# CLIMBING ON THE LIMBS OF A GIANT

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# *‘Again and for the last time we advance up the Rongbuk glacier for victory or final defeat.’*

It has been said of Mallory that he was so committed to climbing Mount Everest, an act of dedication to his wife and an opportunity to return without distraction to family life, that he would never have given up with the highest point in sight.1 The picture of Irvine that emerges from the Summers biography suggests that he too was determined to reach the top, even if the climb was one way traffic.2 However, these considerations might be thought impractical when the pair are envisaged in the previously unexplored ‘death zone’, facing extremes of human exhaustion and terrifying exposure to immense drops. The limitations of their equipment, food and water, together with the too-great distance of their high camp from the final pyramid, have made modern climbers pessimistic of Mallory and Irvine’s chances of success. Then there are technical difficulties such as the headwall of the second step, which would have challenged even the accomplished Mallory. And yet there are those, for example Jochen Hemmleb, who insist the pair might have taken three rather than two oxygen bottles each, and that Noel Odell might have seen them as high as the third step.3 The question of whether or not Mallory and Irvine reached the summit of Everest remains tantalizingly open.

The approach of this paper is to examine the main clues – Odell’s sighting, the ice axe, the mitten and the oxygen bottle – and then address the big question of what happened to Mallory and Irvine in the context of those issues. The question is always ‘what is it rational for us to believe?’, and not ‘what might have happened?’ That something is possible is strictly not an argument that it actually happened.

# What did Odell see?

The central problem in picturing the final movements of Mallory and Irvine is Odell’s sighting. For almost eighty years this testimony has summoned up a romantic and yet tragic vision of two mere mortals far away tackling the great permanence of the Everest massif. But where exactly were Mallory and Irvine when Odell caught sight of them at 12.50pm on the day of their last climb, and what significance does the sighting hold for their chances of success?

Firstly, however, we might consider the possibility that Odell, deprived of oxygen, was mistaken or even hallucinating when he thought he saw Mallory and Irvine. In 1933, Eric Shipton and Frank Smythe were moving up the North Ridge when they thought they caught sight of their companions, Wager and Wyn-Harris, climbing the Second Step. They quickly realised that they were, in fact, looking at two rocks, above and below the step, shimmering in the thin air. Could Odell have made the same mistake? The possibility is certainly appealing as an explanation for the seemingly impossible observation of Mallory and Irvine climbing the massive step in barely five minutes. However, the speed with which the 1933 climbers realised their mistake, together with their own opinion that Odell could not have been permanently so mistaken, seems to rule out this explanation. More generally, it should be remembered that Odell was a trained geologist and used to making scientific observations. His eye-sight was good and he never required the aid of spectacles. Moreover, for all his prevarication and embarrassment on the issue of location, he always fiercely defended his claim to have seen Mallory and Irvine at some point on the ridge. Hence, we have little choice but to take Odell at his word in this respect.4

What of the possibility, asserted by Jochen Hemmleb, that Odell saw the pair climbing the third of the three steps in the Northeast Ridge? This is, after all, the step closest to the final pyramid, in the proximity of which Odell originally tried to fix the location. Hemmleb claims to have watched through a telescope as David Hahn and Conrad Anker climbed the third step in 1999, and to have been profoundly struck by the similarity between what he was observing and the event Odell described. What is more, Andy Politz on the same expedition, having attempted to put himself in Odell’s position near the North Ridge, insists that the earlier climber must have been looking at the third step. However, we should be both suspicious and pessimistic of Andy Politz’s claim to have re-created Odell’s view of the steps, since it surely calls to mind the danger of a man’s judgement being influenced by bias or wilful belief. It seems incredible to claim that anyone could recreate the circumstances of Odell’s experience seventy-five years after the event with sufficient accuracy to decide what he saw with greater authority than Odell himself.

More generally, the third step cannot be considered as a serious candidate for the location of Mallory and Irvine at 12.50pm as long as Odell’s account is followed closely. Odell never mentioned the possibility of the third step being the object of his sighting. What is more, there is much doubt as to whether the third step was even referred to as a ‘step’ in 1924. Another problem with the third step is that it does not fit Odell’s description of a step nearing the base of the final pyramid. From Odell’s angle of vision the third step actually appears to be the base of the final pyramid (at the bottom of the summit snowfield). In other words, if Odell had viewed the third step, then he would never have mistaken it for any point further down the ridge, let alone the much lower first step. Finally, any sighting of the pair on the ridge above the second step assumes that they were able to surmount this obstacle. While this is perhaps not impossible, it remains to be argued in the face of Conrad Anker’s unique personal testimony.

What about the second step as a possible location of Mallory and Irvine? This was, after all, Odell’s original impression of the event. In terms of position, the second step fits Odell’s early claim that the pair were climbing the last obstacle before the base of the final pyramid. To be more precise, the suggestion is that Mallory and Irvine were climbing the snow patch and fifteen foot headwall of the step, rather than the entire second step rock feature (compared by the 1933 climbers to the bows of a battle cruiser and not possibly climbed in a few minutes).

However, the snow patch and headwall of the step hardly fit the finer detail of Odell’s description. In particular, it does not seem that a person would appear at the top silhouetted against the skyline after climbing the step. The location is very small and usually in the shadow thrown by the features around it, and so it is questionable as to whether climbers at this point would have caught Odell’s eye. Also, it is difficult to envisage them moving ‘with considerable alacrity’ over such challenging terrain. Finally, we must be comfortable with the idea that Mallory could have climbed the step (contrary to Anker’s testimony), and done so quickly and immediately (unlike the Chinese). A fuller treatment of this question will be given later, but for now it stands as an obstacle to accepting the second step as the object of Odell’s attention.

Another problem with the second step as Mallory and Irvine’s high point at 12.50pm, and a positive reason for thinking in terms of the first step, is the very fact that Odell eventually decided on that lower step and maintained his view robustly for the rest of his life.5 Unless we have good reasons for doubting the possibility of this sighting, it is surely right to take Odell at his word as the best judge of something only he will ever have seen. The first step is the prominent rock feature in the ridge, and climbers can be seen to cover its terrain in something like the short period of time described by Odell. However, there are two supposed problems with this, namely that the first step is not sufficiently close to the base of the final pyramid, and that Mallory and Irvine would have been impossibly late at that point at 12.50pm. I shall attempt to deal with both of these difficulties.

In addressing the first problem, it should be said that Odell himself directly acknowledged the difficulty it presented. Hence, his later account of the sighting explicitly draws attention to the fact that he originally thought the step was the last before the pyramid, but after looking again at the ridge he decided that it was the last step but one. Also, Odell was surely excited to see Mallory and Irvine so high on the ridge, higher than anyone had been before and with what seemed like a good chance of reaching the summit. This consideration might explain their supposed proximity (in Odell’s opinion) to the final pyramid.

However, any defence of the first step must explain why Odell thought, albeit wrongly, that he was looking at the last step before the base of the pyramid. Odell himself suggested that the error was due to the limited portion of the ridge visible from his position, but this contradicts his original enthusiastic statement that the ‘entire summit ridge’ was unveiled. How does one square the circle?

Perhaps the obstacle to Odell’s visibility was not so much cloud between him and the ridge, but rather mist being blown off the crest of ridge itself, a striking characteristic of the north side of the mountain. Looking at the photographs on pages 112 of *Ghosts of Everest* and 168 of *Detectives on Everest* it can be seen that mist on the ridge between the steps distorts the outline of the second step. It is also difficult to make out exactly the shape and beginning of the final pyramid. Glimpsed by Odell (rather than scrutinised by Politz), the first step is the more distinctive step in the proximity of the base of the pyramid. As for why Odell failed to spot the absence of any lower step (which would have been to his mind the first step), we can only imagine that he did not look, captivated as he was by the sight of Mallory and Irvine. I believe that these factors go some way towards explaining why Odell was hooked on the idea that the step was close to the final pyramid.

