.	In per cent. of the total number.	In per cent. of the special number.	Total average of all the productive wells.	Average of the productive wells.	Average of scarcely productive wells.
Twingoung .	11,274	75·5	10,384	69·5	92·1	890	6·	7·9	53·4	86·5	10
Beme . .	3,658	24·5	3,437	23·0	93·9	221	1·5	6·1	50·8	68·7	10
Total of the two oil-fields.	14,932	100·0	13,821	92·5	...	1,111	7·5	...	53·1	81·3	10

Table No. 12.

Showing the Wells of Twingoung and Beme arranged according to their Depth.

Depth.	Class.	Total.		Productive wells.		Scarcely productive wells.		Unproductive wells.	
		Twingoung.	Beme.	Twingoung.	Beme.	Twingoung.	Beme.	Twingoung.	Beme.
Up to 150 feet	V	26	23	3	8	11	9	12	6
Up to 200 feet	IV	66	12	28	5	27	7	11	...
Up to 250 feet	III	111	36	66	31	41	5	4	...
Up to 300 feet	II	30	7	20	6	10	1	...	...
More than 300 feet	I	3	...	3	...	...	...	...	...

Table No. 13.

Showing the increase of Oil with the Depth at the Twingoung and Beme Oil-fields.

Depth.	Class.	Number of productive wells.		Total daily production of these wells.		Daily average per well.	
		Twingoung.	Beme.	Twin. goung.	Beme.	Twingoung.	Beme.
Up to 150 feet	V	3	8	80	505	26	63
Up to 200 feet	IV	28	5	1,857	365	66	72
Up to 250 feet	III	66	31	5,802	2,080	88	70
Up to 300 feet	II	20	6	2,290	487	115	81
More than 300 feet	I	3	...	365	...	121	...

V.—Future Prospects of the Oil Country.

Before speculating on the future of the oil country in the Yenangyoung district it will be useful to discuss the future of the Burmese oil-fields.

This can be done in a few words as most of what will be said will be found in former paragraphs.

The future of the oil-fields depends on the style of working and on geological conditions. As I pointed out in Section 11, a depth of 310 feet means the limit beyond which Burmese workmanship cannot go.

As the geological conditions only admit of a small area being worked by Burmese labour, and as this limited space is now pretty well filled up with wells, leaving but little more for new ones, the future can easily be foreseen.

As soon as all the wells now in progress or that can be dug reach the depth of 310 feet the Burmese oil-industry must inevitably come to an end. But it is difficult

even to guess the number of years when the Burmese oil-industry will belong to the past. This depends mainly on the greater or less intensity with which the oil-field is worked. If there is a large demand for oil, which forces the Burmans to increase the depth of the wells to supply the demand, the end will rapidly arrive ; if the deepening of the wells proceeds slower, the existence of the Burmese oil-industry will be prolonged. According to the way the working of the oil-fields is going on at present there will be a small increase of the production for the next years ; it will then remain steady for a time, after which it will commence to fall.

While abstaining from any attempt to indicate precisely the exact number of years during which the Burmese oil-industry will continue to exist, still the various facts and data which I have collected warrant the conclusion that it can be only very short-lived.

The future, as I have depicted it, of the oil industry of Burma presents a somewhat dismal picture, and it would be still more so were European energy and enterprize not at hand to rescue it.

Relations between area and production.

Before I discuss the prospects of a European management of the Burmese oil-fields it is necessary to consider the relations between area and production, *i.e.*, to know (1) how many viss per acre and day the oil district can possibly yield, and (2) how many square feet of ground, or how many cubic feet of oil-bearing strata, are necessary to yield a certain amount of oil per diem. I base my calculations on the present daily average production of 12,000—17,000 viss (12,000 viss as the minimum production of the Twingoung field and 17,000 as the maximum present average of the district).

The Twingoung oil-field covers, according to a careful calculation, an area of 90 acres ; the daily production per acre would therefore amount to 133—188 viss.

This area is drained by 209 wells, of which only 120 are considered to be real oil-producers. Taking this number, a single well would drain an area of 0·75 acre ; we might also say on nearly every three-fourths of an acre there are two wells, but only one of which produces oil.

Calculating from the data at hand regarding 141 wells, each well drains in the average 42 feet thickness of the oil-bearing sandstone ; therefore a well which yields 133 viss per diem drains a volume of 1,372,140 ($1\frac{1}{3}$ millions) cubic feet of oil-bearing sandstone, provided that the sandstone is uniformly charged with oil.

On the basis of this calculation a well which yields 100 viss a day drains 1,031,684 cubic feet. As from the Burmese method of working only a relatively small portion of this volume can be referred to height, it is evident that the Burmese well needs for its supply a large horizontal area. Supposing the owner of the well is able to work 100 feet thickness of the oil-bearing strata, I estimate the smallest area necessary for a well yielding 100 viss a day to be one-fourth of an acre. According to this supposition the area of the Twingoung oil-field could supply 360 wells at the daily rate of 100 viss. But as it is not very likely that each well will drain 100 feet oil-bearing sandstone (only three wells do so in fact), we assume this area would supply only half the estimated number of wells, namely, 180, yielding 100 viss per diem. The daily production would therefore amount to 18,000 viss, which comes so near to the stated production of 17,000 viss that in future only a small increase in production from native wells is to be expected.

It would not be difficult to calculate the probable further duration of the wells in years if the quantity of oil contained in one cubic foot of oil-bearing sandstone were known. Unfortunately, however, I can only state that the sandstone is charged with oil, but what the relative proportions of the oil and sandstone are in a cubic foot I am unable to say. To ascertain this would require years of the most careful observation. In this respect one is much worse situated than in the case of, say, a coal seam or a galena vein, where the volume of the existing mineral can be calculated fairly correctly, and once the yearly production is known, the number of years the mine will last is simply a matter of division.

The evil effects attendant on the unmethodical and irrational mode of working the oil-bearing strata adopted by the Burmese are thus evident. Their inability to drain any great thickness causes much valuable surface to be lost, and the oil-field yields less than it should do. The millions and millions of viss contained in the second hundred feet are thus irretrievably lost within the area of the present oil-fields.

In the case of European enterprize these hindrances to Burmese labour would not exist. Nowadays machinery is so perfect that the deepest bores can be sunk without any difficulty. A European bore would therefore drain probably the whole thickness of the oil-bearing strata with the following advantages:—

(1) the oil-bearing strata could be tapped by a greater number of bores;

(2) the production of each bore would probably be higher than 100 viss because we know that the quantity of oil increases with the depth;

(3) the supply would likely be a very steady one, less liable to change.

Working the oil-fields after European style would therefore considerably increase the production of oil without damage to the field. I have no doubt that the production of the Twingoung field might easily be raised up to 50,000 viss or more per diem if regular boring were substituted for the present wells. European bores would infuse new life into the present exhausted Beme fields.

An estimate of the probable minimum production of that small area between the two oil-fields on the map between squares Nos. 10 and 19, where Finlay, Fleming and Co. have started boring, will not be uninteresting. Taking only that area into consideration, which would fall within the limits of the Twingoung field if traced across this country, the area might be estimated at about 65 acres. Two bores per acre would certainly yield 500 viss per diem if sunk to 400 feet depth; the total daily production would therefore amount to 32,500 viss.

If we consider the rate of 500 viss per acre as the minimum production of a bore, one square mile would thus produce 320,000 viss per diem. The lease of Messrs. Finlay, Fleming and Co. reaches to within 4 miles of the boundaries of the two oil-fields. For reasons pointed out in Section 5, only 1 mile east or west can be considered as valuable ground. There would therefore be 16 square miles of highly valuable ground which would produce at least half a million of viss per diem, and I have not the slightest doubt that this quantity would be surpassed.

Technical difficulties in working the oil-fields.

There is only one difficulty in working the oil-bearing strata to any extent, and this is that, in consequence of the very small amoun of pressure that exists, pumping will have to be resorted to in order to raise the oil. This fact will considerably limit the powers of production of each individual bore as pumping cannot be continuous,

intervals being necessary to allow of the oil exfiltrating again. The production is therefore completely dependent on the number of bores, and to work an oil district extensively would require a large number of wells. However, this is a technical matter, and once the necessary apparatus for boring is purchased the sinking of even a great number of bores would not be expensive. Should flowing wells by chance be tapped, the conditions would be totally altered and that too in a highly favourable direction.

Flowing wells.

My own opinion is that such wells will be found, if borings are carried out far enough away from the centre of the anticline to reach the oil-bearing strata at a sufficient depth to stop the gas escaping. It is only repeated experiments, however, that can prove their existence. The risk of boring at a fair distance from the centre of the anticline must be run. The result may of course prove either success or failure, but my own opinion is that success is the more probable of the two. Our knowledge regarding the composition of the oil-bearing group is at present still too limited to admit of a decisive judgment being given in this very important matter.

On the whole there is every reason to believe that the oil industry will develop in the future and will rank amongst the important mineral industries of Burma. Wild ideas about beating or competing with American or Russian oil cannot be too strongly deprecated as being only too likely to prove utterly illusory. The oil-fields, if worked rationally and methodically, will pay well enough, and if in future there should be found flowing wells, equal in production to American ones, so much the better for the Burmese oil-industry.

Summary.

1. The oil-bearing strata in the Yenangyaung division belong to the upper tertiary formation.

2. The oil-bearing strata chiefly consist of a fine soft sandstone of bluish-grey colour which is more or less soaked with oil, changing the colour of the sandstone into a yellowish green, but no data can be given as to the quantity of oil contained in 1 cubic foot of sandstone.

3. So far the oil-bearing strata are known to have a thickness of 200 feet, but there is no doubt that they are considerably thicker.

4. The oil-bearing strata are deposited in beds varying with the quantity of oil contained, separated, especially in the upper parts, by layers containing no oil.

5. The quantity of oil contained in the oil-bearing strata increases with the depth.

6. A bed of blue stiff clay of 20—25 feet thickness is invariably superimposed on the oil-bearing sandstone.

7. The oil-bearing sandstone is found very near the surface, its depth being not more than about 220 feet from the top of the plateau and 120 feet from the bottom of the ravines.

8. Owing to their superficial position no high pressure can be expected within the limits of the oil-fields.

9. The strata form an anticline, the strike of which is N. 40 E., with a maximum dip of 35° towards S. W. and N. E.

10. The oil-fields of Twingoung and Beme are situated on the top of the anticline.

11. The Twingoung oil-field covers an area of about 90 acres, its length being about 50 chains, its breadth between 15 and 20 chains.

12. There are 375 wells in the Twingoung field, of which 166 are totally unproductive.

13. Of the 209 wells which yield oil only 120 produce more than 20 viss a day.

14. The maximum produced by a single well is 500 viss a day; the bulk of the wells produce between 20—100 viss.

15. The total daily production amounts, according to my inquiries, to 12,000 viss, according to other statements from 15,000—17,000 viss per diem.

16. The daily average of a productive well ranges from 86·5 to 133 viss.

17. At present no exact data can be given about the yearly rate of decrease in the production of a well.

18. The wells are rather shallow; the deepest does not exceed 310 feet.

19. The Burmese wells yield a high interest, ranging from 23·6 per cent. upwards, with amortization of the invested capital after ten years.

20. The Beme field only covers 35 acres, its length being 27 chains, its breadth 20 chains.

21. There are 151 wells in the Beme field, of which 79 are totally unproductive.

22. Of the 72 productive wells only 50 produce more than 20 viss per diem.

23. The maximum production of a single well is not more than 165 viss.

24. The total daily production amounts, according to my enquiries, to 3,658 viss.

25. The daily average of a productive well amounts to 68·7 viss.

26. The wells are equally shallow, the deepest being not more than 270 feet.

27. The total number of wells in the two oil-fields is 526, of which 281 yield oil, but only 170 yield more than 20 viss per diem.

