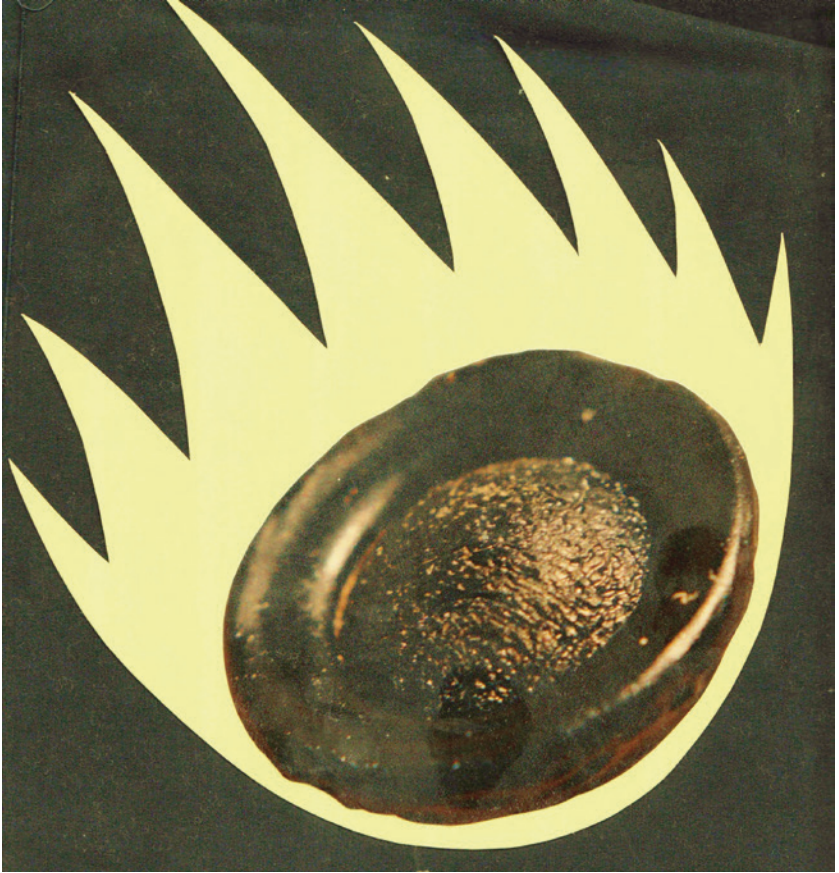

Australia's Little Space Travellers



Artist's impression of a falling tektite. Nearing the end of its ablationary heating stage. It has developed into the form of the classical flanged button, and shortly it will have decelerated to the point where heating stops, and it falls the rest of the way as a cold piece of black glass

Don McColl

Australia's Little Space Travellers

The Flight Shaped Tektites
of Australia

 Springer

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*To the late Dr. George Baker of
Melbourne, who correctly deduced
the history of the remarkably shaped
tektites of Australia, and stood by his
interpretation in a time of considerable
controversy.*

Foreword

It has been said that geological studies have found more mysteries in the history of the Earth than they have solved, and among these one of the most profound are the tektites. Tektites are naturally occurring silicate glass bodies found over large areas of the Earth's surface called strewn fields. Their origin was the subject of controversy for over a century. Most researchers now agree that tektites were formed when large extraterrestrial bodies collided with the Earth producing an impact crater and a large volume of melted surface sediment or rock, which was ejected or thrown great distances over the Earth's surface, cooled, and then rained back down to Earth as tektites. The Australasian tektite strewn field (or South-east Asian strewn field as McColl calls it) is the largest and the youngest known (~0.8 million years). This book is primarily about tektites found in Australia, which are called australites. Much of the terminology and discussion about the origin of the many different shapes of the australites is based on the research and publications of George Baker, an Australian who studied tektites between the late 1930s and the late 1960s; indeed, this book is dedicated in his memory.

The australites are of great interest because they are the only group of tektites that clearly exhibit evidence of having been thrown out of the atmosphere and re-entering at high enough velocity to be partially remelted. NASA scientists studied these objects to better understand the temperatures and pressures a spacecraft would undergo during re-entry.

McColl has been collecting and observing australites intermittently, throughout his entire career. This book includes a large number of photographs (~80) of australites having various forms and shapes. Regrettably few books have shown photographs of the amazing assortment of shapes adopted by australites, and in this regard this book is something of a first. McColl has included a lot of nice photographs of whole, perfectly symmetrical, ablated australites, but of more interest to me are the numerous

photographs of fragmented and oddly shaped australites which may give us additional information regarding the flight and re-entry of these interesting glass bodies.

