MEDICAL PRACTICE

Medical History

The Harveian Oration 1973

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Introduction: Harveian Orations

William Harvey's injunctions to his orators were that they should commemorate all the benefactors of the Royal College of Physicians by name, and should exhort others to imitate those benefactors. Generosity in the past has been so great that fortunately it has been impossible for many years to fulfil the first injunction literally. But it is certainly the duty of the Harveian Librarian, when he combines the two offices, to record by name Dr. Evan Bedford's recent gift of his library of cardiology.

For more than 100 years it has been the custom for the Oration to deal with some subject related to William Harvey, and in praise of him. In the course of years, a large variety of subjects has been dealt with; but no one seems to have considered the sheer artistry of *De Motu Cordis* and its relation to scientific communication in general. That may be because it is difficult to talk about art without using that wonderful modern device, the magic lantern. It is true that it was invented by Athenasius Kircher in 1646, but quite rightly Fellows have waited a decent time before introducing it into a Harveian Oration. The researches of Miss Rawlings have shown that this was done by that paragon of propriety, Dr. George Graham in 1953, and I have no hesitation in following his example.

Art and Communication

When a scientist has made a discovery which he deems of importance, and wishes to communicate it to other people, he becomes a writer or speaker, and is at once involved in the art of

writing or speaking, in problems of form and style. His aim at this stage is twofold: to make it easy and pleasing to the reader, a matter of common politeness; and to make his argument convincing. Unless he is convincing, he might as well not be trying to communicate at all. The more difficult it is to convince the reader, the more necessary are good writing and good construction. That is why those two highly unlikely stories, *Wuthering Heights* and *Frankenstein* are the classic examples of rigid and artificial construction. For one thing, the reader cannot help thinking that if a book is so carefully written, it cannot have been written in a burst of frenzy by a deluded and irresponsible neurotic, however wild and romantic the tale may be. Now, Harvey's *De Motu Cordis* was, at the time, both revolutionary and dangerous, and it was likely that it was going to be equally difficult for him either to convince his readers, or to avoid damaging attack. So he took care to use every method he could to carry conviction, and a beautiful formal construction of the book was one of these devices. Let us for a few minutes consider how Harvey did it.

Physical Mass as Form

If you are interested in how it is done, as well as in what it says, one of the first things you will notice is that *De Motu Cordis* starts with a long "Prooemium" about the ancients, and ends with a long chapter, also about the ancients. They are much the longest chapters in the book: the rest, with one exception, are less than half their length, and four of them are very short indeed. If the lengths of the chapters are set out in a histogram, the columns produce a remarkable silhouette made up of three depressions (fig. 1). There is a steep drop from the Prooemium to chapter 3, a rise over chapters 5 and 6, and a drop to chapter 8. Then the curve repeats itself in reverse, the mirror-image of what has gone before; a rise over chapter 11, a fall to chapter 14, and a steep rise to chapter 17. This is the shape of the book by the simple size of its parts. This is quite a common shape in literature: authors often want to explain a lot to begin with, and set it all out in full at the end. It used to be popular in novels:

FIG. 1—Length of Chapters of *De Motu Cordis*. The columns produce a remarkable silhouette made up of three depressions (broken line).

Scott liked to begin with long descriptions of scenery and weather and atmosphere, and let the tension down gently at the end: things were more leisurely in those days, and palates not so tired.

A physical mass on either side, with incidents in the middle, is also a common shape for landscape paintings. Claude was an outstanding exponent of this kind of construction: he exploited it with skill, putting heavy buildings, trees or ships on the wings, and a vast landscape, or more often seascape, in the middle. "Seascape at Sunset" in the National Gallery is very like *De Motu Cordis* in physical structure. Ward's vast "Goredale Scar" in the Tate Gallery does the same thing with a variation in the shape of the lateral masses. Garofalo of Ferrara's "Madonna with Saints" in the National Gallery is a more complex form. In all, the more humanly interesting things happen in the middle, the important position in paintings and on the stage.