The second problem is that, if Mallory and Irvine were on the first step at 12.50pm, they would have left camp six not much before 7.45am. This is desperately late as a starting time on Everest, and in apparent contradiction with Mallory’s intention to ‘start early’. The time can be ascertained by taking four hours as the known duration of oxygen use provided by bottle ‘number nine’, and adding one hour and fifteen minutes for the pair to cover the remaining ground between the oxygen bottle and the top of the first step, which is the time taken by other climbers over that terrain in similar conditions.6

I suggest that we can assume something went wrong and delayed their start. It is not as if delays on Everest do not often occur, and it was Odell's opinion that their start must have been delayed, perhaps by the faulty oxygen apparatus. Would Mallory still climb after such a delay? I believe that he would. Firstly, we know that, based on his climbs from camp four, he underestimated the time required to reach the summit. He thought that he could reach the final pyramid within a few hours of leaving camp, and then evacuate camp six upon his return before nightfall. He would simply have to leave a couple of hours later and arrive back correspondingly later. In other words, he thought that he had a margin for error in which to make up for lost time. Secondly, if Mallory did not climb on the 8th, he would have spent the day fretting about the arrival of the monsoon. On the 8th there was good weather, and it would been too risky leaving the ascent until the following day, even assuming they had supplies coming up the line. In short, Mallory had no reason not to climb (although it was a shame they had been delayed), and he had every reason to make good use of the day.

With both these problems accounted for, I believe there is no reason why we should not take Odell at his word regarding something that only he will ever have seen. The first question of the mystery is answered in terms of Mallory and Irvine climbing the first step at 12.50pm. However, the significance of the pair leaving as late as 7.45am is that they would have used up much of their perceived margin for error before leaving the safety of camp six. This must have had implications for their decision-making later in the climb.

# Did the ice axe mark the site of a fall?

The next important clue about the movements of Mallory and Irvine is the ice axe found by climbers of the 1933 expedition. Did the axe mark the site of a fatal accident as these climbers assumed and was widely believed for sixty-six years? This seemed to be confirmed in 1999 when Mallory’s body was discovered, as predicted by Wang’s testimony, on the snow terrace of the North Face and roughly below the ice axe site. If the axe marked the location of a fall, then Mallory and Irvine had enough strength and hours of daylight to return from their high point at least this far down the mountain. This limits the likelihood of the pair reaching the summit, given their finite resources.

Firstly, it is necessary to define a scenario in which the axe is abandoned due to a fatal accident. The 1999 expedition climbers described the area of the ‘boiler plate’ slabs (referred to by Wager and Wyn-Harris) as a ‘sidewalk’ of relatively gentle incline running below the ridge, and this makes it an unlikely place for a slip. What is more, if the axe was dropped by a falling climber, would it not have tumbled away through the yellow band as Somervell’s axe had done a few days earlier?

However, immediately below this ‘sidewalk’ the ground falls away quickly, becoming more dangerous, and may have been a place where Mallory as lead climber required a belay as he picked his way over the difficult terrain. The ‘boiler plate’ slabs are an obvious place for Irvine to stand and provide such a belay, placing down his axe and using both hands to feed out the rope. When Mallory fell, Irvine was pulled of his feet by the weight of his companion and unable to retrieve the axe.

Alternatively, if Irvine was left standing on the ‘boiler plate’ slabs after the rope broke, then he must have continued the descent before dying of exhaustion or falling in a separate accident. This possibility seems unlikely given that Mallory and Irvine were roped when Mallory’s fall occurred. If Irvine survived Mallory’s fall, then he would surely have removed the broken end of rope from around his waist, but no rope was found with the ice axe in 1933. Therefore, if Irvine was truly seen well to the east of the ice axe site by the Chinese in 1960, then a fall by either man from the ‘boiler plate’ slabs is unlikely.

Nevertheless, it is questionable as to whether Mallory would have chosen to cut steeply into the yellow band at this point in the descent. In terms of selecting the most direct and less steep route back to camp six, the pair might have continued to traverse along the more gentle route taken by the 1933 climbers. In other words, although there is a scenario in which the axe is abandoned due to a fall by one or both men, it is hardly entirely convincing. On the other hand, the scenario does have the advantage of explaining both the fall and the abandonment of the ice axe. The long axes of the 1920s were commonly used by climbers as third legs over uneven ground, and so any alternative theory (that the ice axe does not mark the site of a fall) must explain why Irvine abandoned such a useful tool.

This biggest problem with the ice axe marking the site of the fall is the claim of the 1999 discovery team that Mallory’s injuries were limited in nature and inconsistent with a fall from that height. Certainly, these injuries were severe enough to end his life. However, unlike those of other fallen climbers in the same area, Mallory’s remains were in tact and his posture was one of apparent self-arrest (suggesting consciousness and strength after the fall). Therefore, the evidence suggests a short fall, and this presents another reason to doubt that the ice axe marked the site of a fatal accident.

Tom Holzel’s clever solution has been to reduce the injuries problem to one of pacific posture and envisage Wang not only finding Mallory in 1975, but also moving his body in such a way as to reduce the physical distortion caused by a long fall.7 Wang’s supposed motivation for doing this is wishing to make Mallory more peaceful, possibly intending to bury the remains and not wishing to place rocks on Mallory’s face (although there is no sign that any such burial took place).

The 1999 team insist that it took them several hours of chiselling at the rock and ice that fixed Mallory to the slope before they were able to free him and search for clues, let alone move the body. It seems unlikely, then, that Wang was able to move a body that had been frozen into the North Face for over fifty years. Also, the distinctive pattern of weathering of clothing and bleaching of skin down Mallory’s back, contrasted with the amazing preservation of detail and artefacts found on his front, suggests that his body lay in the same face down position for all the seventy-five years preceding the 1999 discovery.8

Furthermore, the injuries problem cannot be reduced to the problem of pacific posture. Mallory’s injuries, although including a broken leg and a severe head wound, contrast with those of other fallen climbers, who’s limbs were twisted out of shape and all but torn off. Also, the bodies of climbers falling down a steep slope without self-arrest have a tendency to turn head down. Mallory’s body was facing uphill, and so this suggests some degree of self-arrest, which seems incompatible with a long fall from the ice axe site. Hence, even if Wang had the inclination and ability to move Mallory’s body, it seems unlikely that he would have been able to put it back together so successfully. In other words, even if we are to believe that Wang found Mallory in 1975 (as now seems likely given the known proximity of his camp to Mallory’s resting place) it is extremely difficult to envisage him doing anything to create the (erroneous) impression of a short fall.

It should be added as an important qualification to these remarks that there are no definite rules governing what happens to falling bodies over great distances. Being roped to another Irvine might have slowed Mallory’s fall and given him an opportunity for self-arrest. Perhaps he was held by Irvine before the rope snapped or Irvine was pulled off his feet, thereby reducing the distance of his critical fall by the length of the rope. What is more, the limited injuries arguments is difficult to quantify, given that no other fallen climber has been examined in as much detail as Mallory. It might be argued that self-arrest claim is implausible (regardless of the evidence of his final resting position) on the grounds that Mallory could not have retained consciousness after receiving the head injury.9 Hence, the so-called limited injuries and pacific posture are not strictly incompatible with a fall from the ice axe site, and so any argument based on them is at best limited.