28. The total daily production of the two fields ranges from 14,932 to 20,658 viss.

29. The daily average production of one of the 170 productive wells amounts from 81·3 to 133 viss.

30. The Twingoung oil-field is at present at the zenith of its production, but still a small increase may be expected for the next few years.

31. The Beme wells have nearly extracted the oil existing in the oil-bearing sandstone and a decrease of production is to be expected.

32. The oil-fields, as worked by natives, have only a limited life; the oil industry could not be developed to a greater extent than it is at present.

33. As worked by natives only a small part of the oil-bearing sandstone is touched, for the greater part remaining untouched.

34. If worked according to European style, by bores, they are capable of a considerable development in the future.

RECORD OF THE WELLS OF THE OIL-FIELDS OF TWINGOUNG AND BEME.

I.—Record of the wells of the Twingoung oil-field.
II.—Record of the wells of the Beme oil-field.

Explanation.

Column 3 refers to the map.

In columns 4 and 5, *n. m.* means not measured.

Column 6.—The difference is marked with + if the native statement of the depth (column 5) has been found to exceed my measuring; — if the opposite case.

Column 9.—T. W. means twinza wells. G. W. means Government wells.

TWINGOUNG.

Key to find from a given old Burmese number the consecutive number given by me to the wells of Twingoung.

Remarks.—Burmese numbers in Roman: I, &c.
Consecutive numbers in *Italics*: *1*, &c.

Burmese No.	Consecutive No.	Burmese No.	Consecutive No.	Burmese No.	Consecutive No.
I	...	55	...	109	*300*
2	...	56	*190*	110	...
3	...	57	*191*	111	*293*
4	...	58	*192*	112	*275*
5	*217*	59	*196*	113	*276*
6	...	60	*203*	114	...
7	*213*	61	*205*	115	...
8	...	62	...	116	*281*
9	...	63	*264*	117	...
10	*227*	64	...	118	...
11	...	65	*261*	119	...
12	*224*	66	...	120	*286*
13	...	67	...	121	*287*
14	*214*	68	...	122	...
15	...	69	*361*	123	*290*
16	*212*	70	*241*	124	...
17	*213* (?)	71	*237*	125	*292*
18	...	72	...	126	*294*
19	...	73	...	127	...
20	*181*	74	*249*	128	...
21	...	75	*247*	129	*298*
22	...	76	*246*	130	...
23	*194*	77	*251*	131	...
24	...	78	*259*	132	...
25	...	79	*269*	133	*302*
26	...	80	...	134	...
27	...	81	*266*	135	...
28	...	82	...	136	*308*
29	*253*	83	*199*	137	...
30	*244*	84	...	138	...
31	...	85	*201*	139	...
32	...	86	...	140	...
33	...	87	...	141	...
34	*230*	88	...	142	*309*
35	*231*	89	...	143	*311*
36	*234*	90	*174*	144	...
37	*235*	91	*188*	145	*354*
38	...	92	...	146	*314*
39	*232*	93	...	147	*315*
40	*238*	94	*280*	148	...
41	*240*	95	*278*	149	...
42	*245*	96	...	150	*323*
43	*242*	97	...	151	*318*
44	...	98	*273*	152	*322*
45	*262*	99	...	153	*324*
46	...	100	*270*	154	...
47	...	101	*271*	155	*320*
48	...	102	...	156	...
49	...	103	*256*	157	*325*
50	*195*	104	*248*	158	...
51	*193*	105	*305*	159	*317*
52	...	106	...	160	*328*
53	*179*	107	...	161	...
54	...	108	*257*	162	...

Key to find from a given old Burmese number the consecutive number given by me to the wells of Twingoung—continued.

Remarks.—Burmese numbers in Roman: I, &c.
Consecutive numbers in *Italics*: *1*, &c.

Burmese No.	Consecutive No.	Burmese No.	Consecutive No.	Burmese No.	Consecutive No.
163	...	217	...	271	...
164	*289*	218	...	272	...
165	...	219	...	273	*103*
166	*331*	220	...	274	*104*
167	*330*	221	...	275	*144*
168	*332*	222	...	276	*145*
169	...	223	...	277	*143*
170	*336*	224	...	278	*136*
171	*338*	225	...	279	*135*
172	...	226	*156*	280	*134*
173	...	227	*153*	281	*133*
174	...	228	*159*	282	*131*
175	*345*	229	...	283	...
176	...	230	*158*	284	...
177	*350*	231	...	285	*129*
178	...	232	*149*	286	*128*
179	*351*	233	*148*	287	...
180	...	234	*147*	288	...
181	...	235	*141*	289	...
182	...	236	...	290	*106*
183	*346*	237	...	291	...
184	*344*	238	*139*	292	*76*
185	*347*	239	*137*	293	*77*
186	...	240	*142*	294	...
187	*334*	241	...	295	*73*
188	*333*	242	*150*	296	...
189	...	243	...	297	...
190	...	244	*101*	298	...
191	*161*	245	...	299	*75*
192	...	246	...	300	*69*
193	...	247	*99*	301	*70*
194	...	248	...	302	...
195	*162*	249	...	303	...
196	...	250	...	304	...
197	...	251	...	305	*94*
198	*170*	252	...	306	...
199	*171*	253	...	307	*123*
200	*168*	254	...	308	...
201	...	255	*85*	309	*126*
202	...	256	...	310	*125*
203	...	257	*88*	311	*122*
204	...	258	*87*	312	*113*
205	...	259	...	313	*120*
206	...	260	*89*	314	*121*
207	...	261	...	315	*110*
208	...	262	...	316	*109*
209	...	263	*92*	317	*22*
210	...	264	*95*	318	*111*
211	...	265	...	319	*65*
212	...	266	...	320	*29*
213	...	267	...	321	*30*
214	...	268	...	322	*64*
215	...	269	*81*	323	*63*
216	...	270	*80*	324	...

Key to find from a given old Burmese number the consecutive number given by me to the wells of Twingoung—concluded.

Remarks.—Burmese numbers in Roman: I, &c.
Consecutive numbers in *Italics*: *1*, &c.

Burmese No.	Consecutive No.	Burmese No.	Consecutive No.	Burmese No.	Consecutive No.
325	...	349	*55*	373	*11*
326	*60*	350	...	374	*12*
327	...	351	*39*	375	...
328	...	352	*54*	376	*40*
329	...	353	...	377	...
330	...	354	...	378	...
331	...	355	...	379	*15*
332	*61*	356	...	380	...
333	...	357	*57*	381	...
334	...	358	...	382	*29*
335	*31*	359	...	383	*42*
336	*32*	360	*118*	384	...
337	...	361	...	385	...
338	...	362	...	386	...
339	...	363	...	387	...
340	*18*	364	...	388	*45*
341	*19*	365	...	389	*46*
342	...	366	*5*	390	*47*
343	...	367	...	391	...
344	...	368	...	392	*52*
345	*26*	369	...	393	...
346	...	370	*9*	394	*50*
347	*33*	371	*10*	395	*53*
348	...	372	...	396	*51*

I.—Record of the Wells of the Oil-field of Twingoung.

Consecutive No.	Old No.	Locality.	Depth in feet.	Stated depth in attaungs, at 20 inches.	Difference between 4 and 5 in feet.	Stated daily yield in viss.	How often oil is drawn up.	Proprietor of the well.	Stated age of the well.	REMARKS.
1	2	3	4	5	6	7	8	9	10	11
1	?	9 D.	155	90	...	15	Once a month	T. W.	More than 10 years.	Decrease in yield of oil has not been noticed within the last 10 years.
2	?	9 D.	185	120	—15	140	Daily	T. W.	?	
3	?	9 D.	180	120	—20	60	Every 10 days	T. W.	?	
4	?	10 D.	n. m.	n. m.	...	...	.....	T. W.	?	Old well, broken down, yields no oil.
5	366	10 D.	208	132	—12	32	Daily	T. W.	?	
6	?	10 D.	243	140	+10	40	Daily	T. W.	?	
7	369	10 D.	167	...	...	...	.....	T. W.	?	} Old well, broken down, yields no oil.
8	?	10 D.	...	...	...	...	.....	T. W.	?	
9	370	10 D.	248	150	— 2	200	Daily	T. W.	More than 9 years.	Decrease in yield of oil has not been noticed within the last nine years.
10	371	10 D.	220	...	...	...	.....	T. W.	?	This well yields at present no oil; the owner tries to get oil in a greater depth, so digging is going on, but has been stopped since six weeks.
11	373	10 D.	206	130	—10	120	Daily	T. W.	?	
12	374	10 D.	190	151	— 1	60	Daily	T. W.	15 years.	
13	?	10 D.	213	140	—20	200	Daily	T. W.	?	
14	?	10 E.	215	125	+ 7	80	Daily	T. W.	?	
15	379	9 D.	205	130	—11	70	Daily	T. W.	?	
16	?	9 D.	225	...	...	?	?	T. W.	?	No further information could be got about this well, which evidently yields only a small amount of oil.
17	?	9 D.	231	130	+15	30	Daily	T. W.	?	
18	340	8 D.	241	140	+ 8	40	Every 5 days	T. W.	25 years.	
19	341	9 D.	233	134	+10	50	Daily	T. W.	30 years.	
20	?	8 D.	232	?	...	?	?	T. W.	?	No further information could be got about this well, which evidently yields no large quantity of oil.
21	?	9 D.	201	150	—40	9	Every 13 days	G. W.	?	The well contains much water; it is said to have yielded, five years ago, about 200 viss a day.
22	317	9 E.	230	120	+30	50	Daily	T. W.	30 years.	
23	?	9 E.	111	66	+ 1	...	.....	T. W.	?	New well; digging started since six weeks.
24	?	9 E.	n. m.	...	...	...	.....	T. W.	?	Old well, broken down, yields no oil.

I.—Record of the Wells of the Oil-field of Twingoung—continued.

Consecutive No.	Old No.	Locality.	Depth in feet.	Stated depth in attaungs, at 20 inches.	Difference between 4 and 5 in feet.	Stated daily yield in viss.	How often oil is drawn up.	Proprietor of the well.	Stated age of the well.	Remarks.
1	2	3	4	5	6	7	8	9	10	11
25	?	9 E.	235	140	+ 2	80	Daily	T. W.	20 years . .	It is said that this well yielded 200 viss a day about three or four years ago.
26	345	9 E.	243	137	+15	100	Daily	T. W.	?	When the present owner started work, the well yielded 10 viss a day only; by increasing the depth about 5 attaungs the present daily amount was got.
27	?	8 E.	245	140	+12	110	Daily	T. W.	50 years . .	The daily quantity of oil was increased by further digging; before digging was started, the well only yielded 40 viss a day.
28	?	8 E.	230	140	— 3	40	Daily	T. W.	30 years . .	The well contains much water.
29	320	9 E.	60	...	...	...	.....	G. W.	?	Old well, broken down, yields no oil.
30	321	9 E.	220	120	+20	...	.....	T. W.	?	The well yields at present nearly no oil, but much water.
31	335	9 E.	196			...	.....	T. W.	?	Old well, which had broken down and is now worked up again; yields at present no oil.
32	336	9 E.	220	130	+ 4	20	Every 8 days	T. W.	3 years.	
33	347	9 E.	n. m.	...	...	...	.....	W.	?	Old well, broken down, yields no oil.
34	?	9 E.	200	...	...	...	.....	G. W.	?	This well yields nearly no oil, and it is hardly worked.
35	?	9 E.	235	160	—31	80	Daily	T. W.	?	} The well contains much water.
36	?	9 E.	227	130	+11	10	Daily	T. W.	?	
37	?	9 E.	n. m.	...	...	...	.....	T. W.	?	Old well, which yields at present no oil, but is going to be worked up again.
38	?	9 E.	n. m.	...	...	...	.....	?	?	Old well, broken down, yields no oil.
39	351	9 E.	195	150	—54	110	Daily	T. W.	?	The well contains much water; no decrease of oil has been noticed within the last three years.
40	376	10 E.	170	95	+12	40	Every 3 days	T. W.	?	
41	?	10 E.	215	125	+ 7	140	Daily	T. W.	10 years . .	Last year the well yielded 190 viss a day.
42	383	10 E.	187	130	—29	20	Every 6 days	G. W.	30 years . .	
43	382	10 E.	205	120	+ 5	350	Daily	T. W.	10 years . .	The well contains some water.
44	?	10 E.	207	120	+ 7	80	Daily	T. W.	60 years . .	This well yielded, at the depth at 110 attaungs, only nine viss a day. The owner started further digging, which is still going on.