There is a reason for the long first and last chapters, the two lateral masses. Harvey used them as the means of exonerating himself from possible charges of rash innovation, not to say of heresy. He was nervous about the reception of the book; and rightly, if Aubrey was correct in saying that after its publication "he fell mightily in his practice and 'twas believed by the vulgar that he was crack-brained."¹ He said himself, "I not only fear injury to myself from the envy of the few, but I tremble lest I have mankind at large for my enemies."

So he starts with a long chapter on the views of Galen, stressing that Galen himself had proved that the arteries carried blood, not air, as was generally held by the "Galenists" of Harvey's time. In this Proemium he described the difficulties which the so-called Galenic hypothesis on the movements of the blood involved, how inconsistent Galen's theory really was with itself, and how desirable it was to make further investigations of the heart and arteries. He finishes the book with another long chapter, in which he appeals repeatedly to Aristotle for confirmation, and explains how the new hypothesis of the circulation is really a completion and rectification of the ancients. And in the middle of the book, immediately after propounding his hypothesis, he at once adduces the arguments that it is like Aristotle's views on the "circulation" of water, its evaporation and condensation into rain (by which Aristotle meant something rather different); and that the heart is the sun of the microcosm (the body), even as the sun is the heart of the world. Soft suggestions turning away wrath. Notice that there is *form* in this: a small central appeal to the ancients, balanced by two lateral masses.

Interest as Form

Not only size, but all the components of a work of art are

amenable to construction. Emotional intensities are just as manipulable as size. The emotional construction of *De Motu Cordis*, that is to say the distribution of intensities of interest, follows roughly the inverse of its physical structure, because Harvey usually wrote a short chapter when he had something dramatic to say, and a longer one for sustained argument. The emotional structure is a series of peaks (fig. 2). Most people would agree what these peaks are, but it is impossible to measure their absolute intensity as one can material size. Science deals with objective measurement and quantity; Art with subjective taste and values. The construction would seem to be: firstly, a peak in chapters 2 and 3, on the truth about systole and diastole of the heart and arteries. This is the opposite of what was accepted at that time: they thought that diastole—expansion—was the active, forcible, filling process, coinciding with the pulse and apex beat, and the suggestion of the reverse must have made them feel as though the solid ground had dissolved under their feet. The next shock comes in chapter 6: the pulmonary circulation. Columbus had already described it in definite terms, but the idea was unknown or unaccepted, and the horror of it was that it was directly contrary to what Galen had said, both with regard to the movement of the blood and all the physiology of "fuliginous vapours," and, worse, it denied the existence of Galen's pores in the ventricular septum. Then in chapter 8 came the blow of the theory of the circulation, the pivot of the whole book² and the plunge into frank revolution. Harvey followed this up at once with the estimation of the weight of blood expelled into the arteries in a given time, which was far more than could possibly be made from the food in the time, or be absorbed by the tissues at the periphery. This was an exciting observation, and it was the first time measurement had been used as a physiological argument. He followed this up in chapter 11 with some striking experiments with ligatures, and crowned it in chapter 13 with the explanation of the purpose of

FIG. 2—Distribution of intensities of interest.

the valves in the veins, and his simple but ingenious experiment whereby he estimated the volume of blood returning to the heart in a given time, which also being a large volume, corresponded to the amount sent out by the ventricle, and clinched his whole argument. There is no doubt of the excitement, not to say outrage, produced by these peaks. The shape of the book, then, in terms of emotional interest, is two little peaks, followed by a big one, repeated in mirror-image on the other side: a triangle, or pyramid.

Triangles in Literature

You might expect that in literature, many short stories would be found which had the same form as *De Motu Cordis*, because it is a short book. This is not so, because a short story is more effective if the interest rises at the end, with a shape like the hypotenuse of a triangle, or even an exponential curve. Even long novels

tend to have the climax near the end, and it is popular to have an emotional mass at the beginning as well: to start with an emotional thrill and end with an exciting denouement, as in P. C. Wren's *Beau Geste*. But some older short stories, such as Henry James' *Four Meetings* come near to Harvey's form. This story is arranged in four episodes, of which the middle two are really one. The crisis is in the middle, when you see what is going to happen before you are explicitly told. There are plenty of "three-peak" short stories, of which John Buchan's admirable *Company of the Marjolaine* is a splendid example: the big crisis is the third.