This means there is no very good reason to believe that the fatal fall was much shorter than a fall from the ice axe site. Some commentators, for example Jochen Hemmleb, have used the limited injuries argument to suggest that Mallory and Irvine were very much lower on the North Face than corresponds to a direct route from the ice axe site to camp six. However, the weakness of the limited injuries argument leads me to reject this line of argument. Also, confirmation of the Chinese claim to have seen Irvine near the 1933 camp six would seem to contradict the idea of a short fall from lower in the yellow band.

A separate argument against the ice axe marking the site of Mallory’s slip is developed by questioning whether his body really does lie ‘below’ the supposed ‘boiler plate’ slabs. In photographs of the North Face taken from ground level at base camp Mallory’s resting place appears to be almost directly below the ice axe site. However, in such photographs the contours of the North Face are not square to the camera, and so it does not follow that the body lies in the fall line from the axe.

Using a 1:5000 orthophoto map with superimposed 20 metre contour lines it is possible to identify approximate fall lines down to the location of Mallory’s body and down from the ice axe site.10 These lines follow the steeper sections of the North Face, meeting contour lines at right angles, and represent the probable routes taken by a falling body. However, the two lines do not join up. A fall from the axe site would bring a body to rest some distance to the west of Mallory’s position in the snowfield. A line traced up from the body argues that the pair were east of the ice axe (and a little lower on their descent) when the accident took place.11

The arguments above suggest that Mallory did not fall from the ice axe site. Although no one argument is entirely compelling, when taken together they make a powerful case. The limited injuries suggest Mallory did not fall from the height of the axe, while the contour analysis suggests he did not fall from so far to the west. The elusiveness of a persuasive fall scenario consistent with the topography of the ‘boiler plate’ slabs (and the projected descent route of Mallory and Irvine) further argues against the ice axe marking the site of a fatal fall.

This being the case, an alternative explanation of the abandonment of the ice axe is required. Conventional wisdom is that Irvine forgot the axe after a brief rest on the descent, although this scenario needs elaboration, since climbers are not in the habit of forgetting such useful tools. Both men were probably tired, suffering the effects of coming off oxygen, and perhaps preoccupied with a quick return to camp six. This would explain a moment of absentmindedness, but why was the axe not quickly retrieved after the mistake was noticed? One answer lies in the fact that the two climbers were roped together. If Mallory was descending ahead of his companion, and this was not unusual of climbers in the 1920s, then it may have been difficult for Irvine to indicate to his partner the need to return for the axe. What is more, Irvine might have considered returning for his axe an unworthy distraction of the pair from their business of reaching the safety of camp six.

By combining the limited injuries and short fall argument with that of the contour line analysis we are able to estimate the true location of Mallory’s slip. The fall line up from Mallory’s resting place suggests that he was east of ice axe site and about as far horizontally as the mitten site. This is approximately where a projected route from the ice axe site to the 1924 camp six crosses the modern route down from the ridge and into the yellow band near the 1933 camp six. The location is slightly lower than the ice axe site and more in keeping with the limited nature of Mallory’s injuries.

This estimation of the fall site coheres with the supposed sighting of Irvine in this general area by Chinese climbers in 1960. They claim to have seen Irvine close to the 1933 camp six and only a short distance below the modern route.12 If true, this would endorse the theory that Mallory did not fall from the ice axe site, given that the two climbers were roped. The Chinese sighting of Irvine suggests that, either Mallory and Irvine both fell from near the site of the 1933 camp six (Mallory falling to his death and Irvine falling only a short distance, but suffering injuries that prevented him from moving), or Irvine was left in a state of shock after the fall and death of Mallory, at which point he sat down and died of exhaustion.

A brief recap is useful at this point. We have reason to believe that Mallory and Irvine passed through the oxygen bottle drop site on their way to the first step, which they climbed at 12.50pm (observed by Odell). From this we can calculate that they left camp six at approximately 7.45am, given that we know the position of that camp and are able to estimate climbing times for the pair.

In this discussion it was argued that Mallory did not fall from the ice axe site. There is a significant question mark hanging over the one scenario that accounts for the axe being placed down in the manner required by history. The limited injuries argument and the contour analysis together suggest that the slip occurred in the vicinity of what would later become the 1933 camp six. This conclusion is supported by the claim by the Chinese to have seen a body (presumably Irvine’s) during their 1960 climb. According to this theory, Irvine left the ice axe on the descent, presumably as a result of carelessness induced by tiredness and a preoccupation with retuning to camp six as quickly as possible.

**Did the mitten and the oxygen bottle indicate the route taken on the ascent?**

The conclusion of the previous section (that the ice axe was probably left on the descent) helps to resolve a discrepancy between the clues regarding the route taken by Mallory and Irvine. On the one hand, the mitten found in 2001 was located on the crest of the Northeast Ridge at the top of the main gully that defines the modern route through the yellow band. This suggests that Mallory and Irvine attained the ridge, probably after following the gully. Perhaps the mitten was removed during a rest after the pair were able to see down the great East Face, or perhaps it was meant to indicate the point at which the pair should leave the ridge during the descent. On the other hand, the ice axe found in 1933 was well below the ridge and well to the west of the route Mallory and Irvine would have taken on their way up to the mitten site. This suggests that the pair were climbing lower and parallel to the crest of the ridge below the first step.

The oxygen bottle drop site seems compatible with either route, since it is close to the first step and closer to the ridge than the ice axe site. It is not actually on the ridge, but then Mallory and Irvine, even if following the ridge route, might have left the crest to avoid a large cornice at about this point. It is also worth mentioning that either route (if taken on the descent) would have returned the pair to the supposed fall area near the site of the future 1933 camp six.

It has been suggested that Mallory and Irvine used the ridge route in both directions and that the ice axe was dropped from the ridge, coming to rest on one of the ‘boiler plate’ slabs. This theory would dissolve the puzzle of the axe being abandoned. However, the example of Somervell’s dropped ice axe, which tumbled away through the steep yellow band without stopping, questions the likelihood of an axe coming to rest. Hence, it would seem that Mallory and Irvine took different routes on the way up and on the way down.

The scenario described in the previous discussion (a tired Irvine forgetting his axe after a rest on the descent) suggests that the pair were returning to camp six below the ridge rather than retracing their steps along the crest. The mitten (presumably one of many) is more likely than the ice axe to have been abandoned on the ascent, since it is a less important tool and better suited to the purposes of marking the route. What is more, an ascent by the crest of the ridge (rather than a more direct traverse across the top of the yellow band) coheres with Mallory’s known preference for the ridge. Perhaps he and Irvine were hoping to reach the crest as soon as possible in order to escape the shadow of the North Face and benefit from the warmth of any direct sunlight.

An important question now suggests itself: why did Mallory and Irvine change their route on the descent rather than take the known option of the ridge? They may have decided from their vantage point above the first step that the ridge was more difficult than the lower traverse along what members of the 1999 expedition described as a ‘sidewalk’. If they were descending late and in a hurry to lose altitude, then they might have been convinced that a more direct approach offered them a faster route. However, it still seems unlikely that they chose an unknown route over the familiar route they had taken on the ascent.

The best solution is to suppose that Mallory and Irvine were returning from a slightly different place than their original destination along the crest of the ridge. If the pair were returning from below the steps, then they would have been disinclined to regain the ridge and retrace their steps. In other words, if Mallory and Irvine had chosen to descend from the ridge (and traverse into the Couloir) after climbing the first step, then they would have had good reason for descending something like the route taken by the 1933 expedition climbers (who went into the Couloir from below the first step). Such a route would have taken them through the ice axe site and towards the target fall area.