45	388	10 E.	222	130	+ 6	30	Once a month	T. W.	30 years . .	A short time ago the well yielded 60 viss a day.
46	389	10 E.	223	130	+ 7	150	Daily	T. W.	?	Three years ago the well is said to have yielded 170 viss a day.
47	390	10 E.	129	?	...	...	?	T. W.	?	No further information could be got about this well, which evidently yields only a small amount of oil.
48	?	10 E.	n. m.	...	...	...	.....	T. W.	?	Old well, broken down, yields no oil.
49	?	10 E.	n. m.	...	...	...	.....	?	?	
50	394	10 E.	n. m.	...	...	...	.....	G. W.	?	
51	396	10 E.	203	120	+ 3	200	Daily	T. W.	More than 15 years.	Fifteen years ago this well is said to have yielded 800 viss a day.
52	392	10 E.	212	?	...	?	?	T. W.	?	No further information could be got about this well, which evidently yields only a small quantity of oil.
53	395	10 E.	197	130	— 19	100	Daily	T. W.	?	
54	352	9 E.	228	140	— 5	200	Daily	T. W.	?	
55	349	9 E.	235	130	+ 19	300	Daily	T. W.	15 years . .	This well is said to have yielded formerly 700 viss a day.
56	...	9 E.	65	30				T. W.		This is a new well where digging has just been started; yields no oil.
57	359	8 F.	171	?			.....	T. W.	.....	This well is hardly worked and yields evidently nearly no oil.
58	?	9 F.	241	?	...	?	?	G. W.	?	No further information could be got about this well, which evidently yields only a small quantity of oil.
59	?	9 F.	252	145	+ 11	200	Daily	T. W.	8 years.	
60	326	9 F.	166	80	+ 33	...	.....	T. W.	?	This well yields no oil; it is used as a cistern.
61	332	9 F.	262	152	+ 9	40	Daily	T. W.	?	The well contains water at the rate of 10 viss water in 40 viss oil.
62	...	8 F.	249	150	— 1	140	Daily	T. W.	?	No decrease of oil has been noticed within the last four years.
63	323	9 F.	235	115	+ 44	90	Daily	T. W.	30 years . .	The daily quantity of 40 viss was increased to the present rate by digging 10 attaungs more; the well contains much water.
64	322	9 E.	250	150	+ 0	120	Daily	T. W.	?	The well contains much water.
65	319	9 E.	269	160	+ 3	45	Every 10 days	T. W.	?	At the depth of 140 attaungs the well yielded only 5 viss a day. The daily quantity was increased to its present amount by digging about 20 attaungs more.
66	?	8 E.	...	...	...	...	.....	G. W.	?	Old well, broken down, yields no oil.
67	?	8 E.	287	157	+ 26	80	Daily	T. W.	20 years.	
68	?	8 E.	n. m.	...	...	...	.....	T. W.	?	Old well, broken down, yields no oil.
69	300	8 E.	n. m.	...	...	...	.....	T. W.	?	
70	301	8 F.	210	?	?	?	?	G. W.	?	This well yields nearly no oil; no further information could be got.
71	?	8 F.	n. m.	?	?	?	?	G. W.	?	
72	?	8 F.	n. m.	...	...	...	.....	G. W.	?	Old well, broken down, yields no oil.
73	295	7 F.	245	140	+ 12	30	Daily	T. W.	60 years . .	The well contains water at the rate of 25 viss water in 30 viss oil.

I.—Record of the Wells of the Oil-field of Twingoung,—continued.

Consecutive No.	Old No.	Locality.	Depth in feet.	Stated depth in attaungs, at 20 inches.	Difference between 4 and 5 in feet.	Stated daily yield in viss.	How often oil is drawn up.	Proprietor of the well.	Stated age of the well.	Remarks.
1	2	3	4	5	6	7	8	9	10	11
74	?	8 E.	161	?	...	?	?	T. W.	?	No further information was to be got about this well.
75	299	8 E.	160	90	+ 10	...	.....	T. W.	1 year . .	This well has been recently started and has not reached the oil-bearing strata; it yields at present no oil.
76	292	8 E.	224	133	+ 3	...		T. W.	3 years . .	This well yields at present no oil.
77	293	7 E.	100	127	...	...		T. W.	15 years . .	The well yields at present no oil; it is an old well which had broken down and is not worked up again, the depth of 127 attaungs means the former depth.
78	?	7 E.	258	?	...	?	?	G. W.	;	This well yields evidently only a small amount of oil, as it is very rarely worked; no further data were to be got.
79	?	7 F.	n. m.	...	...	...	.....	T. W.	?	Old well, broken down, yields no oil.
80	270	7 F.	219	?	...	?	?	T. W.	?	This well yields evidently only a small amount of oil, as it is rarely worked; no further data were to be got.
81	269	7 G.	245	150	— 5	140	Daily	T. W.	?	The well contains much water; two years ago it yielded 180 viss a day.
82	?	7 G.	224	130	+ 8	110	Daily	T. W.	?	The well yielded three years ago 150 viss a day; the well contains no water.
83	?	6 G.	195	130	— 20	...	.....	T. W.	?	Old well; broken down and is worked up again; yields no oil at present.
84	226	6 G.	263	150	+ 13	90	Daily	T. W.	?	Two years ago this well is said to have yielded 300 viss a day; the owner tries now to increase the daily quantity of oil by further digging.
85	255	6 G.	193	130	— 23	...	.....	T. W.	19 years . .	The well yields at present no oil, as it is broken down and is going to be worked up again; formerly it yielded 40 viss a day.
86	?	6 G.	n. m.	...	...	...	.....	T. W.	?	Old well, broken down, yields no oil.
87	258	6 G.	n. m.	...	...	...	.....	G. W.	?	
88	257	6 G.	247	145	6	150	Every 3 days	T. W.	?	

86	260	7 G.	170	?	...	?	?	T. W.	?	This well, which is scarcely worked, yields evidently only a small quantity of oil; no further information was to be got.
90	25 ?	7 G.	235	?	...	?	?	T. W.	?	
91	?	7 G.	n. m.	?	...	...	.....	G. W.	?	Old well, broken down, yields no oil.
92	263	7 H.	n. m.	?	...	...	.....	G. W.	?	
93	?	7 H.	n. m.	?	...	...	.....	G. W.	?	
94	?	7 H.	n. m.	?	...	...	.....	G. W.	?	
95	264	7 H.	136	?	...	...	.....	T. W.	?	No further data could be got about this well, which evidently yields nearly no oil.
96	?	6 G.	n. m.	?	...	...	.....	T. W.	?	Old well, broken down, yields no oil.
97	?	7 F.	n. m.	?	...	...	.....	G. W.	?	
98	?	7 F.	233	143	— 10	35	Every 4 days	T. W.	60 years.	
99	247	7 F.	236	140	+ 3	10	Every 10 days	G. W.	13 years . .	The well yielded formerly 30 viss a day.
100	?	7 F.	?	130	...	2	Once a month	G. W.	?	This well yields nearly no oil.
101	244	6 E.	281	?	...	...	.....	T. W.	?	No further data were to be got about this well, which evidently yields only a small quantity of oil.
102	?	6 E.	151	90	+ 1	...	.....	T. W.	6 months .	A recently started well, which yields no oil at present.
103	273	7 E.	183	150	— 77	150	Daily	T. W.	15 years . .	Six years ago this well is said to have yielded 260 viss a day.
104	274	7 E.	276	160	+ 10	12	Every 2 days	T. W.	16 years . .	This well is said to have yielded formerly when unknown 100 viss a day.
105	?	7 E.	n. m.	...	...	...	.....	G. W.	?	Old well, broken down, yields no oil.
106	?	7 E.	n. m.	...	...	...	.....	T. W.	?	
107	?	7 E.	n. m.	...	...	...	.....	T. W.	?	
108	305	8 E.	235	?	...	5	Once a month	T. W.		
109	316	8 E.	n. m.	...	...	...	.....	G. W.	?	Old well, broken down, yields no oil.
110	315	8 E.	277	165	— 2	20	Daily	T. W.	?	
111	318	8 E.	n. m.	...	...	...	.....	T. W.	?	Old well, broken down, yields no oil.
112	?	8 E.	n. m.	...	...	...	.....	G. W.	?	
113	312	8 D.	250	140	+ 17	20	Every 4 days	T. W.	30 years.	
114	3 ? 7	8 D.	240	140	+ 7	50	Daily	T. W.	30 years.	
115	222	9 C.	187	130	— 30	50	Daily	T. W.	?	
116	?	9 C.	n. m.	...	...	...	.....	G. W.	?	Old well, broken down, yields no oil.
117	?	9 C.	n. m.	...	...	...	.....	G. W.	?	
118	360	9 C.	205	125	— 3	80	Every 2 months 6 following days.	T. W.	15 years.	
119	?	9 C.	208	120	+ 8	35	Daily	T. W.	70 years.	
120	313	8 D.	n. m.	...	...	...	.....	T. W.	?	Old well, broken down, yields no oil.
121	314	8 D.	255	170	— 28	3	Once a month	T. W.	10 years . .	Six years ago the well yielded 100 viss a day, ten years ago 150 viss.
122	311	8 C.	n. m.	140	...	...	.....	T. W.	40 years . .	Old well, broken down, and is now going to be worked up again.
123	307	8 C.	n. m.	...	...	...	.....	G. W.	?	Old well, broken down, yields no oil.
124	?	7 D.	298	170	+ 15	50	Daily	T. W.	70 years.	
125	310	8 C.	283	150	+ 33	200	Daily	T. W.	20 years.	

I.—Record of the Wells of the Oil-field of Twingoung—continued.

Consecutive No.	Old No.	Locality.	Depth in feet.	Stated depth in attaungs, at 20 inches.	Difference between 4 and 5 in feet.	Stated daily yield in viss.	How often oil is drawn up.	Proprietor of the well.	Stated age of the well.	Remarks.
1	2	3	4	5	6	7	8	9	10	11
126	309	8 C.	263	160	— 3	100	Daily	T. W.	?	Ten years ago this well is said to have yielded 200 viss a day.
127	?	8 D.	281	167	+ 3	40	Daily	T. W.	?	
128	286	8 D.	n. m.	...	...	...	.....	T. W.	?	Old well, broken down, yields no oil.
129	285	7 D.	310	170	+ 27	160	Daily	T. W.	?	One year ago the well yielded 180 viss a day.
130	?	7 D.	n. m.	...	...	...	.....	G. W.	?	Old well, broken down, yields no oil.
131	282	7 D.	280	160	+ 14	500	Daily	T. W.	?	
132	?	7 D.	n. m.	...	...	...	.....	G. W.	?	} Old well, broken down, yields no oil.
133	281	7 D.	n. m.	...	...	...	.....	T. W.	?	
134	280	7 E.	276	160	+ 10	140	Daily	T. W.	?	
135	279	6 E.	305	160	+ 49	120	Daily	T. W.	19 years.	
136	278	6 D.	282	170	— 1	25	Daily	G. W.	16 years.	
137	239	6 D.	189	?	...	?	?	G. W.	?	Yields nearly no oil.
138	?	6 D.	260	160	— 6	60	Daily	T. W.	6 years . .	Last year the well yielded 80 viss a day.
139	238	6 D.	223	130	+ 7	9	Every 6 days	T. W.	18 years.	
140	No number.	6 D.	102	50	+ 19	...	.....	T. W.	3 months . .	This well yields at present no oil, as digging has been started three months ago.
141	235	6 D.	186	?	...	...	.....	G. W.	?	
142	240	6 D.	n. m.	...	...	...	.....	G. W.	?	
143	277	6 E.	295	?	...	...	.....	T. W.	?	No further information could be got about this well, which evidently yields only a small amount of oil.
144	275	6 E.	286	160	+ 20	140	Daily	T. W.	25 years . .	No decrease of oil has been noticed within the last three years.
145	276	6 E.	101	60	1	...	.....	T. W.	?	This well yields no oil at present; it is an old well which had tumbled down and is to be repaired.
146	?	6 E.	286	?		?	?	G. W.	?	No further information could be got about this well, which is hardly worked and yields only a small quantity or no oil at all.
147	234	6 D.	208	120	+ 8	1	Once every 2 months.	G. W.	?	
148	233	6 D.	273	?	...	?	?	G. W.	?	Yields nearly no oil; no further information could be got.