Triangles in Other Arts

The "principle of the pyramid," as Tristram Shandy, that master of construction, called it, is the basis of the majority of studio paintings. There are literally dozens in the National Gallery. Louis le Nain's lovely "Adoration" is a good example, and Terborch's "Young Woman playing the Theorbo" is an exact parallel to *De Motu Cordis*: two steps up and two down.

In architecture, besides pyramids themselves, the west fronts of most churches are triangles, down the steeple, along the roofs of the aisles, and down the buttresses at their sides; and almost every big house after 1650 had a central pedimented block with two identical wings flanking it. The Radcliffe Observatory, as James Wyatt left it, is an interesting example, because it is all flat tops, but a triangle for all that. So is St. Paul's from the west, because you cannot now see it, but it is a perfect triangle, and a very good example of what a good thing it is, when you are making a very big and complicated building, to make its overall design very simple. All these buildings are also, of course, strict mirror-images, as is an enormous amount of architecture. Harvey's book is not an exact mirror-image; it is not dead symmetrical, but looks forward to the symmetry of balance rather than of repetition: or you could say that he is harking back to Gothic balance, as opposed to the baroque symmetry of his own time. His use of mirror-image certainly had nothing in common with the palindromic forms of modern music: the second half of his book is in no way the first half written backwards, but *De Motu Cordis* has a good deal of relation to the three-section musical construction called "binary form." This has a first section, a second contrasting section, and then a return to the first section, often with subtle differences; recognizably the same, but refreshingly modified. It is the commonest of all short musical forms.

Subject as Form

Another material which should be moulded into construction in any work of art is its subject: what it is about. In music this is a little series of notes, a theme or "subject." In drawing it is a shape of line: Klee defined drawing as "taking a line for a walk." *De Motu Cordis* is "about" the circulation, in the form of two themes which contrast with one another, Galen's theory and Harvey's. The way in which he builds up a construction of these themes is important. He is manipulating his observations, hypotheses and experimental testings. It is their intellectual "shape" which constitutes another structure. Unfortunately, the process cannot be depicted graphically. There is no point in doing it again in words, because Dr. Gweneth Whitteridge has done it far better than I could, in chapter 6 of her 1971 book,³ and it took her 11,000 words. In any case, you could read the *De Motu* for yourselves, with that in mind. It is important: the subject is the major item of construction in the two time-arts, writing and music.

Subject as Form in Other Arts

Construction on two themes is one of the essences of music: it is

the basis of sonata form. Harvey did not, of course, write in sonata form: it had not been invented; but it can be done: the *Case of Mr. Lucraft* was written in strict sonata form by Besant and Rice, correct in every particular. Construction in two themes is common in literature and the drama: the plot and counter-plot of a novel or play are its two subjects, and their development, with and in contrast to each other, is a valuable element of construction. Harvey's handling of his two themes, alternately, as the sense demands, not first one and then the other, as a modern writer would probably be tempted to do, gives life, variety, and freshness to the whole book.

The resources of art are almost unlimited, too vast to deal with here. Every element is amenable to an independent system of construction, the whole thing building up into a complex of simultaneous patterns: saying a dozen things at the same time, which some theorists say is the basis of all art. And parallel with variety, unity: the relation of the parts to the whole, everything connected and relevant. A good example of this, available to everyone, is to play the tunes of all the Lord Chancellor's songs in "Iolanthe" with one finger, and see how they are all derived from the eight notes of the little fugue which is played when he comes on.

The Apex of the Triangle

To return for a moment to the apex of Harvey's pyramid. It comes just before the dead centre of the book, which is the division between chapters 8 and 9. Harvey drew attention to this, rather subtly, by arranging for the type-setter to reduce the last three lines of chapter 8 progressively, to bring them down to a point like the type-setting at the end of a book, as indeed it is when it is repeated at the end of chapter 17. Though Harvey stressed the climax in this way, he did not stress the momentous words "an motionem quandam quasi in circulo haberet." He put them in ordinary type, presumably so as not to make a show of his artistry, and so did the contemporary anonymous translator into English. But in 1848 Dr. Robert Willis saw the point, and helped the reader by putting them in capitals.⁴ Because it is an important feature: the book up to that place is a description of what led Harvey to the hypothesis; what follows is a description of the experimental work which he did to confirm or disprove it. In 1971, Dr. Gweneth Whitteridge made a further observation: "within chapter eight itself there is a similar symmetry. It consists of nine different points, of which the fifth, in the very centre, is the announcement of the hypothesis."⁵