In summary, if we believe that Mallory and Irvine took the crest of the ridge route through the mitten site on the ascent and the lower traverse through the ice axe site on the descent, then the simplest and best explanation of why they changed their route and gambled on an unknown path would be that they were returning from a lower point on the North Face. There was a disincentive (wasted time and energy) to regain the crest of the ridge. The implication is that from above the first step they judged their best option to be an attempt in the Couloir.

This line of thinking prompts a difficult question: would Mallory and Irvine have considered descending the first step and taking a line later used by the 1933 a worthy commitment of time and energy? This question can be answered after the issue has been broadened out in the next section. However, this discussion about changing routes has prejudiced our answer in favour of a traverse into the Couloir.

**What happened after the first step?**

Above the first step Mallory and Irvine were faced with three options. Firstly, they could continue along the ridge in the direction of the second step. Secondly, they could descend the first step and traverse towards the Couloir along the route taken by Wager and Wyn-Harris in 1933. Thirdly, they could abandon the attempt and return immediately to camp six (passing through the ice axe site). Conventional wisdom has it that Mallory and Irvine continued along the ridge, although in 2001 Tom Holzel argued for a return to camp six.13

It will be recalled that Odell’s original impression was that Mallory and Irvine were on the ridge, approaching the final pyramid and going strong for the top. However, much of the conventional wisdom is based on the lingering suspicion that Odell saw the pair climbing the headwall of the second step (which means that they continued along the ridge above the first step). The benefit of the approach adopted in this paper is that important clues are considered before addressing big questions. The earlier judgement that Odell saw Mallory and Irvine on the first step keeps open the subsequent question of their continuing along the ridge.

It has been claimed that Mallory was wary of taking the Couloir option on account of Norton’s failure to reach the summit pyramid by that route. In fairness, however, Norton’s report stated that the ground was difficult and tricky, but also that he turned back ultimately due to exhaustion and lacking a will to continue. Mallory believed that his oxygen would give him an advantage over Norton that would allow him and Irvine to push on towards the summit. Hence, it is important to keep an open mind about Mallory and Irvine’s choice of routes.

There are two strong ‘clues’ that suggest Mallory and Irvine left the ridge in favour of the Couloir, and these present a case against the conventional wisdom that the pair continued along the ridge. The first clue was touched on in the previous sections, namely that a traverse into the Couloir best explains why Mallory and Irvine descended by a route other than that taken on the ascent. The second ‘clue’ concerns the missing evidence of Mallory and Irvine’s remaining oxygen bottles and carrying frames.

Nothing belonging to Mallory and Irvine has ever been found above the oxygen bottle site on the Northeast Ridge, and yet we know they must have dumped their carrying frames and oxygen bottles somewhere on the North Face. The ridge route is very narrow and has seen many expeditions since the first Chinese ascent in 1960. It is surprising, therefore, that no evidence of the pair has been found. On the other hand, the traverse from below the first step into the Couloir has been done very rarely and covers a more open route, leaving ample room for a pair of undiscovered oxygen carrying frames.

Some commentators suggest that Mallory and Irvine threw their equipment down the mountain, leaving no evidence to be found. However, this seems slightly frivolous and not in keeping with the example of oxygen bottle ‘number nine’. Finch and Bruce did something similar with their bottles in 1922, but they were on easier ground and lower on the North Face. Irvine had invested much time and energy in the oxygen apparatus, and it is unlikely that he would have participated in their wanton destruction. For his part, Mallory surely wanted some artefact to mark his high point, even if that was far short of the summit.

Let us suppose that Mallory and Irvine reached the crest of the ridge at the mitten site and climbed towards the first step with every intention of continuing along the ridge towards the second step. It was only when they had climbed the first step (observed by Odell at 12.50pm) that they were able to see the difficulties and dangers of the knife-edge ridge between the steps. We should not be surprised, therefore, if Mallory at this point decided to change routes and attempt the Couloir, even though this meant descending the first step and investigating new terrain. Had Mallory and Irvine approached from below the ice axe site, then they might have had a better view of the ridge between the steps earlier and might not have climbed the first step.

We must think ourselves in the minds of Mallory and Irvine to understand why they made this choice. Firstly, the difficulty and danger of the ridge between the steps should not be underestimated. Jochen Hemmleb’s research papers explain in detail how the route follows the knife-edge ridge and demands various leaps of faith.14 More than half of Conrad Anker’s party in 1999 they would rather descend than continue across this difficult terrain. When applying this knowledge to our theory about Mallory’s decision-making, we should recall that Irvine was comparatively inexperienced in mountaineering and technical rock climbing, and that the route was then both untried and unproven.

Secondly, even from the first step Mallory was able to observe how the second step blocked his way to the summit along the ridge. Mallory was particularly noted in his day for his ability to judge from a distance whether or not a route would ‘go’. It is argued later in this paper (on the basis of Conrad Anker’s testimony) that Mallory would not have been able to climb the daunting second step. If that judgement is correct, then it follows that Mallory probably realised as much from the first step and did not start upon the difficult section of the knife-edge ridge. The question of the second step is not whether Mallory could have climbed the headwall ‘in extremis’, but rather whether it appeared sufficiently easy to justify the time-consuming and risky crossing between the steps. Also, Mallory may have foreseen at that point the later difficulty of descending the step in fading light or darkness.

Thirdly, Mallory may have had something in common with climbers of the 1933 expedition, who eventually chose to traverse into the Couloir from below the steps rather than pursue the route along the ridge. Wager and Wyn-Harris, seemingly in contrast to Mallory and Irvine, did not opt for the ridge or climb the first step, but rather passed below the step with a vague idea of keeping their options open. The 1933 expedition climbers missed their opportunity to attain the ridge, since there is no possible climb from the grey band after the first step under pre-monsoon conditions. However, even though they were defeated in the Couloir, Wager and Wyn-Harris allowed the second 1933 party of Shipton and Smythe to take the same gamble a few days later. Both parties defended their decision to make the traverse on the grounds that they viewed the ridge with suspicion and saw in the second step a massive obstacle (compared to the bows of a battle cruiser). Mallory was born in the same era of mountaineering, and so, faced with a similar dilemma, he might have arrived at the same judgement.

It should be emphasised that the principal reason why modern parties follow the ridge is that it was pioneered as the northerly route to the summit by the Chinese in 1960. They were less preoccupied with the possibility of traversing into the Couloir and had an altogether different climbing mentality. Modern climbers take the route because it is a known quantity (however dangerous). However, this was strictly not true in 1924, when (if anything) the Couloir was the known quantity.

In summary, we have two positive reasons based on ‘clues’ to believe that Mallory and Irvine made a traverse into the Couloir. In addition there are a number of reasons why the pair might have decided to abandon the ridge. Hence, the Couloir deviation ties together loose ends thrown up by the problem of the choice of routes. The theory might also explain why Odell (according to his later account of the sighting) was not sure that he saw the second climber follow the leader up the step and emerge against the skyline. Perhaps it only required Mallory to reconnoitre above the first step and make a decision.

However, descending the step, leaving the ridge, and opting for a lower traverse into the Couloir would have been time consuming and tiring. Would they have chosen to carry on if that was the best chance of success? There remains the possibility that Mallory and Irvine took the third option mentioned above, that of admitting defeat immediately after climbing the first step (as argued by Tom Holzel in 2001).