149	232	6 E.	190	105	+ 15	10	Once a month	T. W.		
150	242	6 E.	265	157	+ 4	120	Daily	T. W.	?	
151	?	6 E.	n. m.	...	...	...	.....	G. W.	?	Old well, broken down, yields no oil.
152	?	6 E.	n. m.	...	...	...	.....	T. W.	?	
153	227	5 E.	201	125	— 7	10	Once a month	G. W.	?	New well, but digging has been stopped.
154	?	5 E.	n. m.	?	...	...	.....	T. W.	?	
155	?	5 E.	195	130	— 21	28	Every 6 days	G. W.	?	
156	226	5 E.	272	150	+ 22	80	Daily	T. W.	20 years.	
157	?	5 E.	n. m.	...	...	...	.....	T. W.	?	Old well, broken down, yields no oil.
158	230	5 E.	n. m.	?	...	...	.....			This well, which yields no oil at present, had broken down and is now going to be worked up again from 10 attaungs depth.
159	228	5 E.	197	?	...	?	?	T. W.	?	A newly started well, which yields no oil and where digging is still going on.
160	?	5 E.	n. m.	?	...	...	.....	T. W.	?	New well, but further digging has been stopped.
161	191	5 F.	261	130	+ 45	70	Daily	T. W.	30 years.	
162	195	5 E.	195	130	— 21	25	Every 6 days	G. W.	30 years.	
163	?	5 E.	n. m.	...	...	...	.....	T. W.	?	
164	?	5 E.	n. m.	...	...	...	.....	T. W.	?	Old well, broken down, yields no oil.
165	?	4 E.	n. m.	...	...	...	.....	T. W.	?	
166	?	5 D.	n. m.	...	...	...	.....	G. W.	?	
167	?	4 D.	n. m.	...	...	...	.....	T. W.	?	
168	200	4 D.	183	130	— 33	80	Daily	T. W.	?	This well is said to have yielded 100 viss a day about four years ago.
169	?	4 D.	n. m.	...	...	...	.....	G. W.	?	Old well, broken down, yields no oil.
170	198	4 E.	248	?	...	?	?	T. W.	?	This well is hardly worked and yields either a small quantity or no oil at all.
171	199	4 E.	250	160	— 16	150	Daily	T. W.	?	
172	?	3 E.	n. m.	...	...	...	.....	T. W.	?	New well, but further digging has been stopped.
173	?	2 E.	240	138	+ 10	...	.....	T. W.	?	This well, where digging is still going on, yields at present no oil.
174	90	2 E.	212	125	+ 4	10	Daily	T. W.	?	
175	?	2 E.	160	100	— 6	8	Daily	T. W.	?	Digging is still going on.
176	?	1 E.	205	?	...	?	?	G. W.	?	No further data could be got about this well, which is hardly worked and yields evidently only a small quantity of oil.
177	No number.	1 E.	n. m.	...	...	...	.....	T. W.	?	New well, about 6 feet deep, further digging stopped.
178	No number.	1 E.	120	75	— 5	...	.....	T. W.	1½ months .	Recently started well; yields no oil at present.
179	53	1 E.	244	142	+ 8	160	Daily	T. W.	16 years . .	This well yielded formerly only 30 viss a day; after digging 5 attaungs the amount increased to the present daily quantity.
180	?	1 F.	203	?	...	?	?	T. W.	?	No further information was to be got about this well, but evidently it yields only a small quantity of oil, which is not often drawn up.

I.—Record of the Wells of the Oil-field of Twingoung,—continued.

Consecutive No.	Old No.	Locality.	Depth in feet.	Stated depth in attaungs, at 20 inches.	Difference between 4 and 5 in feet.	Stated daily yield in viss.	How often oil is drawn up.	Proprietor of the well.	Stated age of the well.	Remarks.
1	2	3	4	5	6	7	8	9	10	11
181	20	1 F.	231	?	...	?	?	T. W.	?	No further information could be got about this well, but evidently it only yields a small quantity of oil.
182	?	1 F.	120	?	...	?	?	T. W.	?	No further information was to be got about this well; the yielding of oil is very small. Once drawn, it yielded about 100 viss, and then the stock was exhausted and working was stopped.
183	?	1 F.	191	110	+ 8	80	Daily	T. W.	4 years . .	This well yielded formerly only 15 viss a day, but by further digging the daily amount was increased.
184	?	2 E.	n. m.	...	...	...	.....	T. W.	?	Old well, broken down, not worked.
185	?	2 E.	210	120	+ 10	160	Daily	T. W.	40 years . .	Six years ago this well yielded 100 viss a day, at the depth of 106 attaungs, as it is stated; after digging further 4 attaungs the daily amount increased to its present rate.
186	?	2 E.	...	...	...	...	.....	T. W.	?	A new well of about 15 feet depth, where further digging has been stopped.
187	?	2 E.	157	...	...	...	.....	T. W.	?	Old well, which does not yield any oil.
188	91	2 E.	185	110	+ 2	230	Daily	T. W.	25 years . .	At the depth of about 105 attaungs the well yielded 100 viss a day; by digging 4 to 5 attaungs more the daily amount increased to its present rate.
189	?	2 E.	n. m.	...	...	...	.....	G. W.	?	} Old well, broken down, yields no oil.
190	56	2 E.	n. m.	...	...	...	.....	T. W.	?	
191	57	2 E.	221	130	+ 5	70	Daily	T. W.	15 years . .	The well yielded formerly 150 viss a day; to increase the present daily amount the owner started fresh digging.
192	58	2 E.	n. m.	...	...	...	.....	G. W.	?	Old well, broken down, yields no oil.
193	51	2 E.	n. m.	?	...	...	.....	T. W.	?	This well evidently yields no oil.
194	23	2 E.	n. m.	...	...	...	.....	G. W.	?	Old well, broken down, yields no oil
195	50	2 E.	200	110	+ 17	50	Daily	T. W.	?	The well contains much water; eight years ago it is stated that it yielded 200 viss a day; further digging is still going on.
196	59	2 E.	185	110	+ 2	5	Once a month	T. W.	20 years.	

197	?	2 E.	n. m.	...	..	...	.....	G. W.	?	} Old well, broken down, yields no oil.
198	?	2 E.	n. m.	...	...	...	.....	G. W.	?	
199	83	2 E.	264	151	+ 12	20	Daily	T. W.	15 years . .	The well had broken down and was worked up again from the depth of 136 attaungs.
200	?	2 E.	212	?	...	?	?	T. W.	?	A rarely worked well, which evidently yields only a small quantity of oil; no further information was to be got.
201	85	2 E.	n. m.	...	...	...	.....	G. W.	?	Old well, broken down, yields no oil.
202	?	2 F.	227	?	...	?	?	T. W.	?	No further information was to be got; the well is evidently scarcely worked.
203	60	2 F.	190	120	— 10	?	.....	T. W.	?	As this well hardly yields any oil it is used as a kind of reservoir to keep oil from other wells.
204	?	2 F.	180	104	+ 7	40	Every 3 days.	T. W.	25 years.	
205	61	2 F.	231	134	— 9	20	Daily	T. W.	20 years.	
206	?	2 F.	210	?	...	15	Every 4 days two following days.	T. W.	?	The data about this well are uncertain, but evidently the production of oil is not large.
207	?	2 F.	188	?	...	?	?	G. W.	?	} No further information could be got, but the well yields evidently only a small quantity of oil.
208	?	1 E.	138	?	...	?	?	T. W.	?	
209	?	1 F.	n. m.	...	...	...	.....	G. W.	?	Old well, broken down, yields no oil.
210	?	2 F.	210	120	+10	90	Every 3 days	T. W.	10 years.	
211	...	2 F.	190	120	—10	50	Every 2 days	T. W.	25 years.	
212	16	1 F.	239	140	+ 6	20	Daily	T. W.	?	The well contains much water; it yielded formerly 100 viss a day; to increase the present amount further digging is still going on.
213	17	1 F.	160	90	+10	15	Every 10 days, 2 following days.	T. W.	?	
214	14	1 F.	182	108	+ 2	40	Every 3 days.	T. W.	35 years . .	The well contains much water; formerly it yielded 70 viss a day, but within the last five years no decrease of oil has been noticed.
215	?	1 F.	n. m.	...	...	...	.....	T. W.	?	Old well, broken down, yields no oil.
216	?	1 F.	170	110	— 7	40	Every 3 days	T. W.	?	The well contains much water.
217	5	1 F.	244	140	+11	30	Every 2 days	T. W.	?	The well yielded one year ago, at the depth of 130 attaungs, 40 viss a day, but instead of increasing, the daily quantity decreased after further digging.
218	?	1 G.	n. m.	...	...	...	.....	G. W.	?	} Old well, broken down, yields no oil.
219	?	1 G.	n. m.	...	...	...	.....	G. W.	?	
220	?	1 F.	n. m.	...	...	...	.....	G. W.	?	
221	?	1 F.	n. m.	...	...	...	.....	T. W.	?	
222	?	1 F.	n. m.	...	...	...	.....	T. W.	?	
223	7	1 G.	173	?	...	...	.....	T. W.	?	No further information was to be got about this well, but evidently it yields only a small quantity of oil.
224	12	1 H.	165	95	+ 7	20	Every 5 days	T. W.	?	One year ago this well yielded 100 viss a day.
225	?	1 H.	n. m.	...	...	...	.....	G. W.	?	Old well, broken down, yields no oil.
226	?	1 I.	145	?	...	?		T. W.	?	} No further information was to be got about this well, but it evidently yields only a small quantity of oil.
227	10	1 I.	n. m.	?	...	?		G. W.	?	

I.—Record of the Wells of the Oil-field of Twingoung—continued.