The Caesura

One effect of a climax such as this, is to bring the reader up with a jerk; to divide what has gone before from what follows, in fact a caesura. The use of the caesura is a very important device. If it is well done, a caesura is most satisfying in all the arts. We need rests, we get tired if anything goes on too long. Full stops, paragraphs, chapters: they are all caesuras, and we are grateful for them. And they add to an emphasis: they give it time to sink in. But it is not an easy device to handle: it may easily be too disruptive. Stevenson, that master of style, had a terrible disaster with it in the *Master of Ballantrae*. The climax of the book, the duel between the two brothers in chapter 27, forms an exciting caesura. But after it, the characters are so altered—quite rightly—and the scene changes so completely from Scotland to New York, that the back of the story is broken, and the book falls into two halves. Thackeray very nearly did the same thing with the Battle of Waterloo in *Vanity Fair*. It is not so dangerous in painting, because it is so obvious when it has been done. Every tyro painter has made the two sides too unrelated; the result is two pictures on the same canvas. A well-managed caesura is very effective: a perfect one does rather more; it not only makes a break, but at the same time

unobtrusively ensures continuity, it prepares for what is to follow. The best example of this is in the opening of the Mass in B Minor: it starts with a fortissimo chorus of four bars; the last chord is accentuated and even louder, it sounds like the end of the world. But it is really the chord leading into the long orchestral introduction. Harvey managed his with great ingenuity; it entices the reader to go on and see how it works out. The whole book is unified by making the second half so like the first that he might almost as well have written it the other way on, putting the second half first, from this drawing the hypothesis, and using the evidence of the first half to confirm it.

Style

With regard to language, the style of which is an important element in construction, only a competent Latinist should express an opinion, because Harvey wrote in Latin. Aubrey who knew Harvey well, said "he wrote very bad Latin,"¹ but Dr. Whitteridge, who should know, and is a more credible witness than Aubrey, says that "His Latin is no better and no worse than that of many of his contemporaries, it is a perfectly adequate medium for the conveyance of his thoughts."² And Sir Geoffrey Keynes suggests that, though he may not have been an outstanding Latinist, modern scholarship would hardly agree with Aubrey.⁶ You must not be misled by some very happy touches in Willis's translation as revised by Dr. Alex Bowie.¹¹ Bowie evidently admired Sir Thomas Browne: compare "Doctrine once sown strikes deeply its root, and respect for antiquity influences all men" with "Some graves will be opened before they are quite closed, and Lazarus be no wonder," or "Mummy is become merchandise, Mizraim cures wounds and Pharaoh is sold for balsom." The first is Bowie, the other two are Browne. And the Bowie one is so good that it deceived that great and wise man, Dr. Richard Asher.

Truth in Exposition

De Motu Cordis was a carefully-planned work of art, and partly for that reason it was, and still is, read. A further question remains: how far, as a description of what actually happened in his mind, is it true? And to what extent is descriptive truth important as an element in securing conviction? The book is, you see, a description of what put him on to the track, how he came to formulate the hypothesis of the circulation of the blood, and how he convinced himself of its soundness. The story is convincing in no little part because he takes us through the actual stages of doubt, inspiration, conviction, and certainty as he went through them himself. It is, as it were, a chapter of autobiography, describing an important event in his life, and it thus carries the reader with him. It has the impress of truth, and it looks as though that is how it succeeds. The trouble is that in 1688 Sir Robert Boyle said that he had asked Harvey, when an old man, what induced him to think of the circulation, and that Harvey told him that what suggested the idea was the valves in the veins, making it impossible for the blood to flow centrifugally.⁵ But in *De Motu Cordis*, Harvey said that it was the valves in the heart which suggested the idea, and the valves in the veins which provided one of the most convincing confirmations. It would be pleasant to think that *De Motu Cordis* is the correct and accurate description that it implicitly claims to be; that Harvey told the story of an episode in his life truly when he wrote it, and that as an old man his memory played him false in his answer to Boyle. But one must not be led astray by pleasing imaginations; and Dr. Whitteridge has shown, in her mature work on the whole story, that Harvey was right in what he told Boyle. She says: "the book is, after all, not a chronological account of its putting together."³ Sir Clifford Allbutt urged that in a scientific paper the thoughts ought to be presented in an orderly manner, but he said: "an order of thought may be either the order of research or the order of exposition; and under