According to this scenario, the fatal slip occurred during the snow squall that lasted from about 2.00pm until about 4.00pm. The squall explains why Mallory removed his goggles and placed them in his pocket, and perhaps also explains the fall itself. Holzel suggests that the time shown on Mallory’s watch (retrieved in 1999) indicates the time of the accident. This time of 1.25 could only be consistent with the pair turning back immediately after being seen by Odell. However, the 1999 expedition determined that the watch wound down of its own accord, and so the time displayed has no bearing on the accident. Holzel points out that the watch was missing its crystal and placed in a pocket, suggesting that the pressure of coat fabric prevented the hands from moving, thereby preserving the time of the accident forever. This seems a little farfetched, although it might cohere with other arguments supporting a prompt return from the first step.

In his last note to Captain Noel, Mallory indicated his intention to reach the final pyramid by 8.00am. Even before arriving at the base of the first step he must have realised that he was massively behind schedule. Surely Mallory would have acknowledged his earlier mistake, namely failing to take into account the deterioration of climbing rates above camp six. It was this mistake that led him and Irvine to take only two bottles of oxygen each, believing that they could reproduce their encouraging progress from camp three with a ‘quick dash with oxygen’. Even before reaching the top of the first step, Mallory must have realised they were going to run out of oxygen and hours of daylight before returning successfully from the summit. This (it is argued) forced Mallory to accept that it was too late to invest more time in the ascent, whether it was continuing along the ridge or deviating into the Couloir.

However, there are a number of reasons for thinking (from Mallory’s point of view) that there was still a chance of pushing on and reaching the summit. Firstly, Mallory may have underestimated the demands of the mountain and the time required, but he may have done so to such an extent (hoping to reach the rock band at 8.00am and evacuate camp six before dark) that he had in his mind a large margin for error. The late start eats into this, but perhaps leaves open the possibility of returning to the top camp ‘in extremis’ at the end of the day. Since Mallory and Irvine were moving ‘with considerable alacrity’ and enjoying reasonable weather, and since the route above the second step appears to be relatively quick and easy, they might have decided to continue.

Secondly, Mallory knew hardly anything by modern standards about the effects and uses of oxygen. This was an age when it was still hoped that the mountain could be climbed ordinarily without oxygen. Finch’s account of coming off oxygen mid-climb in 1922 had been equivocal, stating that, although the effects were very unpleasant, they were not the extreme trauma predicted by some of his contemporaries. Spurred on by Norton’s impressive efforts, Mallory might have anticipated having an hour or more climbing even after coming off oxygen. What is more, he was probably of the opinion that oxygen was even less important on the descent.

These arguments are not meant to shed light on Mallory and Irvine’s chances of reaching the summit, since misperceptions do not help climbers reach the summit of Mount Everest. However, they do suggest the pair were not so quick to turn back (from the first step) as Tom Holzel supposes. If they chose to go on, then it could only be at the cost of losing yet more of their perceived margin for error and leaving hardly any room for further set backs.

Two definite problems with Holzel’s scenario are the positive arguments that Mallory and Irvine traversed into the Couloir. Holzel must explain why the pair chose to return by a route different to that taken on the ascent and why the bulky oxygen apparatus has not been found by the many climbing parties to have followed the familiar routes. Any suggestion that the apparatus was thrown down the mountain by the Chinese is rather disingenuous. Taking that approach to its conclusion, we may as well take seriously the idea that Tenzing and Hillary pushed Mallory and Irvine’s evidence off the summit pyramid in 1953.

In summary, there are two positive reasons for thinking that Mallory and Irvine went into the Couloir. There are various reasons why the pair might have decided to change their approach after seeing the difficulty of the knife-edge ridge between the steps. The main problem, namely that descending the first step would have consumed time and energy, has been answered in terms of Mallory’s perceived margin for error. Even if they were to begin the descent immediately, they would still have to climb down the first step. However, having used up his margin for error (at the beginning of the climb and then again in deciding to continue beyond the first step), Mallory must have realised the need to make fast progress towards the Couloir if he and Irvine were to stand any chance of reaching the summit.

Hence, the strong conclusion of this section is that Mallory and Irvine chose not to make the crossing between the steps. They climbed down the first step shortly after being seen by Odell at 12.50pm and probably proceeded towards the Couloir. The next section addresses the question of whether the pair reached the top. In deference to conventional wisdom, I look at the possibility that Mallory and Irvine continued along the ridge as well as the possibility that they traversed into the Couloir. If neither route offers a good chance of success, then the inescapable conclusion is that Mallory and Irvine failed to reach the summit of Mount Everest.

# Did they reach the top?

Assuming Mallory and Irvine continued their ascent after 12.50pm, what is the likelihood that they reached the summit, either by the ridge route or by a traverse into the Couloir?

If Mallory and Irvine chose the ridge, then the main obstacle to their reaching the top was the difficult second step. Could Mallory have climbed the fifteen foot headwall and helped Irvine over the same pitch? In the course of the 1999 expedition Conrad Anker attempted to free-climb the second step, but was forced in a moment of exhaustion to step on a rung of the Chinese ladder dating from 1975. Although he says that there was a foothold behind the rung, which he might have used in the absence of the ladder, he denies that he free-climbed the second step. However, Anker’s experience allowed him to grade the pitch on a modern climbing scale, placing the headwall climb a couple of points higher than any of Mallory’s climbs that have been graded by modern climbers. Hence, the testimony of the one man presently in a position to shed light on this question suggests that Mallory could not have climbed the second step. Anker did originally prevaricate, saying immediately afterwards that he thought ‘Mallory could have done that’. However, as our encounter with Odell demonstrates, there is no point having a star witness unless you are prepared to take him at his word, and that means his final word.15

This does not strictly rule out the possibility that Mallory was able to climb the second step. Many of his climbs have been reassessed and are now thought to be a little more difficult than originally supposed. These climbs, together with the equipment and safety practices of the time, indicate that Mallory was able to climb effectively even when greatly exposed. What is more, it does not follow from the fact that Mallory never had cause to make such a difficult move that he was incapable of rising to the occasion. However, weighing against this is the fact that Mallory would have been encumbered by the bulky oxygen equipment or else suffering the effects of coming off the gas. Also, if Mallory and Irvine were on the first step at 12.50pm, then they must have reached the second step just as the snow squall was beginning to make the going even more difficult.

Another consideration is a comparison with the Chinese climbers of 1960. They used a combination of techniques to scale the headwall fifteen years before their compatriots fixed a ladder to the rock. The shoulder stand was a technique familiar to climbers of the 1920s, and we can only expect that Mallory was prepared to use the broad rowing shoulders of his companion. However, even using the shoulder stand, Qu Yinua was required to remove this boots, later losing toes and his heel to frostbite, and made use of a piton driven into the rock, a tool that was not available to Mallory and Irvine in 1924. Hence, while it is just about conceivable that Mallory was able to climb the second step, we have good reasons to believe that, in fact, it was beyond his powers.

The likelihood of Mallory being able to climb the second step is usually debated within the context of this being where Odell saw the two climbers. In this analysis Odell’s sighting has been considered first, and so it has been possible to assess the question of the second step on its own merits. (Incidentally, the conclusion reached above can only support (retrospectively) the earlier arguments in favour of a first step sighting.)

The second step, then, is the major obstacle to the pair reaching the summit along the ridge route over the steps. Another constraint on any theory that puts Mallory and Irvine on the top is the necessary assumption that (having reached the summit) they possessed enough strength, oxygen, and hours of daylight to descend at least as far as the ice axe site. This consideration requires that we estimate times for the remaining sections of the climb.

