"Lower It Would Not Go" – Travels amongst the Great Andes by Edward Whymper in 1879-1880

Jane INSLEY, United Kingdom

Key words: Edward Whymper, Climbing, Ecuador, 19th century, Royal Geographical Society, aneroid barometer, barometric altitude measurement, history of surveying.

ABSTRACT

Edward Whymper is probably best known for the first successful ascent of the Matterhorn, the highest mountain in Europe, in 1865. Of the seven climbers to attempt it, four died during the descent; mountain climbing then was regarded as still an extension of "scrambling", although standards of professionalism and safety were beginning to be taken more seriously. Whymper also travelled to the Great Andes in Ecuador, primarily to investigate the effects of altitude sickness on humans and animals (with himself and his team as guinea pigs). An important part of his journey revealed that the mapping of the areas inland from the coast and near to Quito was very inadequate; he attempted to follow the path taken by Alexander von Humboldt in the 1820s, and to repeat barometrical measurements on various peaks in the area.

Until Humboldt's time, Chimborazo was considered to be the highest mountain in the world. By the time of Whymper's trip, this was known to be untrue, and that accolade had been given to Mount Everest in the Himalayas. The height of Mount Everest had been determined during the measurement of sightings of peaks from fixed stations at a considerable distance, and the calculations which identified it took place some four years after the original measurement. In the case of Chimborazo, the mountain could and had been climbed, with mercury barometers for summit measurements. Whymper took both mercury and aneroid barometers with him to check the earlier work, and entrusted their care to two Alpine guides who accompanied him, the Carrel cousins from Val Tournanche.

The subsequent account of his journey was copiously illustrated with engravings, giving a vivid picture of their progress (or otherwise).

CONTACT

Ms Jane Insley
Science Museum. Exhibition Road,
London SW7 2DD
UNITED KINGDOM
Tel. + 44 (0) 207 942 4213
Fax + 44 (0) 207 942 4103
E-mail: j.insley@nmsi.ac.uk
Web site: www.sciencemuseum.org

"Lower It Would Not Go" – Travels amongst the Great Andes by Edward Whymper in 1879-1880

Jane INSLEY, United Kingdom

1. INTRODUCTION

Edward Whymper is probably best known for the first successful ascent of the Matterhorn, the highest mountain in Europe, in 1865. He is equally well known for the terrible accident that occurred on the descent - of the seven climbers to attempt it, four died in a fall; mountain climbing then was regarded as still an extension of "scrambling", although standards of professionalism and safety were beginning to be taken more seriously. Whymper also travelled to the Great Andes in Ecuador, primarily to investigate the effects of altitude sickness on humans and animals (with himself and his team as guinea pigs). An important part of his journey revealed that the mapping of the areas inland from the coast and near to Quito was very inadequate; he attempted to follow the path taken by Alexander von Humboldt in the 1800s, and to repeat barometrical measurements on various peaks in the area. Until Humboldt's time, Chimborazo was considered to be the highest mountain in the world. By the time of Whymper's trip, this was known to be untrue, and that accolade had been given to Mount Everest in the Himalayas. The height of Mount Everest had been determined during the measurement of sightings of peaks from fixed stations at a considerable distance, and the calculations which identified it took place some four years after the original measurement. In the case of Chimborazo, the mountain could be and had been climbed, and summit measurements made with mercury barometers. Whymper took both mercury and aneroid barometers with him to check the earlier work, and entrusted their care to two Alpine guides who accompanied him, the Carrel cousins from Val Tournanche. He also used the sightings of peaks to measure the heights of other significant Ecuadorean Andes.

2. BRIEF BIOGRAPHY OF WHYMPER

Edward Whymper was born in London on 27 April 1840, the second of eleven children of the wood engraver Josiah Wood Whymper and his first wife Elizabeth Claridge. He attended school to the age of 14, then became an apprentice draughtsman engraver in his father's business. Both father and son were notable watercolour illustrators as well as engravers, and the young Whymper was groomed to follow in his father's footsteps. He developed a strong but initially unfocused ambition to make something of himself, which began to resolve itself in 1860 during a trip to the European Alps, on commission for illustrations for the publisher William Longman. Later Whymper claimed that his initial aim was to bcome familiar with conditions in snow and ice, with a view to Arctic exploration. However, his natural talent for "scrambling" netted him the first ascent of Mount Pelvoux in 1861, and subsequent election to the Alpine Club; in the following summers he made a series of brilliant climbs, culminating in success on the Matterhorn in 1865, at the seventh attempt.