ordinary circumstances the latter is to be preferred."⁷ A work certainly carries more conviction if it has every appearance of truth. It is one of the aims of art to make a work *appear* real, but often, especially on the stage, actual reality would appear quite unconvincing, and artifice looks like real life. Listen to a tape-recording of a bit of real conversation, and then read a page of Somerset Maugham's dramatic dialogue: the genuine sounds impossible, the artificial exactly like "real life."

Darwin's *The Origin of Species*

It would be unconvincing to draw too much general conclusion about scientific writing from one example, even from so great a book as *De Motu Cordis*. Do other scientific books follow a similar pattern? It would be better to defer any criticism of modern writing until we have looked at another example. An obvious choice would be Darwin's *The Origin of Species*. Both books revolutionized not only their own subjects, but other fields of thought as well. *The Origin of Species* so altered the way we think about things, that we write about "The Evolution of the Earth's Crust," or "The Evolution of the Welfare State" as though that was the obvious line of attack, just as, after the perfection of the science of anatomy, people naturally wrote about "the Anatomy of Transsubstantiation," "The Anatomy of Melancholy," "The Anatomy of the Separatists" and so on. Even Harvey called his book *Exercitatio Anatomica de Motu Cordis et Sanguinis in Animalibus*.

The Origin of Species is, as Darwin said in the last chapter,⁸ "one long argument," and an argument of 415 pages would be indigestible unless it was carefully organized. It is a bigger book than Harvey's, and its structure is proportionately more complicated. He did not exploit the physical size of his chapters; preferred to cut them all to about the same size for the convenience of his readers. The book is mainly constructed round its subject (fig. 3).

FIG. 3—Construction of *The Origin of Species*.

It starts with a five-page introduction, which, like Harvey's *Letter to Dr. Argent* explains why he is publishing it. The first chapter is on variation, in domestic plants and animals, and its use by breeders in the selection of desirable qualities to produce new and better varieties. In a shorter chapter he then shows that variation also happens in natural surroundings, and in the third goes straight to the point and claims that Malthus' Law holds in nature, and produces a struggle for existence. In the fourth chapter he puts the facts together and shows that selection is as effective in nature as in the hands of the breeder. This section of 108 pages could stand alone as an exposition of Darwin's theory. In structure it resembles that of Stevenson's *Treasure Island* in being a series of waves. Stevenson linked the waves together by starting the next adventure before the present one had expended itself, so carrying the story irresistibly forward. Darwin's waves rise to greater and greater impressiveness, and are linked by anticipatory references: for instance, in chapter 1,

on variation in domesticity, there are repeated references to variation in nature, the subject of chapter 2. And so on in each chapter. This device of "anticipatory reference" is common in literature, and was exploited with particular skill by James Joyce in *Ulysses*, and by Wilkie Collins in *The Woman in White*.

The end of this section is marked by a caesura, which is accentuated by chapter 5, an intermezzo, standing by itself, on the laws of variation. It was a brave thing to do, because little was known about variation, and it is rather unsatisfactory: it contains the germs of the things which spoiled later editions of the book. But from the point of view of the structure of the book it is a great success, completing the break in the argument and accentuating the caesura.

After this, in chapters 6 to 10, Darwin faces the music and grapples with the appalling difficulties involved in the theory of natural selection: the absence of transitional forms; the appearance of organs of great perfection, like the mammalian eye; the behaviour of the cuckoo; the origin of neuter and sterile insects and so on. It was a brave and wise thing to admit these difficulties, and try to explain them: if he had not, a good many readers would have thrown the book aside, thinking they had disproved its thesis at sight.

