The Professor had an interesting case the other day—some footprints in the sand. The question was, whose?

It was easy enough for frightened Robinson Crusoe: he instantly recognised as human the footprints on his beach.

But what faced Professor Jim Warren of Monash's department of zoology were two or three trackways of animal footprints in slabs of sandstone.

Mr. Norman Wakefield, well known naturalist, and head of biology at Monash Teachers' College, found them in the Genoa River area of east Gippsland in 1971. (Mr. Wakefield has since died as the result of a tragic accident.)

From the meagre evidence of the imprints, what can we infer about the animals that made them? Warren and Wakefield have published a formal discussion of that question in 'Nature', London, of August 25, 1972 (Vol. 238, No. 5365, pp. 469,70).

First, the geologists give the age of the sedimentary rocks as Upper Devonian, laid down about 350 million years ago.

Since it is a sandstone rock, the imprints were originally made in sand, presumably wet sand, and therefore under shallow water or at the water's edge.

The prints, as seen in the photo, clearly show the two sets of pairs that belong to a four-limbed animal, a vertebrate belonging to the class Amphibia; and it was self-
supporting—its belly left no marks of scraping the ground.

Here indeed was a discovery—the record of a tetrapod vertebrate, older by 100 million years than any other land vertebrate recorded in the southern hemisphere. Furthermore, the imprints show that the feet had digits; some prints are clear enough to show five digits.

Warren was able to say that, at that stage in vertebrate evolution, only one record has been found of a tetrapod with digits—skeletal remains of Ichthyostega found, as were our trackways, in Upper Devonian sandstones, but in Greenland.

Having only the trackways of our specimens but no skeleton, and the fossilised skeleton but no trackways of the Greenland specimen, Warren is by no means saying that our animal is Greenland’s Ichthyostega.

Nevertheless, they obviously have some bold features in common: age, vertebrates, tetrapods with digits. And, Warren believes, they are about the same size.

In some places in the trackways, the hind foot partly obliterates the print of the front foot. This suggests, by an argument of some complexity, that the distance along the trunk between the pair of front limbs and the pair of hind limbs (that distance is called the “coupling”) is equal to twice the pace, that is, twice the distance between successive prints of the one foot.

Taking the coupling as a base for dimensions, Warren would expect the trunk to be a little longer than the coupling, the tail to be about as long as the trunk, the head about half the length of the trunk.

Since the trackways in Warren’s lab, show a pace of 11cm., he estimates the likely length of that animal to have been about 55cm. On the same argument, one of the other trackways would have been made by an animal about 90cm. long. The width would be about the same as the width between the left and right prints—about 10cm.

The only other positive evidence, as against inference, on the dimensions of the animal is the width of the hind foot, 3½ cm. But that and the estimated dimensions, Warren says, are essentially the same as in Ichthyostega.

Warren cannot say yet whether the foot with its five digits is paddled, webbed or clawed; but the hind foot prints out at nearly 90° from the direction of travel, giving a sprawling gait.

Here is the first evidence that these early tetrapods still had the outward style of the fish fins—no distinct ankle or wrist joints.

The tantalising question in Warren’s mind, and in the mind of all his colleagues around the world, is whether this too is Ichthyostega, whose skeletons were found at a single site in Greenland in 1931. For ultimate confirmation, Warren and his zoological colleagues and successors must await the discovery of the fossil skeleton of the animal that made our trackways.

If that correspondence were established, questions would be asked about the distribution of such ancient species, and the distribution of continental land masses in those times.

One may also ask, in what sort of world did those animals live? From the accompanying fossil remains of ferns and plants, we have an idea of the contemporary flora, and perhaps of the climate. But what did those animals live on? What other animals, in what numbers? Was the water salt or fresh, sea or lake?

But our animals were eventually overwhelmed by changing environment: only their footprints were preserved for us to find by a combination of chance and good observation 350 million years later.

It would be an ironical turn of events, when man is overwhelmed by his own offal, to find the only record of him in his footprints on the moon!
The shock wave, like any wave, has a leading peak and a following trough (corresponding to the leading and trailing edges of the aircraft), though the peak and trough are in terms of pressure in the air, the one following close behind the other.

The wave spreads out behind the source rather like the waves from the bow of a boat in water, but of course as a cone, since the body is within the medium, the air, not on the surface of it. The angle of the cone is about 15° or so from the axis of flight. The wave (the peak and trough pair) travels as an increasing ring down the surface of the cone at the speed of sound, while the cone travels forward at the speed of the aircraft.

It is the sharp rise in pressure to the peak (called overpressure) and a similar sharp rise from the trough back to ambient pressure that give the characteristic double single claps of thunder.

When the cone of the shock wave reached the ground at Alice Springs, from an altitude of 50,000 ft., the overpressure was about 2 lb per sq. ft., and the interval between the bangs was about ½ second.

By that time, the plane was miles ahead, and, at a height of eight or nine miles, just visible, and its engine barely audible.

The plane itself is of course inside the cone of the shock wave; so observers in the plane hear nothing of it. They simply hear the muffled insulated noise from engine and boundary layer, their own conversation and the clink of glasses.

Alfredson points out that local gradients of wind and temperature can give a focusing or augmenting effect on the sonic boom: the overpressure could be doubled.

He summarises the sonic boom by saying that, while man can accept without demur the natural noises of thunder, he tends to be less tolerant when the noises, though no more harmful, are made by man.