Firstly, let us recall the timings yielded by the position of the oxygen bottle. It probably would have taken Mallory and Irvine four hours to exhaust oxygen bottle ‘number nine’ and another one hour to make up the distance between the bottle site and the first step. Assuming it took no more that fifteen minutes to climb the step, and assuming this is where Odell saw them at 12.50pm, Mallory and Irvine must have left camp six only a little before 7.45am. Their rate of climbing was good, but not exceptional compared to modern climbers (who spend more time fixing ropes). It should also be remembered, however, that Mallory and Irvine were covering a greater horizontal distance between their high camp and the first step, and so their climbing rate was at least as good as the modern average. This average can form the basis of estimations for the pair over sections of the route above the first step.16

The climb between the first and second step usually takes about one and a half hours (plus another fifteen minutes to climb the step). It can be assumed that, if Mallory was able to climb the headwall, then he would have done so as quickly as Conrad Anker. Above the second step, it takes modern climbers about four hours to reach the summit. Assuming that Mallory and Irvine kept up their fast pace, we can envisage them on the summit at about 6.30pm. Descending the route is easier than ascending, but we should give Mallory and Irvine no less than two and a half hours to reach the second step (at about 9.00pm). The section between the steps, due to its technical difficulty, still takes the best part of one and a half hours. Adding the best part of one hour for the pair to descend to the ice axe site puts them on the outskirts of the fall area no earlier than a staggering 11.30pm. (This analysis does not begin to take account of any possible delay caused by darkness.)

Clearly, these estimates are extremely rough. However, in each case I have been generous in my assessment of Mallory and Irvine’s climbing rates, and so the scenario above represents the best they could have achieved. If this best is inadequate, then we must rule out the possibility of their reaching the summit (assuming a first step sighting).

The problem with these timing is their relationship with the loss of daylight. Jochen Hemmleb estimates that sunset on Everest on 8th June 1924 occurred at about 7.00pm and was followed by a period of dusk and twilight lasting until about 8.30pm.17 By the time Mallory and Irvine arrived at the top of the second step it was already fully dark. No climber familiar with the headwall imagines that Mallory and Irvine would have been able to descend the second step under that condition. No light was seen on the mountain that evening by the watching expedition members, and so it is unlikely that Mallory and Irvine had any means of illuminating their path. Even descending the ridge towards the yellow band would have been extremely difficult and dangerous. Since we know that Mallory and Irvine descended at least as far as the ice axe site, it seems to follow that they could not have reached the summit by the ridge route.

This argument is should be disappointing to the hopes of those who wish to put Mallory and Irvine on the summit of Mount Everest. There are at least two more disappointing arguments, which hold true whether the pair ascended by the ridge or by the Couloir. The first is that, regardless of the timing of nightfall relative to their progress along the ridge, Mallory and Irvine simply did not have the physical strength (supported by the flow of oxygen from two bottles each) to reach the summit and descend as far as the ice axe site. Jochen Hemmleb suggests the pair might have taken a full complement of three bottles each, given the inventory found in Mallory’s pocket in 1999. However, it is not known when during the climb from camp three the list was made. Even if it were made on the night of 7th June, it still gives us no good reason to disregard Mallory’s expressed intention to ‘probably go on two cylinders’.

Any answer to the medical question of whether Mallory and Irvine were able to push on to the summit must take into account their exertions over the previous month and their strenuous efforts to deal with disorganised conditions at the lower camps. Irvine was suffering from excruciating sunburn of his face, painfully aggravated by the oxygen mask, and Mallory had expended much energy in a failed attempt on the North Ridge and in rescuing porters stuck on the North Col. Both men were exhausted even before they left camp six on the morning of the climb. On a separate point, however, they might not have been as ignorant of the dangers of dehydration as some commentators emphasise. Both men would have observed the state of Norton and Somervell when they returned to camp four desperate for liquid, and Irvine himself would have learned from his experience of dehydration at the lower camps.

A final problem is the absence of any evidence of the pair above the first step. The bulky oxygen frames, complete with finals bottle for each man, remain to be discovered either above or below their known high point. The problem extends to the lack of any evidence of the pair on the summit itself, since Hillary made a point of looking when he reached the top with Tenzing in 1953. It is farfetched at best and disingenuous at worst to suggest that either Hillary or the Chinese (who made the first ascent from the north) destroyed this evidence. Furthermore, Mallory and Irvine were not spotted by Captain Noel, whose camera was trained on the summit pyramid in accordance with Mallory’s final instructions. Other expedition members watched the mountain all evening for any sign or light, but saw nothing.

These last problems apply as much to the possibility that Mallory and Irvine ascended by the Couloir as they do to the possibility that they continued up the ridge. What else can be said of that alternative scenario, in which they change routes after climbing the first step and opt for a traverse towards the Couloir?

Firstly, it should be recalled that the lack of material evidence is less problematic for the Couloir theory than it is for the ridge. Possible routes into the Couloir and those returning from it cover a much wider area than the narrow section of the ridge between the steps, and (because of the success of the Chinese in 1960) far fewer expeditions have gone that way than have followed the ridge. Hence, it is less problematic that nothing has been found in the Couloir. This is one reason to think that a summit theory is more compatible with a traverse than a ridge climb.

Second, Mallory and Irvine would have completely bypassed the double obstacle of the second step. Not only is the great problem of ascending the headwall removed, but they are also spared the timing problem of descending the step in daylight. This seems to put a possible summit back on the map, although the Couloir scenario presents its own timing difficulties to theories that place Mallory and Irvine on the summit of Everest.

How long would it have taken Mallory and Irvine to reach the critical section of the Couloir from the first step? Wager and Wyn Harris (following the same projected route) spent more than five hours reaching their high point by a traverse from just below the first step. Norton and Somervell and (to a lesser extent) Shipton and Smythe followed an easier and more direct route well below the steps. It took Norton a little over six hours to reach his high point from the 1924 camp six on the North Ridge. Perhaps three of those hours represent his traverse below the steps. Shipton and Smythe took four and a half hours from their high camp, including one hour to reach the first step. Even if Mallory and Irvine took a lower route into the Couloir, and even taking into account their oxygen advantage over other pre-war British climbers, it still would have taken them at least three hours to arrive at the critical section of the Couloir (at about 4.00pm).

One very specific problem follows from this timing. Mallory and Irvine would have been on the steeply sloping tiles of the Couloir immediately after the snow squall that lasted for two hours. Norton’s account of the difficulty of these tiles under good conditions was not encouraging. A layer of new snow would have made it almost impossible for Mallory and Irvine to find a route over the tiny ledges.18 Perhaps all four pre-war parties that made good progress towards the summit were defeating at this point in the Couloir.

There is a broader question of timing that holds true even if the route was passable. It would have taken Mallory and Irvine another four hours to reach the summit (at 8.00pm) from the critical section of the Couloir. Assuming it took them at least two and a half hours to retreat those steps and at least another three hours to reach the fall area, Mallory must have slipped and fallen no earlier than 1.30am on the morning of 9th June. Hence, it is extremely unlikely that Mallory and Irvine had the hours of daylight or the strength, let alone the oxygen, to reach the ice axe site from the summit. It is also unlikely that the pair could have climbed down the Couloir in twilight or complete darkness. The Couloir route may offer a better chance of their reaching the summit, but Mallory and Irvine’s descent as far as the ice axe site still suggests that they failed to reach the summit.