Whymper's climbing interests fed back into his professional life. His illustrations became much sought after for travel books and journals, he contributed jointly with his father to Joseph Wolf's "Wild Animals" (1873-4), and eventually took over his father's business in addition to his own. The firm only closed in 1900, in the face of over-whelming competition from cheap photography. He maintained his interests in climbing and exploration with frequent visits to the Alps, producing and marketing guidebooks to Chamonix and Zermatt, and in the winters used his considerable skills as a communicator in public lectures illustrated with his own work.

He married in 1906, divorcing four years later, and died in Chamonix on 16 September 1911, where he is buried in the churchyard of the English Church.

3. THE MATTERHORN

The biggest draw for climbers in the Alps during the 1860s was of course the Matterhorn. Its appeal for Whymper lay in its grandeur, and in the challenge of its being thought to be the most thoroughly inaccessible of all mountains. He became more determined either to find a way up it, or to prove it to be inaccessible. "Scrambles Amongst the Alps" , his account of his attempts, was not only extremely skillfully written, but also lavishly illustrated with over 100 woodcuts from his own sketches, and he paid tribute to the engravers in the preface. The book was published in 1871, and became one of the most popular mountaineering books ever written. The stories described his surroundings, his travelling companions, and the people and places he came across along the way, with stylish good humour and considerable wit.

His first attempt at the Matterhorn was in 1861. The peak is 14780 feet high and rises abruptly by a series of cliffs a clear five thousand feet above the glaciers which surround its base. Local superstitions ran rife concerning the "jins and afreets" that lived above an apparent cordon beyond which no-one had yet ascended. Of the five men who had tried the climb from 1858, three were from the Carrel family of guides from the Val Tournanche. Whymper described Jean-Antoine as "the finest rock-climber I have ever seen" and during the next few years the two vied with each other and Tyndall for victory. As time passed, Whymper not only became a much more skilful climber, but he also began to take a more technical interest in climbing equipment than had been the case before this point. In the 1862 season, he tested a new form of tent , devised to combine lightness with stability. The base was six feet square, and it was intended to accommodate four people. He also developed two gadgets to assist the solitary climber – a small grapnel to act as an anchor on a supporting rope, and a metal ring used to help release rope from loops around rocks. The narrative for the 1864 season introduced the reader to the guide Michel Croz, whose professional qualities were demonstrated during a particularly tricky passage over the highest pass in the Dauphine region. The descent was even more challenging, including a slope of 54 degrees, comprised of sheet ice, down which steps had to cut one by one. The way became unclimbable just as clouds rolled back to reveal a huge fissure in the ice, necessitating each man to jump fifteen or sixteen feet outwards, and seven or eight feet outwards. The illustration of this feat being embarked upon by Whymper's friend Reynaud is one of the more memorable in the book.

By 1865, many were keen to attempt the Matterhorn, and Whymper himself was "bamboozled and humbuggd" over the booking of guides for his own efforts. Having been outwitted by a prestigious party of Italians, who had engaged the Carrels for their expedition, Whymper was fortunate enough to meet a party of English climbers led by Lord Francis Douglas, and also to discover his former guide-chef Michel Croz in Zermatt was available for work. By setting up a camp on the mountain on 13th July, the English team were able to set off at first light on the 14th, and at 1:40 pm were not only on the summit, but had the satisfaction of seeing the Italian party down below. They attracted their attention by shouting and throwing rocks down the cliffs, incidentally adding substance to the stories of jins and afreets, and planted a makeshift flag on a pole at the top, to be seen from all the villages in the valleys below.

However, disaster struck on the way down. The most inexperienced of the party slipped at a moment when Croz as lead guide had put down his axe to turn to give him a hand; the next two were dragged from their feet, but Whymper and two other guides at the back had time to brace themselves. When the rope jerked tight, it also broke, and subsequent enquiries established that it was an inferior lightweight one which was being incorrectly used. The front four men died in their fall, and the bodies of three were recovered soon after.