Another unusual kind of tektite is that which McColl calls minitektites, which are pancake shaped and appear to be mostly flange. They are so thin that they are translucent instead of black opaque like the larger tektites. Minitektites have also been found in the central Indian Ocean, but they are millimetre-sized spheres and rotational forms (teardrops, dumbbells) without any evidence of atmospheric ablation. McColl proposes that the mini-australites were formed from molten material that was stripped off of larger tektites during ablation. He posited that they would continue to be heated and shaped by ablation, thus producing tiny flanged button shapes with very little or no unmelted glass in the core. This is an interesting idea; however, I favour an alternative hypothesis, which is that they may be the remains of tektites that were nearly ablated away. Regardless of how they might have formed, they represent, at least to me, a new form of ablated tektites that merits ongoing study.

Another unusual kind of australites is those which McColl calls asymmetric flanged forms. These are centimetre- or more-sized tektites which have peculiar primary shapes and which have experienced melting/ablation with little or no flange formation. McColl suggests that they might be fragments of tektites that broke up prior to or during atmospheric re-entry either due to stress or collision. This seems to be a reasonable explanation for these unusual tektites.

In the book, McColl points out that by chance a large number of very tiny tektites have also recently been discovered in semi-desert sand dune country south of Kalgoorlie in Western Australia. This is a fascinating discovery, of which I have become aware only recently. After the discovery of microtektites in deep-sea sediments, it appeared that there was a size gap between the smallest tektite and the largest microtektite. Most australites are centimetre in size and the smallest known australites were ~4–5 mm (average dimension) in size; the largest microtektite, found in deep-sea sediments adjacent to Australia, were ~1 mm in diameter. Thus, there appeared to be a gap in size between the smallest australite (found on land) and the largest microtektite (found in ocean floor sediments) of a few millimetres. The discovery of the very tiny 'tektites' found in Western Australia helps to fill in the size gap and demonstrates that, as was expected, microtektites fell on land as well as in the oceans.

As previously mentioned, tektites are believed to have formed as melt that was produced and ejected over large areas of the Earth's surface during the impact of extraterrestrial bodies. The source craters for three of the tektite strewn fields have been found, but the source crater for the Australian strewn field, which is

the largest and the youngest, has not been found. This book illustrates some of the amazing shapes which these tektites have adopted, presumably during their flight through the atmosphere. However, as McColl points out, the location of the source crater for the australites is still remaining as one of the biggest scientific mysteries of our time.

Delaware, USA, June 2016

Prof. Billy Glass

Acknowledgments

The author has appreciated the patience and work of his wife Lois who greatly contributed to the successful preparation of this book. If she had not been prepared to travel and share the work of searching in many remote and not always the most scenic or beautiful parts of inland Australia, during a period extending over more than the last fifty years, a great many tektites would have remained undiscovered. She acquired the knack of finding all sorts of unusual and different specimens, which have given us insight into the formation and shaping processes of the Australian tektites across a great deal of central and southern Australia.

In their early years, our children Janet, Judith, James and John also contributed some remarkable finds during the sixties and seventies, right at the time when discoveries were most prolific in the Heytesbury Scheme area of the Port Campbell district. Now along with their partners and their own children they have continued to find occasional pieces.

In that same area, many local residents were kind enough to share our interest, by welcoming outsiders on to their properties, and often also into their homes. Among these, the contributions of the late Bert Lawson, and his wife Phyl., were especially appreciated, and also particularly Kate and Jimmy Robbins, Lisa and Chris. Robbins and Adrian and Emma Hislop. Ian Marriner, and Peter McKinnon of Warrnambool Lime Works Pty Ltd, were also kind enough to allow repeated visits to their sand quarry, which is in the Chapple Vale area on the western slopes of the Otway Range.

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About the Author



Don McColl has been involved with Australian meteorites and tektites for over fifty years. His early graduate years were in the early sixties, when he was studying at Melbourne University, and spent time in the company of George Baker whose work on the tektites of Australia was monumental. It is difficult to believe now how much controversy there was at that time, about the nature and origin of the superbly shaped Australian tektites. George Baker never had any doubts, but then he did have the advantage of having the finest shaped tektites in the world virtually at his doorstep. During the author's working life, which included curating for three different national museums, he continued to take a special interest in these remarkable specimens. In recent retirement years, he and his wife Lois have amused themselves finding a large number of stony and iron meteorites, plus great numbers of the flight textured tektites, in all kinds of country, along the tracts of inland Australia where the tektites fell in such abundance so long ago. In 2011 together with Svend Buhl of Hamburg, he produced the recent book, "Henbury Craters and Meteorites, their Discovery, History and Study", and it seemed logical to follow this with something about the tektites.

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