What of the final arguments made to suggest the pair made it to the top? Firstly, there is the fact that no photograph of Ruth was found on Mallory’s body in 1999. It has been suggested that Mallory intended to place a photograph of his wife on the summit by way of sealing his dedication of the climb to their love. It is argued, therefore, that Mallory must have succeeded in his task. However, the photograph story may have been greatly exaggerated, since Mallory made no recorded mention of these plans in the weeks before his last climb. The story may have been a romantic ideal rather than a practical intention. Alternatively, it is possible that Mallory, knowing that he would not return to Everest, placed the photograph at his highest point as a letting go of the ‘wildest dream’ and a dedication to his future family life.

Secondly, there is the fact that folded snow goggles that were found in Mallory’s pocket. The argument is that, having seen how Norton developed snow blindness only a few days previously, Mallory would not have removed the goggles under sunny conditions. It is inferred, therefore, that Mallory was descending at night when the slip occurred. This, it is claimed, increases the likelihood of his reaching the summit. However, as we have seen, Mallory would have been descending not just in darkness, but actually in the middle of the night. It is quite possible that he turned back above the first step and descended in twilight. Alternatively, if Mallory retuned from the first step immediately after being seen by Odell, he would have passed through the fall area during the snow squall. This may have forced him to remove the goggles in order to see his way through the yellow band. In short, the goggles clue sheds no what happened to Mallory and Irvine (except perhaps by endorsing a division of possibilities between their turning back at 12.50pm and continuing long enough to descend in twilight.

# What really happened?

What can we conclude about the movements of Mallory and Irvine after they were last seen by Odell on the first step at 12.50pm? It is extremely unlikely that the pair had any chance of reaching the summit, and so the issue becomes their point of return and the measure of their achievement. Perhaps they were halted at the headwall of the second step and forced to retreat down the ridge, or perhaps they went into the Couloir and were repelled by the snow covered slabs. Alternatively, if they advanced beyond these obstacles, then they were forced to turn back by physical exhaustion and the depletion of their bottled oxygen. Each possibility is based on a practical impediment to their reaching the top. However, the final piece of the jigsaw must also fit more human considerations of motivation and decision-making. It will be argued here that Mallory and Irvine chose to turn back even before arriving at their physical limit.

In earlier sections it was strongly emphasised that Mallory and Irvine must have been aware of being far behind any reasonable schedule for reaching the summit. The decision to continue beyond the first step, together with the lateness of their start, meant that Mallory and Irvine had used up whatever margin for error they had in their minds when planning the attempt. The anticipated ‘quick dash with oxygen’ had been slow at the beginning and had found the going even harder than expected. It is in this context that the possibility of their continuing the ascent should be considered. It would not have taken much to force them into recognise that the game was up and that their best option was to begin the descent.

What factors influenced their decision-making progress? Firstly, the arrival of the snow squall at approximately 2.00pm would have greatly concerned Mallory and Irvine. We now know that the squall cleared up within two hours, but the climbers on the mountain faced the real and dangerous possibility that the squall would develop into a storm. This would have made route-finding more difficult and progress almost impossible, particularly since Mallory and Irvine had no compass. Mallory was very concerned about the arrival of the monsoon, which he understood could strike at any moment. This is not to say that he feared the monsoon arriving in the hours of their climb, but they had still to descend to base camp, and so there would have been no time for continuing the attempt.

Secondly, Mallory and Irvine would have been hampered by inevitably slow progress beyond the first step. If they continued along the ridge, then their rate of climbing fell dramatically as they negotiated the difficult section between the steps. A traverse into the Couloir would have required losing height in order to reach easier ground, and this height would not have been regained within three hours. This means that oxygen available to the pair was running out faster relative to distance gained. Having gambled on a fast ascent with oxygen, Mallory could not have disregarded the depletion of the gas, even if he entertained notions of continuing without its use.

Hence, it is likely that, even if they continued beyond the first step, Mallory and Irvine chose to turn back (irrespective of technical obstacles to their reaching the top). When all factors are seen together the pressure to turn back is irresistible. We have identified the severe obstacles in the way of the pair reaching the summit and descending successfully to the ice axe site. As long as we maintain that Odell saw the pair climbing the first step at 12.50pm, it is practically impossible that Mallory and Irvine were the first people to climb Mount Everest.

# Conclusion and evaluation

A number of factors make it extremely unlikely that Mallory and Irvine reached the summit of Everest. Their high camp was simply too far from the top (and Mallory’s fall too low on the mountain) for us to envisage them having the strength to cover the necessary ground. The problem is also one of oxygen supply, since Mallory’s stated intention of taking only two bottles each means that they had insufficient gas to support them to the summit and back. The discovery of bottle ‘number nine’ suggests that Mallory and Irvine were not climbing fast enough to reach the summit and return to camp six in daylight. The timing problem is accentuated by Odell’s sighting the pair on the first of the steps, since this suggests a late time of starting. Finally, if Mallory and Irvine are supposed to have continued along the ridge beyond the first step, then the headwall of the second step represents a major obstacle to their reaching the summit.

Mallory and Irvine probably left camp six later than they hoped (perhaps due to some failing in the oxygen apparatus) at about 7.45am. They climbed towards the modern route following the gully running through the yellow band, attaining the ridge at the mitten site. They followed the ridge and dropped their first oxygen bottle before the first step (where a cornice forced a slight traverse to the right) and proceeded to climb the step (observed by Odell) at 12.50pm. This interpretation of Odell’s sighting, which yielded the estimated start time for the pair, considers Odell the best judge of something only he will ever have seen. The two problems with a first step sighting, the step being a long way down the ridge and the lateness of Mallory and Irvine, were addressed and overcome.

Two clues give us good reason to believe that Mallory and Irvine descended the first step and made a traverse towards the Couloir. The position of the ice axe means the pair were returning to camp six by a different route, and the best explanation for this change is that they were returning from a point below the ridge. The conspicuous absence of the pair’s oxygen apparatus on the familiar route between the steps suggests that those artefacts lie on the barely explored route between the first step and the Couloir. In addition are various reasons (based on the danger of the section between the steps and the difficult of the second step) why Mallory and Irvine would have chosen not to continue along the ridge.

It seems likely that the pair decided to turn back within a couple of hours of passing beyond the first step. They had already eaten into their perceived margin for error. The snow squall, the difficult section of the Couloir, the persistent slowness of their progress, and the depletion of their oxygen, probably convinced Mallory and Irvine that they would not reach the summit.

On the descent Mallory and Irvine had no incentive to regain the crest of the ridge, and so they attempted to return to camp six by a route that passed through the ice axe site. Irvine must have forgotten the axe after a short rest due to tiredness and a preoccupation with getting back to camp. By the time he realised the mistake it was already too late to alert Mallory (at the other end of the rope) and not worth returning for the axe.

The combination of contour line analysis and the limited injuries argument enable us to approximate the location of Mallory’s fatal slip. It appears that Mallory fell near the site of the 1933 camp six, slightly lower and to the east of the ice axe. Irvine, exhausted and in a state of shock, collapsed here and died later of exposure. The area identified matches the supposed sighting of Irvine by the Chinese in 1960.

Two points of argumentation require particular emphasis. The first is the primacy of Odell’s sighting, since a potential confusion was removed from the discussion by answering that question first. Keeping the Odell question open would have left too many variables in discussion of the remaining issues. It would have prejudiced us in favour of the notion that Mallory and Irvine continued along the ridge (given the possibility that Odell saw them on one of the higher steps). The revisionism of this paper is the argument that Mallory and Irvine chose to traverse into the Couloir rather than continue along the ridge between the steps.