Although Whymper would continue to travel to the Alps and indeed write guidebooks to Chamonix and Zermatt, his career as an Alpine climber was effectively ended. In 1867 he turned his attention towards Greenland, and although his original plan for exploration and perhaps a crossing proved to be beyond his means, his preliminary trips resulted in papers in the Alpine Journal a lecture to the British Association, and a description of the specimens obtained was published in Philosophical Transactions (1869). But in 1874 his thoughts turned further afield.

4. WHY ECUADOR? SUSTAINING LIFE AT GREAT HEIGHTS

The problems of what we would now refer to as altitude sickness were acknowledged but not well understood in Whymper's time. The diversity of symptoms include nausea and vomiting, headaches of a severe nature, fever, lassitude, haemorrhages, deprtession and weakness, and in most cases could only be cured by descending to a lower altitude. Theories about its cause abounded, whilst diminished atmospheric pressure was accepted as key, with local factors and individual constitutions contributing to a variety of symptoms. Contrary evidence came from the experiences of balloonists and mountaineers reports, and in 1874 Whymper suggested a scheme whereby most of the variables could be avoided. This would involve eliminating complications arising from fatigue, privations, cold, lack of or the wrong type of food; the persons should be previously accustomed to mountain work; the heights to be dealt with should be well above those at which symptoms are known to appear; and that preparations should be made to stay at high altitude for a relatively long time.

For political reasons the Himalayas, Chile, Peru and Bolivia were all out of bounds. Whymper's attention turned to Ecuador. As the main object of the journey was to observe the

effects of low pressure and to attain the greatest possible height to experience it, Chimborazo claimed the first attention. Its height had been measured by Humboldt in 1810, and reported as 21,425 feet; altitude symptoms tended to manifest themselves above about 14,000 feet, so the plan was to made a series of camps on the mountain, eventually reaching the summit and measuring it. In case circumstances mitigated against this, other plans were to determine the heights and relative positions of the chief mountains of Ecuador, the comparison of aneroid barometers and boiling point apparatus against the mercury barometer, and the collecting of botanical and zoological specimens from high altitudes.

To carry out the plan, a team of four was thought to be desirable. Whymper's first choice was Jean-Antoine Carrel, who accepted the proposals. Two other Alpine guides agreed but then withdrew, so Jean-Antoine prevailed upon his cousin Louis to join the group. A fourth had to be engaged in Ecuador, but who lacked the same knowledge of mountain craft shared by the other three. Introductions and other tips and guidance were readily forthcoming from other travellers with experience of the region; Douglas Freshfield (also of the Alpine Club and in due course to be Whymper's obituarist) arranged a meeting with Von Thielmann, recently returned from Columbia and Ecuador, and through him Dr Stubel of Dresden provided a copy of unpublished altitudes he had taken in 1871 to 1873. In December 1879, the party landed at Guayaquil.

5. THE EXPEDITION

Guayaquil was the port nearest to Chimborazo, which according to Humboldt stood 21,425 feet above the sea. Local knowledge remarked that the mountain could rarely be seen from the coast more than once or twice a month. The significance of this for reconnaissance purposes was not lost on the team, particularly as the rainy season was about to start, so as soon as drivers and pack animals could be organised, they took a steamer up river, and set off. With the rains, the road became "a sea of greasy mud", and roadside accommodation varied from extremely basic – "Sleep was enlivened by a superabundance of animal life" – to almost non-existent, when they were reduced to sleeping on their packing cases.

For the early part of their journey, they had little confidence in where they were going. Three earlier maps were available – one by Don Pedro Maldonado from the early 1700s, La Condamine's precision triangulation for the Peru arc of the meridian in 1751, and a more modern map by Manuel Villavicencia published in New York in 1858. Maldonado made no mention of an entire range of mountains to the immediate west of Chimborazo, and suggested in several places that the land was flat. La Condamine, whilst transmitting his own detailed precise measurements, both copied from Maldonado for the rest and left out some more, and

Villavicencia took this even further. So their first crossing of a pass above Tambo Loma came as a revelation, and not merely because they were above the clouds. Whymper was able to describe, and subsequently circuit, a range of mountains which included several peaks of 15,000 feet or more, and being 65 miles long and up to 20 miles wide was at least double the size of the Mont Blanc range. Chimborazo was separated from the end of the range by "a large and profound valley".