Consecutive No.	Old No.	Locality.	Depth in feet.	Stated depth in attaungs, at 20 inches.	Difference between 4 and 5 in feet.	Stated daily yield in viss.	How often oil is drawn up.	Proprietor of the well.	Stated age of the well.	Remarks.
1	2	3	4	5	6	7	8	9	10	11
228	?	1 I.	227	130	+11	20	Daily	T. W.	?	Digging is still going on.
229	?	2 I.	n. m.	...	...	...	.....	T. W.	?	Old well, broken down, yields no oil.
230	34	2 I.	162	?	...	?	?	T. W.	?	No further information was to be got about these wells, but they evidently yield only a small quantity of oil.
231	35	1 I.	150	?	...	?	?	T. W.	?	
232	39	2 I.	160	?	...	?	?	T. W.	?	
233	?	2 I.	140	?	...	20	Every 5 days	T. W.	?	This well, which is rarely worked, yields evidently only a small quantity of oil.
234	36	2 I.	n. m.	?	...	?	?	T. W.	?	
235	37	2 I.	133	...	...	...	.....	T. W.	.....	Digging still going on.
236	?	2 I.	n. m.	...	...	...	.....	T. W.	?	Old well, broken down, yields no oil.
237	71	2 I.	147	75	+22	40	Every 3 days	T. W.	20 years.	
238	40	2 I.	166	100	— 0	35	Once a month	T. W	8 years.	
239	?	2 H.	247	145	+ 5	30	Every 4 days	T. W.	25 years.	
240	41	2 H.	161	90	+11	8	Once a month	G. W.	6 years . .	This well yielded formerly (when unknown) 30 viss a day.
241	70	2 H.	149	?	...	?	?	T. W.	?	No further information could be got about this well, but it evidently yields only a small quantity of oil.
242	43	2 H.	146	90	— 4	1	Daily	T. W.	?	Digging is still going on.
243	17	2 H.	145	?	...	?	?	T. W.	?	No further information could be got about this well, which is evidently hardly worked and yields only a small quantity of oil.
244	30	2 H.	242	140	+ 9	300	Daily	T. W.	4 years . .	At the depth of 137 attaungs this well yielded 200 viss; after digging 3 attaungs the present daily amount was got.
245	42	2 H.	246	145	+ 4	30	Daily	T. W.	3 years . .	Further digging is still going on.
246	76	2 H.	145	?	...	?	?	T. W.	?	No further information could be got about this well, but it evidently yields only a small quantity of oil.
247	75	2 H.	165	80	+32	30	Every 3 days	T. W.	?	This well contains much water.
248	104	2 H.	145	120	—55	20	Once a month	T. W.	?	
249	74	2 I.	100	80	—33	2	Once a month	T. W.	50 years.	

250	?	2 H.	n. m.	...	...	...	.....	G. W.	?		Old well, broken down, yields no oil.
251	77	2 H.	n. m.	...	...	...	.....	T. W.	?		New well, of about 5 feet depth, but further digging stopped.
252	?	2 H.	n. m.	...	...	...	.....	T. W.	?		Old well, broken down, yields no oil.
253	29	2 H.	233	140	— 0	450	Daily	T. W.	3 years.		Four years ago this well is said to have yielded 1,000 viss a day.
254	?	2 H.	172	?	...	?	?	T. W.	?		No further information could be got about this well, but it evidently yields only a small quantity of oil.
255	?	2 H.	n. m.	...	...	...	.....	T. W.	?		New well, further digging stopped.
256	103	2 H.	145	?	...	?	?	T. W.	?		Old well which evidently yields not much oil.
257	108	2 H.	197	?	...	?	?	T. W.	?		No further information could be got about this well, but it evidently yields only a small quantity of oil.
258	?	2 H.	n. m.	?	...	...	.....	T. W.	?		New well, but further digging stopped.
259	78	2 H.	151	?	...	?	?	T. W.	?		No further information could be got about this well, but it evidently yields only a small quantity of oil.
260	...	2 H.	230	?	...	?	?	T. W.	?		No further information could be got about this well, which evidently yields only a small quantity of oil.
261	65	2 H.	n. m.	?	...	?	?	T. W.	?		
262	45	2 H.	210	119	+11	1	Daily	T. W.	5 years	...	Further digging is still going on.
263	?	2 G.	206	?	...	?	?	T. W.	?		No further information could be got about this well, which evidently yields only a small quantity of oil.
264	63	2 G.	201	120	+ 1	20	Daily	T. W.	8 years	...	
265	?	2 G.	228	?	...	?	?	T. W.	?		No further information could be got about this well, which evidently yields only a small quantity of oil.
266	51	2 G.	130	70	+ 13		.....	T. W.	?		Old well, broken down, and is being worked up again, yields at present no oil.
267	?	2 G.	n. m.	...	...	...	.....	T. W.	?		Old well, broken down, yields no oil.
268	?	2 G.	162	?	...	?	?	T. W.	?		No further information could be got about this well, which evidently yields only a small quantity of oil.
269	79	2 G.	n. m.	...	...	...	.....	T. W.	?		New well, but further digging stopped; no oil.
270	100	2 G.	n. m.	...	...	...	.....	T. W.	?		
271	101	2 G.	188	?	...	?	?	T. W.	?		No further information could be got about this well, which evidently yields only a small quantity or no oil at all.
272	?	2 G.	n. m.	...	...	...	.....	G. W.	?		Old well, broken down, yields no oil.
273	98	2 G.	n. m.	...	?	...	.....	G. W.	?		
274	?	2 G.	n. m,	...	?	...	.....	G. W.	?		
275	112	2 G.	159	?	...	?	?	T. W.	?		No further information could be got about this well, which evidently yields only a small quantity or no oil; digging is still going on.
276	113	2 G.	200	110	+ 17			T. W.	?		This well, which yields no oil, is used as a kind of reservoir for oil got from other wells.
277	?	2 G.	n. m.	...	...	...	.....	T. W.	?		Old well, broken down, yields no oil.
278	95	2 F.	195	120	+ 5	70	Daily	T. W.	?		Digging is still going on.
279	?	3 F.	n. m.	...	...	...	.....	T. W.	?		A new well, of about 10 feet depth; further digging stopped.

I.—Record of the Wells of the Oil-field of Twingoung—continued.

Consecutive No.	Old No.	Locality.	Depth in feet.	Stated depth in attaungs, at 20 inches.	Difference between 4 and 5 in feet.	Stated daily yield in viss.	How often oil is drawn up.	Proprietor of the well.	Stated age of the well.	Remarks.
1	2	3	4	5	6	7	8	9	10	11
280	94	2 F.	n. m.	?	...	?	?	T. W.	?	No further information could be got about this well, which yields either no oil or only a small quantity.
281	?	2 F.	n. m.	...	...	...	.....	G. W.	?	Old well, broken down, yields no oil.
282	116	2 E.	235	150	— 15	150	Daily	T. W.	3 years.	
283	?	2 F.	n. m.	...	...	...	.....	G. W.	?	Old well, broken down, yields no oil.
284	?	2 F.	n. m.	...	...	...	.....	T. W.	?	
285	?	3 F.	n. m.	...	...	...	.....	T. W.	?	
286	120	3 F.	172	?	...	?	?	T. W.	?	No further information could be got about this well, which yields either no oil or only a small quantity.
287	121	3 G.	229	130	+ 13	140	Daily	T. W.	More than 15 years.	This well yielded at the depth of 125 attaungs only 90 viss a day; after digging 5 attaungs more the present quantity was got.
288	?	3 F.	n. m.	...	...	...	... ..	G. W.	?	Old well, broken down, yields no oil.
289	164	3 F.	221	133	+ 0	12	Twice a month	T. W.	?	
290	123	3 G.	n. m.	...	...	...	.....	T. W.	?	Old well, broken down, yields no oil.
291	?	3 G.	n. m.	...	...	...	.....	G. W.	?	
292	125	3 G.	193	?	...	20	Every 7 days	G. W.	?	
293	111	3 G.	180	?	...	?	?	T. W.	?	No further information could be got about this well, which yields either no oil or only a small quantity.
294	126	3 G.	172	100	+ 6	10	Every 10 days	G. W.	15 years.	
295	?	3 G.	251	143	+ 13	270	Daily	T. W.	5 years.	Four years ago this well is said to have yielded 1,000 viss a day.
296	?	3 G.	n. m.	...	...	...	.....	T. W.	?	Old well, broken down, yields no oil.
297	?	3 H.	n. m.	?	...	...	.....	T. W.	?	Yields either a small quantity only or no oil at all.
298	129	3 G.	136	82	+ 0	...	.....	T. W.	...	New well where digging has been started only a few months ago; the well yields at present no oil.
299	?	3 H.	n. m.	...	...	...	.....	G. W.	?	Old well, broken, yields no oil.
300	109	3 H.	200	135	— 25	50	Every 3 days	G. W.	18 years.	
301	?	3 H.	n. m.	...	...	...	.....	T. W.	?	Old well, broken down, yields no oil.
302	133	3 H.	213	?	...	...	.....	T. W.	?	
303	?	3 H.	n. m.	...	...	...	.....	G. W.	?	No further information could be got about these wells, which evidently yield nearly no oil.
304	?	3 H.	203	?	...	...	.....	T. W.	?	

305	105	3 H.	190	120	— 10	100	Daily	T. W.	20 years.	
306	?	3 H.	n. m.	...	...	...	.....	G. W.	?	Old well, broken down, yields no oil.
307	?	3 H.	230	150	— 20	50	Every 3 days	T. W.		Within the last five years no decrease of oil has been noticed.
308	136	3 I.	240	130	+ 24	100	Daily	T. W.		
309	142	3 H.	232	?	...	?	?	T. W.	?	No further information could be got about this well, which evidently yields only a small quantity of oil.
310	?	3 I.	n. m.	...	...	...	.....	G. W.	?	Old well, broken down, yields no oil.
311	143	3 H.	220	140	— 13	160	Daily	T. W.	6 years.	Formerly this well yielded 600 viss a day.
312	?	3 I.	n. m.	...	...	...	.....	T. W.	?	} Old well, broken down, yields no oil.
313	?	3 H.	n. m.	...	...	...	.....	G. W.	?	
314	146	3 H.	196	130	— 20	120	Daily	T. W.	?	The well contains much water; the last year it yielded 160 viss a day.
315	147	4 H.	190	120	— 10	20	Every 3 days	T. W.	?	
316	?	4 G.	198	?	...	?	?	T. W.	?	No further information could be got about this well, which evidently yields only a small quantity or no oil; digging is still going on.
317	159	4 G.	224	?	...	?	?	T. W.	?	No further information could be got about this well, which evidently yields only a small quantity of oil.
318	151	4 G.	251	140	+ 18	3	Once a month	T. W.	80 years.	
319	?	4 G.	n. m.	...	...	...	.....	T. W.	?	New well of small depth; further digging stopped.
320	155	3 G.	250	150	+ 0	20	Every 10 days 5 following days.	T. W.	?	This well is said to have yielded formerly when unknown 400 viss a day.
321	...	4 G.	253	151	+ 1	6	Daily	T. W.	?	This is an old well, which had broken down and was worked up again since three years; digging is still going on.
322	152	4 G.	245	140	+ 12	100	Daily	T. W.	50 years . .	This well yielded one year ago only 50 viss; after digging 1 attaung the present daily amount was got.
323	150	4 G.	221	?	...	?	?	T. W.	?	No further information could be got about this well, which evidently yields only a small quantity of oil.
324	153	4 G.	215	?	...	?	?	T. W.	?	No further information could be got about this well, which evidently yields only a small quantity of oil; digging still going on at present.
325	157	4 G.	50	...	...	...	.....	T. W.		New well; further digging is stopped.
326	?	4 F.	n. m.	...	...	...	.....	T. W.		} Old well, broken down, yields no oil.
327	?	3 F.	n. m.	...	...	...	.....	T. W.		
328	160	4 F.	225	130	+ 9	16	Daily	T. W.	;	Old well, which had broken down and is worked up again since three years; further digging is still going on.
329	?	4 F.	n. m.	...	...	...	.....	T. W.	?	New well of small depth; further digging is stopped.
330	167	4 F.	242	150	— 8	100	Daily	T. W.	40 years . .	
331	166	4 F.	250	150	+ 0	8	Once a month	G. W.	...	

I.—Record of the Wells of the Oil-field of Twingoung—continued.