The second point is the importance of timing, since all climbing rates and times have been derived from the single clue of oxygen bottle ‘number nine’. It is assumed that the bottle was full when Mallory and Irvine departed camp six, and that it was set to the lower flow rate (providing a longer climbing time). These assumptions are based on the supposition that, having decided to take two bottles, the pair made maximum use of the gas to justify the weight of the apparatus. However, if this interpretation is false, then Mallory and Irvine’s climbing rates do not compare with the modern average over the distance from camp six to the oxygen bottle site, and we are unable to estimate times for the remaining sections of the climb.

Does this mean that Mallory and Irvine could still have reached the summit? It is possible, but only if we unravel the careful reasoning of this analysis. If Odell did not see the pair anywhere on the Northeast ridge, then Mallory and Irvine need not have been greatly behind schedule and might have left camp six as early as 6.00am. If oxygen bottle ‘number nine’ was only half full, then their rate of climbing from camp six is as good as doubled. If the bottle was one of three available to each climber, then their supply of oxygen is significantly increased. Finally, if Mallory and Irvine took a route into the Couloir, avoiding the second step, then perhaps they could have reached the summit before the snow squall made progress too difficult. Reaching the summit pyramid during the snow squall would explain why they were not seen by through the lens Noel’s camera.

This possible scenario is an exciting prospect. However, that something is possible is strictly not a reason to believe that it actually happened. The message of this analysis is that we have every reason to believe that Mallory and Irvine did not climb Mount Everest in 1924.

# Appendix – Odell’s sighting

Odell’s first written account of the sighting (his diary entry) stated simply that he saw Mallory and Irvine on the ridge nearing the base of the final pyramid.

The original dispatch to The Times newspaper:

‘At 12.50, just after I had emerged from a state of jubilation at finding the first definite fossils on Everest, there was a sudden clearing of the atmosphere, and the entire summit ridge and the final peak of Everest were unveiled. My eyes became fixed on one tiny black spot silhouetted on a small snow-crest beneath a rock-step in the ridge; the black spot moved. Another black spot became apparent and moved up the snow to join the other on the crest. The first then approached the great rock-step and shortly emerged at the top; the second did likewise. Then the whole fascinating vision vanished, enveloped in cloud once more.

‘There was but one explanation. It was Mallory and his companion moving, as I could see even from that great distance, with considerable alacrity, realizing no doubt that they had none too many hours of daylight to reach the summit from their present position and return to Camp VI by nightfall. The place on the ridge referred to is the prominent rock-step at a very short distance from the base of the final pyramid, and it is remarkable that they were so late in reaching this place. According to Mallory’s schedule, they should have reached it several hours earlier if they started from the high camp as anticipated.’

Key selections from the revised account in *The Fight for Everest 1924*, published in 1925:

‘I noticed far away on a snow slope leading up to what seemed to me to be the last step but one from the base of the final pyramid, a tiny object moving and approaching the rock-step. A second object followed, and then the first climbed to the top of the step.’

‘Owing to the small portion of the summit ridge uncovered I could not be precisely certain at which of these two ‘steps’ they were, as in profile and from below they are very similar, but at the time I took it to be the ‘second step’. However, I am a little doubtful now whether the latter would not be hidden by the projecting nearer ground from my position below on the face.’

**Notes**

1. Geoffrey Winthrop Young said of his friend: ‘after nearly twenty years’ knowledge of Mallory as a mountaineer, I can say… that difficult as it would have been for any mountaineer to turn back with the only difficulty passed – to Mallory it would have been an impossibility… because Mallory was Mallory’.
2. See the epilogue in the paperback edition of *Fearless on Everest*.
3. Jochen Hemmleb is the historical mastermind behind the archaeology of the 1999 and 2001 Mallory and Irvine Research Expeditions. He is a co-author of *Ghosts of Everest*, 1999.
4. It might be argued that Odell invented the sighting on the second step to suggest that Mallory and Irvine were at least ‘going strong for the top’, as if to offer some consolation to the grieving relatives. This is partly contradicted by the fact that Odell recorded seeing Mallory and Irvine on the ridge before he realised the pair were dead.
5. Odell originally changed to the first step because he believed he would not have been able to see the second step from where he was standing on the North Face. The 1933 expedition climbers proved this to be false, but Odell stuck to his opinion about the first step. He then picked up on the height and difficulty of the second step compared to the first step. Odell returned to Everest in 1938 and surely scrutinised the ridge through binoculars. When questioned in the late 1980s shortly before his death, Odell was adamant that he saw Mallory and Irvine on the first step.
6. The 1924 oxygen bottles supported about four hours of climbing on the lower flow rate. Mallory’s note to Odell suggest they were climbing with two bottles each. It is assumed that they were full and used sparing to justify the weight.
7. Tom Holzel reopened the debate about Mallory and Irvine in the 1970s. He is the co-author of *The Mystery of Mallory and Irvine*, 1986, revised 2000.
8. Another argument that Wang moved Mallory is the claim that Wang referred to Mallory’s head wound, which he could only have seen if the body was originally face up. Since it was face down in 1999, Wang must have moved Mallory. However, Wang pointed to his cheek rather than his forehead. It can be assumed that he was simply indicating that some flesh had been eaten by the goraks, which matches the evidence of Mallory’s legs and buttocks.
9. It was claimed in *Ghosts of Everest* that Mallory had moments of consciousness after the fall, in which he adopted the ‘pacific’ posture. The moments of consciousness and self-arrest arguments provide alternative accounts of the same outcome, and both are seemingly incompatible with a long fall. I incline to reject the idea of Mallory stretching out his arms (when surely he would try to curl up) and placing one leg over the other broken one (which is incredible). On the other hand, Mallory’s fingers seemed to be undamaged, bringing into question the theory of self-arrest. There is no easy answer.
10. See the orthophoto of the North Face produced by the Swiss Alpine Institute. This is an aerial photograph modified to correspond to a two-dimensional map over which highly accurate 20 metre contour lines have been superimposed.
11. See http://www.wou.edu/poston/everest for an introduction to photo analysis.
12. The Chinese claim to have seen Irvine during their 1960 climb is baffling and unconfirmed. Why did this not come to light much earlier, for example in the late 1980s (when Tom Holzel was inquiring after Wang Hongbao’s earlier sighting) or after Mallory was found in 1999? The Chinese suggested that Irvine was in a sleeping bag, and yet it is surprising that he took such an item on the summit attempt, since the pair took no lighting and did not anticipate having to bivouac.
13. See High Mountain Sports magazine, June 2001.
14. See <http://www.k2news.com/jocheni.htm> for Jochen Hemmleb’s research.
15. At a lecture attended by the author in 2002 Conrad Anker reiterated that he did not free-climb the headwall of the second step and that he did not think Mallory could have done it. He said that he would like to meet anyone who could do it, and that he would gladly ‘buy them a big steak dinner’.
16. These average climbing times are taken from a variety of sources, but based mainly on Conrad Anker and Dave Hahn’s climb in 1999, since that expedition experienced snow conditions similar to those experienced by the 1924 expedition. If Mallory and Irvine’s climbing rates did not equal those achieved during this climb, then it might be possible to calculate how fast they were progressing as a proportion of Anker and Hahn’s times.
17. See Hemmleb’s treatment of this question in chapter 8 of *Ghosts of Everest*.
18. It might be thought that sufficiently heavy snowfall would have made the going easier, although Odell testified that the snow did not settle. The danger, as Norton experienced, was that a climber could not see where he was putting his foot in relation to the tiny ledges offering a route through that part of the Couloir.