So Whymper started to make his own map. “I have used the Latitudes of La Condamine for Quito and Rio Bamba, and adopted 79 degrees 52 minutes 27 seconds W as Longitude for Guayaquil. The details have been filled in from my own observations (principally angles taken with a transit theodolite) except such courses of rivers as are given in dotted lines. Many of my names will not be found in earlier maps, and in the positions both of towns and mountains I frequently differ from my predecessors. As nearly every town, village or inn is given on the route from Guayaquil to Quito, this route map may be found of some service by persons travelling between the coast and the capital.”

At Guaranda, after another night on the packing cases, they hired a house for the duration of their Chimborazo expedition. At this stage, despite this being the nearest town to the mountain, it was still invisible. Even when they set out to begin the climb of the lower slopes, there was no way to know such a high peak was so near. However, a regular mule route to collect ice from the glaciers above indicated that local assistance should be forthcoming to a height of 15,000 feet with little difficulty.

On 21 December they saw the mountain for the first time.Chimborazo had two peaks and the intervening distance was almost entiurely glacier, a feature that none of the earlier writers had mentioned. This had serious implications for route planning, and after some debate amongst the team it was agreed that perhaps the furthest peak was the tallest, and that the choice of route should be the south west ridge. This had the added attraction of being the route used by both Humboldt, who got to 19,286 feet in 1802, and another climber, Joseph Dieudonne Boussingault, who in 1831 thought he had reached 19,698 feet. Neither got to the top. While the Carrels scouted ahead, to choose a campsite, Whymper returned to these earlier reports to look for further clues.

Until this moment, there was no reason to think the heights were other than correct. Both reported relatively easy climbs, and both described symptoms of altitude sickness. Humboldt had clearly been deeply impressed by Chimborazo, but Whymper had to admit that he could not tell from the writings just where exactly he had been. Boussingault had climbed with two companions, and had been shown the point that Humbodlt reached, but not how to get there. Both groups also reported descents across apparently dangerous terrain “at a divine rate for men encumbered with mercurial barometers, and laden with geological collections”. At last being in a position to study the reports and the mountain together, Whymper found himself “roughly disillusionized” – at the heights reported, there were no visible places on the slopes where mercury barometers could possibly have been used, and he began to doubt the altitudes. The actual height of Chimborazo became a matter of much greater interest.

The Carrels returned, having reached a highest point registered on their aneroid as equivalent to 19,122 feet, but which in practice turned out to be a mere 16,450 feet. The main climb had to be postponed to Boxing Day, mules and drivers were guided to the chosen campsite, the temperature plummetted overnight, and the team awoke to discover that the drivers and five of the mules had disappeared.

This had the effect of requiring rather more trips up the mountain to set up the higher camps, plus the necessity for someone to remain with the stores to ensure nothing else went missing. The site chosen for the second camp was not a large distance away, but none of the Europeans had ever been higher than 16,000 feet before, and by the time the site was reached everyone, including the mules, was gasping for breath. The barometer stood at 16 and a half inches. About an hour later, the Europeans were all struck by severe mountain sickness. Somewhat to Whymper's surprise, and probable relief, the local agent Mr Pelling, not an active man in the slightest in normal times and with a physique to match, was completely unaffected, and nursed all three of them for the two or three days it took for the symptoms to wear off.

It was not until January 4th 1880 that they finally reached the summit, via a third camp. Wrestling against both deep soft snow ad a vicious wind, they managed to set up the barometer using the theodolite tripod. One had to hold the tripod down in place, another held a poncho to form a windshield of sorts, and the third lay flat on the ground in order to take the reading. At a temperature of 21 degrees Fahrenheit, the barometer read 14.100 inches, and "Lower it would not go". This was roughly estimated to give a height of 20,608 feet (over 800 feet lower than the Humboldt estimate), later adjusted to 20,545 feet. Two aneroids taken to the top showed readings of 13.050 and 12.900 inches respectively, the mean reading of which would have given a height some 1000 feet higher than Humboldt.

"I considered that it was desirable to ascend Chimborazo again, to see whether we could improve our route, to learn whether our deplorable rate at the upper part was due to the softness of the snow or was to be attributed to diminution in atmospheric pressure; and to remain a longer time on the summit to repeat the observations of the barometer, and to obtain a round of angles, - for it was obvious that this commanding position covered an immense range. It was consequently understood that another ascent was to be made, as soon as the conditions became favourable."