Consecutive No.	Old No.	Locality.	Depth in feet.	Stated depth in attaungs, at 20 inches.	Difference between 4 and 5 in feet.	Stated daily yield in viss.	How often oil is drawn up.	Proprietor of the well.	Stated age of the well.	REMARKS.
1	2	3	4	5	6	7	8	9	10	11
332	168	4 F.	243	150	— 7	220	Daily	T. W.	7 years.	
333	188	4 F.	302	170	+ 19	85	Daily	T. W.	40 years.	
334	187	4 G.	262	?	...	?	?	T. W.	?	No further information could be got about this well, which evidently yields nearly no oil.
335	?	4 G.	247	?	...	?	?	T. W.	?	
336	170	4 G.	243	150	— 7	30	Every 3 days	T. W.	?	
337	?	4 G.	n. m.	...	...	...	.....	G. W.	?	Old well, broken down, yields no oil.
338	171	4 G.	230	150	— 20	200	Daily	T. W.	?	
339	172	4 G.	215	?	...	?	?	T. W.	?	No further information could be got about this well, which evidently yields only a small quantity of oil; digging still going on.
340	?	4 H.	n. m.	...	...	...	.....	T. W.	?	
341	?	4 H.	n. m.	...	...	...	.....	G. W.	?	Old well, broken down, yields no oil.
342	?	4 H.	n. m.	...	...	...	.....	G. W.	?	
343	?	4 G.	n. m.	...	...	...	.....	T. W.	?	New well of small depth, about 10 feet; further digging stopped.
344	184	4 H.	250	?	...	?	?	T. W.	?	No further information could be got about this well, which evidently yields only a small quantity of oil.
345	175	4 G.	258	?	...	?	?	T. W.	?	
346	183	4 H.	225	140	— 8	50	Daily	T. W.	?	Within the last five years no decrease of oil has been noticed.
347	185	4 G.	245	?		?	?	T. W.	?	No further information could be got about this well, which evidently yields only a small quantity of oil.
348	?	5 G.	n. m.	...	...	...	.....	T. W.	?	Old well, broken down, yields no oil.
349	?	5 H.	233	140	— 0	30	Every 3 days	T. W.	More than 27 years.	
350	170	4 H.	223	140	— 10	90	Daily	T. W.	25 years.	
351	179	5 H.	129	?	...	...	.....	T. W.	?	This well yields at present no oil; had broken down and is to be repaired.
352	?	5 H.	n. m.	...	...	...	.....	T. W.	?	Old well, broken down, yields no oil.
353	?	4 H.	n. m.	...	...	...	.....	G. W.	?	

354	145	4 H.	n. m.	?		?	?	T. W.	?	No further information could be got; the well evidently yields only a small quantity of oil.
355	?	4 H.	n. m.	?	...	...	.....	G. W.	?	
356	?	3 I.	n. m.	?	...	...	.....	G. W.	?	
357	?	3 J.	n. m.	?	...	...	.....	G. W.	?	
358	?	5 H.	n. m.	?	...	...	.....	G. W.	?	
359	?	10 E.	n. m.	?	...	...	.....	T. W.	?	
360	?	7 E.	n. m.	?	...	...	.....	T. W.	?	
361	69	2 H.	n. m.	?	...	...	.....	T. W.	?	
362	?	6 B.	n. m.	?	...	...	.....	G. W.	?	
363	?	6 B.	n. m.	?	...	...	.....	G. W.	?	
364	?	5 B.	n. m.	?	...	...	.....	G. W.	?	
365	?	5 A.	n. m.	?	...	...	.....	G. W.	?	Old well, broken down, yields no oil.
366	?	5 A.	n. m.	?	...	...	.....	G. W.	?	
367	?	4 A.	n. m.	?	...	...	.....	G. W.	?	
368	?	4 A.	n. m.	?	...	...	.....	G. W.	?	
369	?	5 B.	n. m.	?	...	...	.....	T. W.	?	
370	?	5 B.	n. m.	?	...	...	.....	G. W.	?	
371	?	5 B.	n. m.	?	...	...	.....	G. W.	?	
372	?	5 B.	n. m.	?	...	...	.....	G. W.	?	
373	?	5 B.	n. m.	?	...	...	.....	G. W.	?	
374	?	5 B.	n. m.	?	...	...	.....	G. W.	?	
375	?	6 C.	n. m.	?	...	...	.....	T. W.	?	

BEME.

Key to find from a given old Burmese number the consecutive number given by me to the wells of Beme.

Remarks.—*Burmese numbers in Roman: 390.*
Consecutive nnmbers in Italics: 7.

Burmese No.	Consecutive No.	Burmese No.	Consecutive No.	Burmese No.	Consecutive No.
390	*7*	440	...	490	*49*
391	...	441	*76*	491	*50*
392	...	442	...	492	*51*
393	...	443	*39*	493	*53*
394	...	444	*40*	494	*54*
395	...	445	...	495	*55*
396	...	446	*88*	496	*52*
397	*68*	447	*86*	497	*56*
398	...	448	*87*	498	*57*
399	*4*	449	*100*	499	...
400	*3*	450	*102*	500	*58*
401	...	451	*103*	501	*59*
402	*2*	452	*106*	502	*67*
403	*6*	453	...	503	*66*
404	...	454	...	504	*65*
405	*17*	455	*107*	505	*63*
406	*16*	456	*113*	506	*64*
407	*18*	457	*112*	507	*60*
408	*19*	458	*111*	508	*61*
409	*21*	459	...	509	*62*
410	*20*	460	...	510	*126*
411	...	461	*114*	511	*127*
412	*27*	462	...	512	*125*
413	...	463	...	513	*128*
414	*28*	464	...	514	*122*
415	*23*	465	...	515	*123*
416	...	466	*132*	516	*129*
417	...	467	...	517	*124*
418	*24*	468	...	518	*121*
419	...	469	...	519	*120*
420	*26*	470	...	520	*130*
421	*9*	471	*89*	521	*117*
422	*13*	472	*75*	522	*116*
423	*10*	473	...	523	*118*
424	*11*	474	*93*	524	*115*
425	*12*	475	*94*	525	*119*
426	*14*	476	*92*	526	*131*
427	...	477	*95*	527	*140*
428	*30*	478	*96*	528	...
429	*99*	479	*44*	529	...
430	*31*	480	...	530	*141*
431	*32*	481	...	531	...
432	*33*	482	...	532	...
433	*34*	483	*77*	533	...
434	*35*	484	*78*	534	*144*
435	*41*	485	*79*	535	*145*
436	*36*	486	*80*	536	*146*
437	*37*	487	*46*	537	*147*
438	*38*	488	*47*	538	*148*
439	...	489	*48*	539	*149*

II.—Record of the Wells of the Oil-field of Beme.

Consecutive No.	Old No.	Locality.	Depth in feet.	Stated depth in attaungs, at 20 inches.	Difference between 4 and 5 in feet.	Stated daily yield in viss.	How often oil is drawn up.	Proprietor of the well.	Stated age of the well.	Remarks.
1	2	3	4	5	6	7	8	9	10	11
1	?	19 C.	n. m.	n. m.	...	...	.....	G. W.	Unknown .	Old well, broken down.
2	402	19 C.	n. m.	n. m.	...	...	.....	G. W.	Unknown .	
3	400	19 D.	110	156	+ 150	70	Daily	T. W.	30 years . .	Seven years ago, this well is said to have yielded about 170 viss a day. The native statements regarding the depth are obviously utterly wrong.
4	399	19 D.	n. m.	n. m.	...	...	.....	T. W.	Unknown .	Old well, broken down, not worked.
5	?	19 D.	n. m.	n. m.	...	...	.....	T. W.	Unknown .	
6	403	19 C.	128	150	+ 122	70	Daily	G. W.	30 years . .	Two years ago this well is said to have yielded 150 viss a day. The native statements regarding the depth are obviously wrong.
7	390	19 C.	150	135	+ 74	105	Daily	T. W.	Unknown .	The oil is mixed with much water. The native statements regarding the depth are obviously wrong.
8	?	19 C.	n. m.	n. m.	...	...	.....	G. W.	Unknown .	Old well, broken down, not worked.
9	421	20 D.	155	150	+ 95	75	Daily	T. W.	35 years . .	Twenty years ago this well is said to have yielded 100 viss a day (?) The native statements regarding the depth are obviously wrong.
10	423	21 D.	60	40	+ 6	...	Once a month	T. W.	Unknown .	This well yields nearly no oil; oil is drawn up once a month. The amount then got is about 30 viss, as the oil is mixed with much water.
11	424	21 E.	n. m.	n. m.	...	...	.....	T. W.	Unknown .	Old well, broken down, not worked.
12	425	21 E.	n. m.	100	...	...	.....	T. W.	Unknown .	
13	422	21 D.	60	40	+ 6	1	Once a month	G. W.	Unknown .	This well yields nearly no oil; oil is drawn up once a month; the amount then got is about 10 viss.
14	426	21 D.	110	100	+ 83	10	Daily	T. W.	Unknown .	The well contains much water. The native statements regarding the depth are obviously wrong.
15	?	21 E.	n. m.	n. m.	...	...	.....	T. W.	Unknown .	Old well, tumbled down, not worked.
16	406	19 C.	n. m.	n. m.	...	...	.....	G. W.	Unknown .	Old well, broken down, unproductive.
17	405	19 C.	105	80	+ 28	...	Once a month	G. W.	40 years . .	This well yields at present nearly no oil. The amount got once a month is about 10 viss, as the well contains much water. Formerly, 9 years ago, this well is said to have yielded 100 viss a day.

II.—Record of the Wells of the Oil-field of Beme—continued.

Consecutive No.	Old No.	Locality.	Depth in feet.	Stated depth in attaungs, at 20 inches.	Difference between 4 and 5 in feet.	Stated daily yield in viss.	How often oil is drawn up.	Proprietor of the well.	Stated age of the well.	Remarks.
1	2	3	4	5	6	7	8	9	10	11
18	407	19 C.	215	130	+ 1	60	Daily	G. W.	40 years . .	Twenty years ago this well is said to have yielded 200 viss a day.
19	408	19 C.	n. m.	n. m.	...	...	.....	T. W.	?	This is a well, about 5 feet deep, where further digging has been stopped.
20	410	19 C.	245	150	+ 5	100	Daily	T. W.	60 years.	
21	409	19 C.	245	144	— 4	110	Daily	T. W.	100 years .	This well is said to have yielded formerly (when unknown) 300 viss a day.
22	?	20 D.	n. m.	n. m.	...	...	.....	G. W.	Unknown .	Old well, broken down, not worked.
23	415	20 D.	205	156	+ 55	90	Daily	T. W.	60 years . .	This well is said to have yielded formerly (when unknown) 400 viss a day, *vide*—No. 3.
24	418	20 D.	210	150	+ 40	70	Daily	T. W.	60 years . .	This well is said to have yielded formerly, 30 years ago, 300 viss a day, *vide*—No. 3.
25	?	20 D.	120	80	+ 13	1	Once a month	T. W.	Unknown .	The well, which contains much water, yields nearly no oil, as the amount got at present is not more than 30 viss a month; nine years ago it is said to have yielded 80 viss a day.
26	420	20 D.	132	80	+ 1	40	Daily	T. W.	Unknown .	The well contains much water.
27	412	20 D.	225	130	— 9	60	Daily	T. W.	50 years . .	The well contains little water.
28	414	20 D.	235	150	+ 15	80	Daily	G. W.	60 years . .	This well is said to have yielded formerly, about 40 years ago, 300 viss a day.
29	425 ?	21 E.	n. m.	n. m.	...	...	.....	T. W.	Unknown .	Old well, broken down, no oil.
30	428	21 D.	95	60	+ 5	40	Daily	T. W.	100 years .	The well contains much water.
31	430	21 D.	120	80	+ 13	90	Daily	T. W.	Unknown .	The well contains much water; it is said to have yielded formerly, nine years ago, 110 viss a day.
32	431	21 D.	n. m.	n. m.	...	...	.....	T. W.	Unknown .	Old well, broken down, yields no oil.
33	432	21 D.	70	50	+ 13	10	Three times a month.	T. W.	100 years .	The well contains much water.
34	433	21 D.	n. m.	n. m.	...	...	.....	T. W.	Unknown .	} Old well, broken down, yields no oil.
35	?	21 D.	n. m.	n. m.	...	...	.....	G. W.	Unknown .	
36	?	21 C.	n. m.	n. m.	...	...	.....	T. W.	Unknown .	
37	437	21 C.	230	153	+ 25	165	Daily	T. W.	100 years .	