Alfredson does not believe that the sonic boom from Concorde would normally have any damaging or structural effect on buildings, including their glass windows, though he is not prepared to say what would happen to a delicately balanced stack of cards.

### STAR GAZING

We are to have an observatory, with an optical telescope, dome and all.

The telescope, about 3 metres long and 45 cm. in diameter, is known as a Newtonian reflector, in which the parallel rays entering the open front are reflected back by a paraboloid mirror to a focus near the open end; to bring the image out of the tube, a small mirror near the focus reflects the rays at right angles through an aperture in the side of the tube.

While the instrument can be used for observing by eye or by camera, the team has built a spectrometer for observing the spectrum of a body’s light, and a photometer for studying the luminous intensity of an object.

The instrument is electronically controlled to rotate in right ascension—that is, to match the apparent motion of the sky.

While the southern sky is the general interest, some attention will be focused on the planets, particularly Jupiter.

The Jeffree Telescope Committee, representing the faculties of science and engineering, chaired by Professor K. C. Westfold, Dean of Science, will operate the observatory on a leased site east of Melbourne where the sky is reasonably clear.

Why Jeffree? Because the late Mr. L. C. Jeffree made the telescope some years ago, and set it up part-finished in his back garden in Bendigo, Victoria. Monash acquired it from the Jeffree estate two or three years ago.

Since then, with the instrument set up in the courtyard of the physics block, the mirror has been reground and recoated, the drive gear redesigned, and the other instruments added.
His last word

“Oh, Miss Conway, would you take this letter:
‘Dear Sir, You will remember . . .’.”

Does it matter whether you say “recollect” or “recall”? Or go the other way round: “May I remind you”? Or go straight to the point: “You have forgotten”?

Perhaps the successful letter writer has a scale for these things, a hierarchy of effect, depending on how big the big deal is, or how big the reader is as colleague, adversary, or victim.

The question again is whether, in writing, we retain the first word or form that comes to mind or pen, or whether we change it in dictation, or in the draft or in the final typing—and why.

According to Dr. Peter Sucksmith, senior lecturer in Monash’s department of English, Charles Dickens, like many other literary giants, made many changes in his draft, perhaps changing, deleting or inserting a word or a phrase here and there, or heavily revising a substantial passage.


In his analysis of Dickens’s narrative art, Sucksmith read the novels in the original manuscript (or photo copies of them) and in the corrected printers’ proofs.

Sucksmith points out that Dickens was famous, like a modern pop star, and kept his manuscripts and proofs, most were given to John Forster, his friend and literary executor, who bequeathed them to the South Kensington Museum, now the Victoria and Albert Museum.

In a sense Sucksmith was lucky, because Dickens wrote in such a hurry, under such pressure, that he was rarely able to make clean written copies in the successive forms or even in their final form.

So there the whole process usually was, on the one piece of paper: scratchings out, insertions, interlineations.

Sucksmith’s task was to trace the successive changes in a passage. The order in which Dickens made his changes was often obvious enough, especially when, as often happened, more than one set of corrected proofs survived; but other clues were found in differences in the pens, and different densities and colours of ink that Dickens happened to use.

In this process of detection and deduction, Sucksmith sought the significance in the successive changes, and in the final outcome. He was looking for the pattern of meaning, of creating effect.

He adopted and tested the hypothesis that Dickens was a rhetorical writer, and he defined rhetoric as “the technical means whereby, through structure, effects are created and vision focused”.

Dickens wrote for effect—to focus a vision of life through his effects. And— the silent reader may wonder at this—the effect was best when read aloud, as the monthly serials often were in the homes of subscribers, and by Dickens himself on tour.

Taking his definition “technical means whereby, through structure, effects are created . . .”, Sucksmith expected to find that Dickens’s successive stages of revision steadily built up the effect: the first version in a weaker form, succeeding versions growing stronger.

After sufficient experience with the manuscripts and the corrected proofs (the essential data in the experiment), Sucksmith went so far as to say that, starting with a passage as finally printed, he could postulate what Dickens might have done in the preceding stages of drafting, revising and correcting.

He tested this many times. Taking 20 or 30 key passages from each of several novels as published, he found that, by applying what he believed to be Dickens’s principle of rhetorical composition, he could arrive reasonably well at the general pattern of revision as confirmed by going back to the MSS and the corrected proofs.

This is not to say that Sucksmith claimed to be able to write or rewrite Dickens, but it allowed him to analyse the rhetoric and the narrative art.

It turned out that many of Dickens’s proofs were improperly or inadequately corrected (the perpetual haste again), and not strictly followed in the printing room so that the printed versions of some of the novels, perhaps all of them, do not or may not fully represent Dickens’s intentions. Many of those errors are, of course, minor ones.

Following that line of argument, Sucksmith has written (now in typescript) a possible new edition of “Little Dorrit”, edited from the original MS and the corrected proofs of the first edition, and collated with the three editions revised during Dickens’s lifetime, “with a commentary and introduction”. Obviously such a work is for the Dickens scholar rather than for the general reader.

By the time that edition of “Little Dorrit” is published, Sucksmith will be Associate Professor in English at Dalhousie University, Halifax, Nova Scotia, Canada. But Dickens himself will have the last word, for in his will he says “I rest my claims to the remembrance of my country upon my published works”.

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