The weather then deteriorated, and it also became clear that the staff were becoming unhappy. The youger Carrel had succumbed to very bad frostbite on his feet, and the older one insisted that retreat was the only option. So in stages, the expedition descended the mountain, Whymper remaining at height until he had taken more angles for his map, and measured a base line near the position of the second camp. By the time the team regrouped at Chuquipoquio, the next village on the itinerary, Whymper too was in need of a doctor, "through having acquired in Ecuador a complaint which rendered riding impossible, and obliged [him] to walk with circumspection."

The promised return to Chimborazo did not take place until early July. The route they followed took them past Quito to Cotocachi, and then back to head for Guayaquil and the steamer home. However, whilst in Quito, Whymper took the opportunity to try to discover the fate of the pyramids erected by La Condamine to mark the baseline used for the measurement of the Peruvian arc, and was delighted to find one of the commemorative tablets. This had been annexed by a local farmer; measuring four feet long and six inches thick, it had been placed on one side of a courtyard for use as a mounting stone.

July 3rd saw them ready to go. Just after their departure they noticed that the volcano Cotopaxi, some sixty miles distant, was beginning to erupt. The skies gradually filled with a variety of unusual phenomena, dutifully recorded by Whymper (and subsequently published in *Nature*), including a green sun. By noon the clouds of ash were almost overhead, and when they reached the summit just after 1 pm, the sun was invisible and the temperature was falling. Protection from the wind was afforded by digging a trench in the snow, and the mercury fell from 14.050 inches at 20 degrees Fahrenheit, to 14.028 at 15 degrees, and "*lower it would not go*".

About ten minutes after their arrival at the summit, the ash began to settle around them. "In the course of an hour caused the snowy summit to look like a ploughed field. It filled our eyes and nostrils, rendered eating and drinking impossible, and at last reduced us to breathing through handkerchiefs. The brass and glass of the mercurial barometer, like everything else, became costed with this all-pervading dust, but the vernier afforded protection to the portion of the tube which was behind it, and this protected part remained reasonably bright, while all the rest of the tube above and below was thickly encrusted. The height of the barometer on the summit of Chimborazo, on July 3, 1880, was registered in this manner by a volcanic eruption which occurred more than sixty miles away!"

By 2:30pm it had become so dark that it was best to depart. A commemorative photograph was taken at the top. "All the conditions were favourable for the production of a bad photograph, and the result was just what might be expected." The team descended, noting along the way that none experienced altitude sickness, and that their time spent in the great Andes had indeed acclimatised them to the thinness of the air at height.

6. THE INSTRUMENTS

So what were the instruments used on the expedition? On the mercurial barometer front, Whymper arranged for two mountain barometers of the Fortin type to travel to altitude, and a Kew pattern was left with the agent Mr Chambers in Guayaquil for simultaneous comparisons. Boiling point thermometers and aneroid barometers were both recommended in the 6th Edition of "Hints to Travellers" but Whymper felt "observations made by them would not command confidence" and took them for three way comparisons and as a reserve for the mercurial barometers. All had arrived safely except for one aneroid, which had probably been stolen. Jean-Antoine Carrel took personal responsibility for the Fortins, carrying them on foot for most of the journey- they were nicknamed "the Babies" from the care they received. They had been verified at Kew Observatory, and all readings were referred to the mean of the two reduced to 32 degrees Centigrade.

Seven aneroids travelled, with one left at Guayaquil. Opinion about them was very mixed, with reports of their unreliability being difficult to resolve. It was certain, however, that "differences of pressure can be determined by them with marvellous accuracy". Favourable opinion appeared to depend on the assumption that they read against the mercurial barometer with the same degree of accuracy in the field as they did when tested against it under the air pump.

Whymper found that this last assumption was not only not true, but their behaviour was perplexing. Taking their means, larger and larger departures from the mercurial barometer were achieved and eventually all the instruments were reading lower. This discrepancy increased throughout the trip, and Whymper felt serious errors in altitude would have arisen had he relied on them alone.