38	438	21 C.	145	90	+ 5	...	.....	T. W.	.....	This is a new well where digging has been started a short time ago.
39	434	21 C.	262	150	— 12	110	Daily	T. W.	100 years.	
40	444	21 C.	250	150	— 0	50	Daily	T. W.	80 years.	
41	435	21 C.	270	150	— 20	3	Once a month	T. W.	80 years . .	The well yields at present nearly no oil; the owner tries to get more by further digging. The well is said to have yielded formerly, when unknown, 100 viss a day.
42	?	21 D.	n. m.	n. m.	...	...	.....	T. W.	?	Old well, broken down, yields no oil.
43	?	21 D.	n. m.	n. m.	...	...	.....	T. W.	?	
44	479	21 C.	208	120	— 8	40	Daily	T. W.	80 years.	
45	?	21 C.	190	150	+ 60	60	Daily	T. W.	100 years . .	The well contains much water; ten years ago it is said to have yielded 200 viss a day,—*vide* No. 3.
46	487	21 C.	227	157	+ 35	90	Daily	T. W.	100 years . .	The native statements regarding the depth are evidently exaggerated.
47	488	21 B.	230	140	+ 3	60	Daily	T. W.	100 years.	
48	489	21 B.	207	130	+ 9	70	Daily	T. W.	100 years.	
49	490	21 B.	236	145	+ 5	90	Daily	T. W.	100 years.	
50	491	21 B.	117	65	— 9	...	.....	T. W.	?	Old well, which was broken down and is now to be repaired again; no oil at present.
51	492	21 B.	235	150	+ 15	105	Daily	T. W.	100 years . .	The owner tries to get more oil by further digging and increasing the depth of the well.
52	496	21 B.	203	120	— 3	80	Daily	T. W.	100 years . .	
53	493	21 B.	210	130	+ 6	40	Daily	T. W.	100 years . .	
54	494	21 B.	195	157	+ 66	10	Once a month	T. W.	100 years .	The native statements regarding the depth are evidently highly exaggerated.
55	495	21 B.	n. m.	80	...	...	.....	T. W.	.....	This well has just begun to be dug; yields no oil.
56	497	21 B.	205	110	— 22	20	Daily	T. W.	100 years.	
57	498	21 B.	205	100	— 49	10	Once a month	T. W.	30 years.	
58	500	21 B.	172	100	+ 6	10	Once a month	T. W.	30 years.	
59	501	21 A.	250	130	— 34	30	Daily	T. W.	80 years.	
60	507	21 A.	n. m.	n. m.	...	...	.....	T. W.	30 years.	Old well, broken down, yields no oil.
61	508	21 A.	n. m.	n. m.	...	...	.....	T. W.	?	New well, about 5 feet deep; further digging stopped.
62	509	21 A.	240	130	— 24	80	Daily	T. W.	100 years . .	The owner tries to increase the amount of oil by further digging.
63	505	21 A.	105	120	+ 95	40	Daily	T. W.	100 years . .	The native statements regarding the depth are evidently highly exaggerated.
64	506	21 A.	n. m.	n. m.	...	...	.....	T. W.	?	New well, about 5 to 6 feep deep; further digging has been stopped.
65	504	21 A.	252	145	— 11	105	Daily	T. W.	100 years.	
66	?	21 A.	207	110	— 24	70	Daily	T. W.	100 years.	
67	502	21 B.	230	130	— 14	70	Daily	T. W.	100 years.	
68	397	20 E.	n. m.	n. m.	...	...	.....	G. W.	?	Old wells, broken down, yield no oil.
69	?	19 C.	n. m.	n. m.	...	...	.....	G. W.	?	
70	?	20 D.	n. m.	n. m.	...	...	.....	G. W.	?	
71	?	20 D.	n. m.	n. m.	...	...	.....	G. W.	?	

II.—Record of the Wells of the Oil-field of Beme—continued.

Consecutive No.	Old No.	Locality.	Depth in feet.	Stated depth in attaungs, at 20 inches.	Difference between 4 and 5 in feet.	Stated daily yield in viss.	How often oil is drawn up.	Proprietor of the well.	Stated age of the well.	Remarks.
1	2	3	4	5	6	7	8	9	10	11
72	?	20 C.	n. m.	n. m.	...	...	.....	G. W.	?	Old wells, broken down, yield no oil.
73	?	20 C.	n. m.	n. m.	...	...	.....	G. W.	?	
74	495	20 C.	190	156	+ 70	160	Daily	T. W.	100 years.	The native statements regarding the depth are obviously wrong.
75	472	20 C.	100	100	+ 66	10	Once a month	G. W.	?	*Vide* No. 74.
76	441	20 B.	n. m.	n. m.	...	...	.....	T. W.	?	Old well, broken down, yields no oil.
77	483	21 B.	n. m.	n. m.	...	...	.....	T. W.	?	
78	484	20 B.	85	70	+ 31	10	Once a month	T. W.	100 years.	
79	485	20 B.	60	80	+ 73	1	Once a month	T. W.	100 years.	This well yields nearly no oil,—*vide* No. 74.
80	486	21 B.	n. m.	n. m.	...	...	.....	T. W.	?	Old wells, broken down, yield no oil.
81	?	20 A.	n. m.	n. m.	...	...	.....	T. W.	?	
82	?	20 A.	n. m.	n. m.	...	...	.....	T. W.	?	
83	?	20 A.	n. m.	n. m.	...	...	.....	T. W.	?	
84	?	20 D.	n. m.	n. m.	...	...	.....	T. W.	?	
85	?	21 D.	n. m.	n. m.	...	...	.....	T. W.	?	
86	447	21 D.	243	130	— 27	30	Daily	T. W.	100 years.	The well contains much water.
87	448	21 D.	155	120	+ 45	30	Daily	T. W.	100 years.	
88	446	21 D.	195	110	— 12	10	Once a month	G. W.	30 years.	
89	471	21 D.	270	150	— 20	115	Daily	T. W.	100 years.	
90	?	22 D.	n. m.	n. m.	...	...	.....	T. W.	.....	New well, is about 3 feet deep; further digging stopped; yields no oil.
91	472	21 D.	185	110	+ 2	10	Once a month	G. W.	30 years.	Old well, broken down, yields no oil.
92	476	22 C.	n. m.	n. m.	...	...	.....	G. W.	?	
93	474	22 C.	195	110	— 12	10	Once a month	G. W.	30 years.	
94	475	22 D.	n. m.	100	...	10	.....	G. W.	30 years.	
95	477	22 C.	n. m.	n. m.	...	...	.....	G. W.	?	Old well, broken down, yields no oil.
96	478	22 C.	n. m.	n. m.	...	...	.....	G. W.	?	
97	No number.	22 C.	...	...	...	...	.....	T. W.	?	This well is going to be dug, but digging has not started at present.
98	?	22 C.	n. m.	n. m.	...		.....	G. W.	?	Old well, broken down, yields no oil.
99	429	21 D.	n. m.	n. m.	...		.....	T. W.	?	

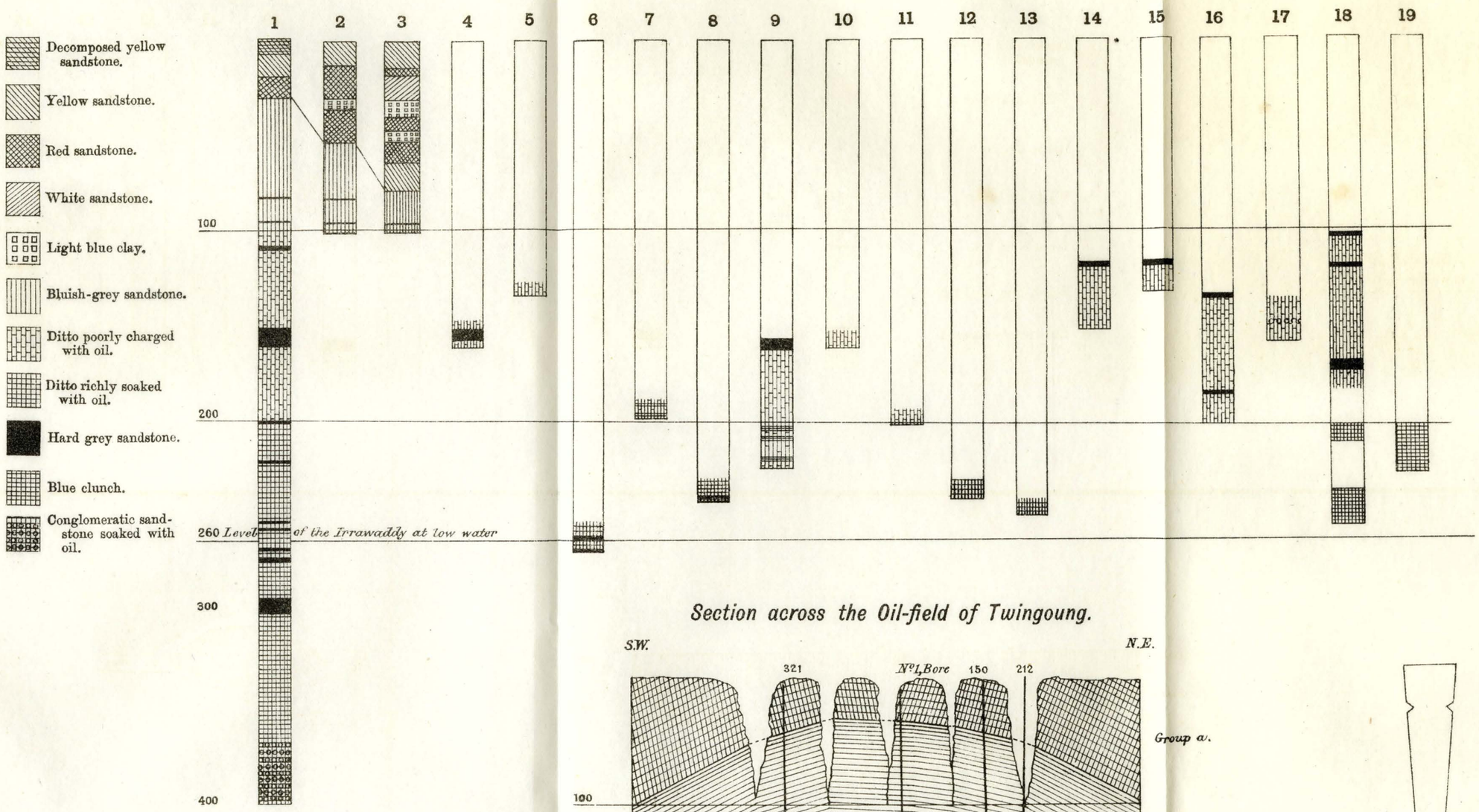
100	449	21 D.	n. m.	n. m.	...	...	.....	T. W.	?	}	Old well, broken down, yields no oil.
101	?	21 A.	n. m.	n. m.	...	...	.....	T. W.	?	}	
102	450	22 D.	n. m.	70	...	...	.....	T. W.	?		Old well, broken down, is going to be worked up again at present.
103	451	22 D.	n. m.	n. m.	...	...	.....	T. W.	?		Old well, broken down, yields no oil.
104	?	22 D.	n. m.	n. m.	...	...	.....	T.W.	?		Old well, yields no oil.
105	?	22 D.	n. m.	n. m.	...	...	.....	T. W.	?		Old well; digging stopped.
106	452	22 D.	105	110	+ 78	50	Daily	T. W.	100 years.	.	The well contains much water; it is said to have yielded formerly, 20 years ago, 80 viss a day. The native statements regarding the depth are obviously wrong.
107	455	22 D.	223	135	+ 1	40	Daily	T. W.	70 years.		
108	?	22 D.	n. m.	n. m.	...	...	.....	T. W.	?		This well, which is broken down and not worked since 20 years, is said to have yielded, at 147 attaungs depth, 80 years ago, 2,000 viss a day.
109	?	22 D.	n. m.	n. m.	...	...	.....	T. W.	?	}	Old wells, broken down, yielding no oil.
110	?	23 D.	n. m.	n. m.	...	...	.....	T. W.	?	}	
111	458	22 D.	n. m.	n. m.	...	...	.....	T. W.	?	}	
112	457	22 D.	n. m.	n. m.	...	...	.....	T. W.	?	}	
113	456	22 C.	190	110	—113	40	Daily	T. W.	100 years.	.	This well is said to have yielded, 20 years ago, 170 viss a day.
114	461	23 C.	n. m.	n. m.	...	...	.....	T. W.	?		Old well, broken down, yields no oil.
115	524	22 C.	232	140	+ 1	70	Daily	T. W.	?		The well contains much water.
116	522	22 C.	248	150	+ 2	10	Once a month	T. W.	100 years.		
117	521	22 B.	250	152	+ 3	40	Daily	T. W.	100 years.		
118	523	23 B.	255	153	+ 0	40	Daily	T. W.	100 years.		
119	525	23 C.	n. m.	n. m.	...	...	.....	T. W.	?		Old well, broken down, yields no oil.
120	519	22 B.	245	153	+ 10	50	Daily	T. W.	100 years.		
121	518	22 B.	250	140	— 17	30	Daily	T. W.	100 years.		
122	514	22 B.	260	155	— 2	60	Daily	T. W.	100 years.		
123	515	22 B.	n. m.	n. m.	...	...	.....	T. W.	?		Old well, broken down, yields no oil.
124	517	22 B.	227	140	+ 6	15	Once a month	T. W.	100 years.		
125	512	22 A.	250	140	— 17	70	Daily	T. W.	30 years.		
126	510	22 A.	190	123	+ 15	15	Once a month	T. W.	70 years.		
127	?	23 B.	n. m.	n. m.	...	...	.....	T. W.	70 years	.	Old well, broken down, yields no oil.
128	513	23 B.	240	140	— 2	40	Daily	T. W.	100 years.		
129	516	23 B.	251	155	+ 2	60	Daily	T. W.	100 years.		
130	520	23 B.	250	157	+ 11	70	Daily	T. W.	100 years.		
131	526	23 C.	215	140	+ 19	15	Once a month	T. W.	100 years.		
132	466	23 C.	232	140	+ 1	15	Once a month	T. W.	70 years.		
133	?	23 D.	120	100	+ 46	...	.....	T. W.	100 years.	.	Old well, which yields no oil.
134	?	23 D.	135	100	+ 31	15	Once a month	T. W.	100 years.		
135	?	23 D.	n. m.	n. m.	...	...	.....	G. W.	?		Old well, broken down, yields no oil.
136	?	23 D.	102	100	+ 64	15	Once a month	T. W.	100 years.	.	This well contains much water.
137	?	23 D.	n. m.	n. m.	...	...	.....	T. W.	?	}	Old wells, broken down, yielding no oil.
138	?	23 D.	n. m.	n. m.	...	...	.....	G. W.	?	}	