Darwin had the happy thought of dealing with the observations which confirmed his thesis immediately after these chapters dealing with the difficulties: most effective. And he very skilfully moves over from the difficulties to the section on confirmation, in chapters 11 and 12, by a syndesis as opposed to a caesura: the chapter on the geological succession of organic beings (10) is not only an explanation of difficulties, it is also a description of distribution in time. The next chapter, 11, is about distribution in space, and is at the same time the first of the chapters on confirmation. It is interesting that Darwin should have used the geological evidence first as a difficulty to be explained, then as a confirmation of his hypothesis: historically, it was reading Lyell as a young man, which linked on to the work of Malthus and his experiences in the "Beagle" to suggest the whole idea of evolution. Darwin, like Harvey, transposed historical autobiography for the purposes of polemical argument.

Geographical distribution provides so much confirmatory evidence that it is expanded into two chapters, 11 and 12, followed by chapter 13, a final synthesis of classificatory systems with their evolutionary basis "the mutual affinities of organic beings." This is a most impressive and wide-ranging discussion. Only then does he finish the book with chapter 14, a statement of the general theory of evolution by natural selection. He thought it essential to answer the question of causation before setting out the general theory. Indeed he always found it difficult to consider a theory unless he saw how it worked. That is why he undervalued the evolutionary ideas of Lamarck and his grandfather Erasmus: they gave no explanation, so Darwin did not notice them.⁹

So the structure of the book consists of:

- (1) A first section, tightly organized, on two subjects: variation and selection; the latter in two forms, domestic and natural. They are united by the idea of the struggle for existence, leading to a synthesis, evolution by natural selection. The section ends with a considerable climax, and a caesura.
- (2) An intermezzo on variation.
- (3) A more sombre section on the difficulties of the thesis, leading without a break into
- (4) A brisker section in a more positive vein on confirmatory evidence for the hypothesis, and
- (5) A final synthesis of the evidence (chapter 13), leading to a general restatement in chapter 14, a coda.

Structure of Mrs. Gaskell's *Cranford*

This form is common in literature, though it has never been given a name. A good instance is a well-known novel: Mrs. Gaskell's *Cranford* (fig. 4). Its first six chapters form an obvious

and very beautiful structure, ending with the climax of the book and a caesura. Chapter 7 is at once an intermezzo on "Visiting" and the first of four chapters, the second section, in a rhythm of two, three, two and three peaks of interest in each. Chapter 11 is a syndesis between this and the third, more tragic section, three chapters of crises; and the last three chapters resolve these crises. This is almost identical with the structure of *The Origin of Species*.

Symphonic Structure

This form, which is a large-scale literary one, has clear symphonic connexions: a striking first movement; a second, usually more sombre and deliberate: a brisker third movement, scherzo, trio, and repeat of scherzo; and a finale complementing the first movement, commonly with a coda. In *Cranford*, as in Beethoven's Ninth Symphony, the slow movement and the scherzo are transposed, for the same reason. The trick of running on directly from one movement to another is common in symphonies.

FIG. 4—Construction of *Cranford*.

Symphonic Form in Architecture and Painting

It is to be expected that the forms of large works in different media should be related, particularly in the two time-arts, writing and music. Even the space-arts, in their larger examples, show a similar tendency. Gothic cathedrals, for instance, are too large to take in at a glance: they need time, and they follow the same pattern: an "introduction" in the complex west end; a main movement in the long nave; a tripartite interlude in the north transept, crossing, and south transept, like a minuet, trio, and repeat of the minuet; a finale, the choir; and a coda, the lady chapel. A similar correspondence in paintings is easily found. What is a little surprising is that it is present in a picture which excited Darwin as a young man.⁹ This turns out to be Sebastian del Piombo's *Raising of Lazarus*, the only example of his work in the National Gallery at the time (it was acquired in 1821). It is a huge picture of rich Venetian colouring and dramatic content. The basic feature in its composition is the great diagonal thrust from middle-left to bottom-right, but there is another build-up consisting of a rising interest from bottom-left, through St. Peter to the Saviour, the climax of the picture, a third of the way across the canvas. This is connected to the nominal subject, Lazarus—three-quarters of the way to the bottom-right—by the diagonal movement past a kneeling (presumably) St. John in yellow, through a highly dramatized Virgin standing two-thirds of the way across in a blue dress with a red cloak; the crowd forming inverted triangles, massed on the two sides.