Some years after returning from this journey, it occurred to him to set out his readings in chronological order, and he realised the readings of the aneroids were influenced by elapsed time as well as by variations in pressure. With the cooperation of the instrument maker J J Hicks, a number of aneroids were put under test for varied conditions of temperature and pressure. Over seventy examples were tested over a period of several years, and the results were published in "How to Use the Aneroid Barometer" in 1891. Part 1 described the field results, part 2 described the workshop experiments. "At the commencement, I employed the apparatus which was in daily use at Mr Hicks' establishment. It was soon found necessary to duplicate this in order to facilitate progress, and subsequently I set up a similar apparatus in my own workshop. It became necessary also to duplicate this, and finally I had a receiver 30 inches high constructed, in order to have twenty or more aneroids under examination at one time."

"Upon going one day to Mr Hicks' establishment, I found the aneroid department in some confusion, and learned that just before my arrival an accident had happened to an apparatus which we were keeping experimentally at a pressure of 16 inches. With a report like a rifle, plate glass more than a quarter of an inch thick was crushed in by the external pressure, and rebounded in a multitude of fragments over the room. The apparatus was shattered, and an attached mercurial barometer was destroyed."

The mess was cleared up, the apparatus replaced, and the experiments continued. Part 3 gave instructions on the use of aneroids to avoid the problems identified and diagnosed. Owing to the elastic properties of the metal used for the box, aneroids brought rapidly down from a height do not immediately read correctly. The experiments showed that the error is greatest in the first hour of the first day that an aneroid was subject to diminished pressure, and was particularly marked on open-scale aneroids. Whymper and Hicks filed two patents in 1892 and 1893, for annealing certain parts of the aneroids to prevent this. A later device by Watkins used the technique of throwing the aneroid mechanism out of gear while it was being transported from one place to another. Whymper tested this on a trip to Switzerland, to the satisfaction of both himself and Watkins, and the latter took out another patent in 1898.

7. RECOGNITION OF THIS ACHIEVEMENT

On the publication of his work in Ecuador, the Royal Geographical Society awarded Whymper the Patron's Medal. He "had largely corrected and added to our geographical and physical knowledge of the mountain systems of Ecuador, fixed the position of all the great Ecuadorian mountains, produced a map constructed from original theodolite observations extending over 250 miles, and ascertained seventy altitudes by means of three mercurial

barometers". This makes no mention of his use of himself and his companions as human guinea pigs for the effects of altitude sickness, but even without that, his achievement was significant. He earned that medal.

REFERENCES

For a recent description of the 19th century exploration of the European Alps, see

Fleming, Fergus, 2001, *Killing Dragons – The Conquest of the Alps*, London, Granta Books

For a scholarly discussion of the development of the aneroid barometer, see

McConnell, A, 1998, *"King of the Clinicals – The Life and Times of J J Hicks"*, pp52 – 71, York, William Sessions Limited

Young, Prof B E , 1913, Edward Whymper, Alpinist of the Heroic Age, in *Popular Science Monthly*, vol LXXXII, no 6, pp559 – 566, Lancaster, The Science Press.

Freshfield, D W, 1912 , Whymper, Edward, (1840-1911), in *Dictionary of National Biography*, Vol LXIX Supplement II. (revision in press), Oxford, Oxford University Press

Whymper, E, 1884, Coloured sky observed during eruption of Cotopaxi, in *Nature*, vol 29 pp199-200, London, Macmillan

Whymper, E, 1891, *How to Use the Aneroid Barometer*, London, John Murray

Whymper, E, 1892, *Travels Amongst the Great Andes of the Equator*, 2nd ed, London, John Murray

Whymper, E, 1981 (but first published in 1871), *Scrambles amongst the Alps*, Berkley, Ten Speed Press

BIOGRAPHICAL NOTES

Jane Insley, MA, MSc, AMA is the Curator of Environmental Science and Technology at the National Museum of Science and Industry (Science Museum), London. She has a Physics degree from Oxford University and an MSc in the history of technology from Imperial College, London.

She has worked at the Science Museum since 1974, on projects as wide ranging as the Weather Gallery, the Science Museum Guide Book, Open Days at the Wroughton Airfield store in Wiltshire, the Great Survey of India, a catalogue of historic microscopes, and environment exhibitions on the stratospheric ozone hole, oil spill, air pollution, and cities. Her current research interest is in environmental prizes, and the way funky engineering underpins sustainable development – however, she has escaped back to her earlier obsession with the amazing things scientific explorers did to do the work for this paper. She is currently Deputy Director, IIHS&M.