II.—Record of the Wells of the Oil-field of Beme—concluded.

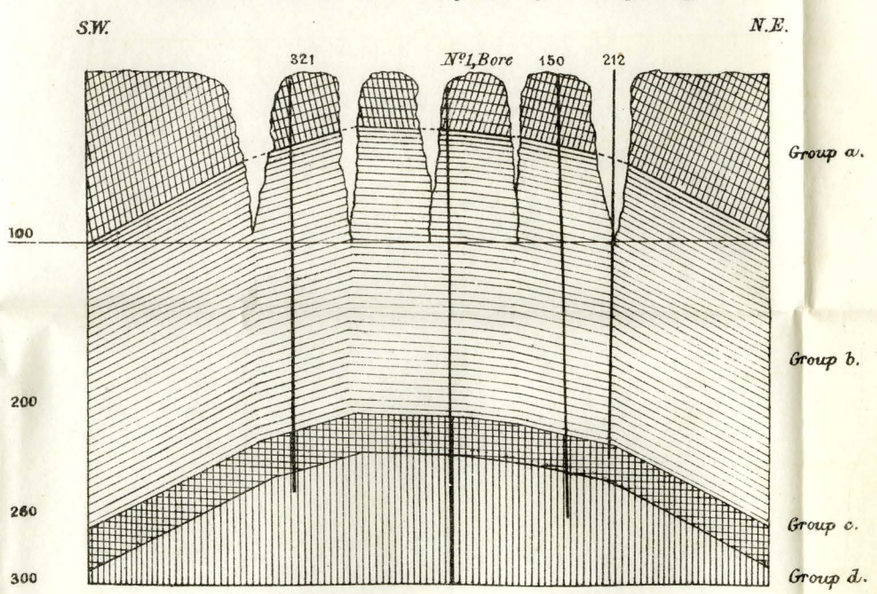
Consecutive No.	Old No.	Locality.	Depth in feet.	Stated depth in attaungs, at 20 inches.	Difference between 4 and 5 in feet.	Stated daily yield in viss.	How often oil is drawn up.	Proprietor of the well.	Stated age of the well.	Remarks.
1	2	3	4	5	6	7	8	9	10	11
139	?	22 D.	n. m.	n. m.	...	...		T. W.	?	Old wells, broken down, yielding no oil.
140	527	24 A.	n. m.	n. m.	...	...		T. W.	70 years . .	
141	530	24 B.	105	100	+ 61	...		T. W.	70 years . .	This well yields at present no oil, but it is said to have yielded 20 years ago 100 viss. The owner tries to get oil by increasing the depth of the well.
142	531	24 B.	n. m.	n. m.	...	...	.....	G. W.	?	Old wells, broken down, yielding no oil.
143	532	24 B.	n. m.	n. m.	...	...	.....	T. W.	?	
144	534	23 B.	n. m.	n. m.	...	...	.....	T. W.	?	
145	535	24 B.	n. m.	n. m.	...	...	.....	T. W.	?	
146	536	24 B.	n. m.	n. m.	...	...	.....	T. W.	?	
147	537	24 B.	n. m.	n. m.	...	...	.....	T. W.	?	
148	538	24 B.	n. m.	n. m.	...	...	.....	T. W.	?	
149	539	23 B.	n. m.	n. m.	...	...	.....	G. W.	?	
150	?	24 C.	n. m.	n. m.	...	...	.....	T. W.	?	
151	?	22 C.	n. m.	n. m.	...	...	.....	T. W.	?	

G. I. C. P. O.—No. 21 D. G. Survey.—20-6-89.—55.

Geological Sections from the Oil-field of Twingoung.



Section across the Oil-field of Twingoung.



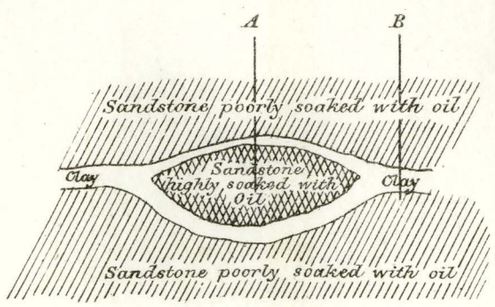


Fig. 1 *Diagrammatic.*

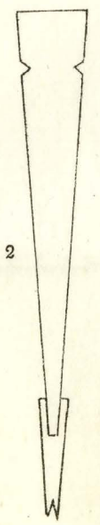
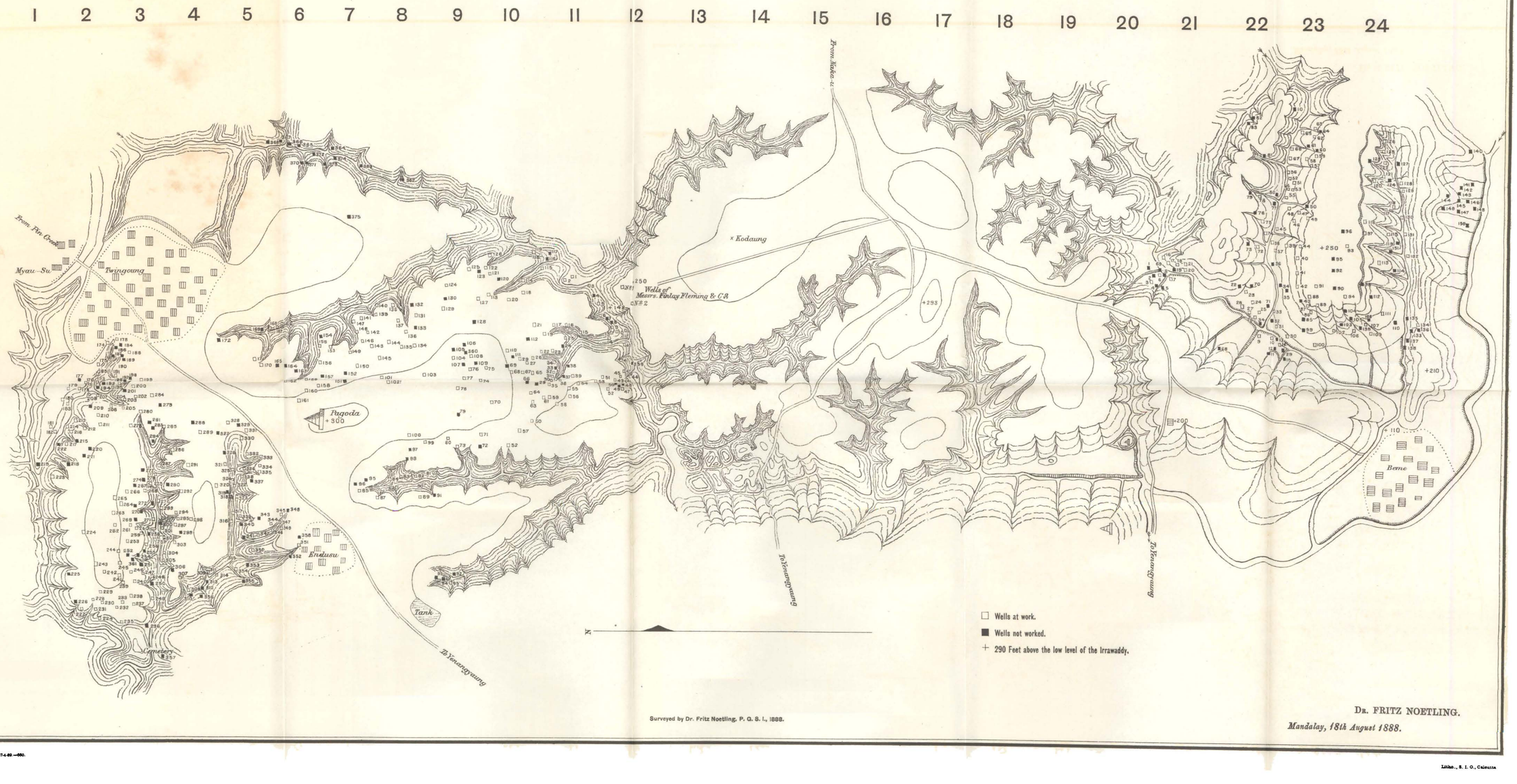


Fig. 2

Map of the OIL-FIELDS OF TWINGOUNG AND BEME.

Scale 16 Inches = 1 Mile.



Surveyed by Dr. Fritz Noetling, P. G. S. I., 1888.

DR. FRITZ NOETLING.

Mandalay, 18th August 1888.

Reg. No. 2484, Geol. Sur.—27-4-89—600.

Litho., S. I. O., Calcutta