Darwin as Artist

We know a good deal about Darwin as an artist from his *Autobiography*. He said that as a young man he delighted in pictures, poetry, and music, and that the Sebastian del Piombo "excited

in him a sense of sublimity."¹⁰ Later, after the age of 30, he neglected the arts: music set him "thinking too energetically on what he had been at work on, instead of giving him pleasure,"¹¹ and his brain "seems to have become a kind of machine for grinding general laws out of large collections of facts,"¹² which he regretted, and would have taken care to avoid if he had his life over again. He certainly worked like an artist in the sense of giving free rein to his unconscious mind to begin with, and reorganizing what he had written afterwards. He said "it saves time to scribble in a vile hand whole pages as quickly as I possibly can, contracting half the words; and then correct deliberately. Sentences thus scribbled down are often better ones than I could have written deliberately."¹³

Concerning the style of the writing, no one would deny that Darwin wrote a clear, readable, understandable English. He said of it himself that he had great difficulty in expressing himself clearly and concisely,¹⁴ but however difficult it was he certainly achieved it. There is not a sentence which has to be read twice to be sure what it means, and there are only two clumsy expressions in the whole book—for example, "there is the severest rivalry between the males of many species to attract by singing the females." Set against this the fascination of moving freely from one subject to another: displaying a knowledge deep and wide, making the text a continual surprise and delight. This is artistic writing, and an important part of the making of a good book. In the first edition he said, clearly and exactly, what he found, and what he concluded from it; he was quite definite, did not hedge, and speculated as little as possible. In some of these respects he reneged in subsequent editions, especially in the fifth, when he accepted Herbert Spencer's catchpenny phrase "the survival of the fittest," instead of his far better phrase "survival of the adapted." But it was the first edition which made the impact: his later attitudes were a matter of character. He hated to hurt people's feelings, and he was made ill by a row. He would have agreed with Burne-Jones in liking everything to go smoothly and comfortably. He wisely let Huxley, who enjoyed it, do the fighting.

Modern Medical Writing

So there are two books, each the basis of a revolution in thought, both of which are examples of skill and construction. They are very different from the modern ordinary "scientific communication," which is so often unreadable. The blame for this lies not entirely with modern writers: the editors of some scientific journals, possibly exasperated by some of the material sent in to them, advocate a highly dishonest pseudo-inductive form of construction, which has been criticized by Sir Peter Medawar¹⁵ more effectively than I could do it. Let us just say that there is a good deal to be said, in the writing of any article of importance, for the autobiographical form, or as near as the writer can get to it. It is likely to be more convincing if the reader can be taken through the same sequence of facts observed, hypotheses

formulated, and experimental confirmations or refutations, than an attempt at inductive recasting of the evidence would be. It is also easier to write, and would therefore be better done: autobiography is usually interesting reading. It would probably be advisable, in general, to "readjust" the order of events, as Sir Clifford Allbutt advised, and as William Harvey practised. But of the literary form to be adopted, it is doubtful if any rule could, or should, be laid down. Some sensible man, he was probably talking on the "steam radio," said that "good writing is characterised by an unconscious sense of rightness, of coherence with what has gone before." and Kipling said:

"There are nine and sixty ways

Of composing tribal lays,

And every single one of them is right."

But consider, for a moment, the advice of the Editor of the *Annals of Internal Medicine*: "The form of the paper should be proper for its purpose. Frequent faults are failure to state clearly and early the questions or problems being considered and inappropriate adherence to conventional outlines." Splendid.

Conclusion

Meanwhile, we in this College might add to the famous injunctions of William Harvey. He told us "to study and search out the secrets of Nature by way of experiment," and to "continue in mutual love and affection amongst ourselves." We might also remember to follow the example he set us in the *De Motu Cordis* when we come to writing up our results.

I would like to thank Mr. L. M. Payne for much sensible and helpful advice, Mrs. M. Engel for making the slides, and Lord Platt for having written, at a critical moment: "Be sure not to get cold feet about it and change over to something more mundane."

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