

# PRAY, MR. BABBAGE . . .

A character study in dramatic form

by Maurice Wilkes

Mr. Babbage's library in his house at 1 Dorset Street, London, is a comfortable apartment, as it needs to be, for he spends much of his time in it. It has the usual trappings of a library, including book-cases, a writing table, and leather armchairs. By the side of the fireplace—which has no fire—is a bell handle of the usual rotary type. The door is at the rear, and on one side of it is a small oval looking-glass in a gilt surround. On the other side there is a just discernible mark on the wallpaper, suggesting that at some time a similar looking-glass has hung there.

The date is 19 November 1856, and Mr. Babbage is 65 years old. His wife died young and for the last thirty years he has lived by himself. His loneliness has been accentuated by the circumstance that his two elder sons have migrated to Western Australia and his youngest son—of whom we shall hear more—is in the service of the East India Company.

As long as anyone can remember, Mr. Babbage has been working on a vast mechanical digital computer—which he calls his Analytical Engine—but has never succeeded in producing anything that would work. In consequence, the world has written him off as a crank, a verdict that history will one day triumphantly reverse. He is given to complain to anyone who will listen that, in spite of having expended much effort and a considerable fortune on the Analytical Engine and on the Difference Engine that came before it, he has received nothing but rebuffs in his own country—particularly from the Government—and that he is better appreciated abroad. Nor is he free from the Victorian failing of indulging in personal vendettas, conducted in print, with those who have crossed his path. However, you would be very wrong if you were to think of him as an embittered and isolated man. Far from it. He is socially a great success. He knows everybody, goes everywhere, and is at no loss for friends. He may dislike being contradicted and may be more than a little pompous in manner, but keep him off his hobby horses and you will find him an entertaining enough companion. However, when we first meet him, it is his number one hobby horse that he is riding.

At this moment, Mr. Babbage is standing in his library facing his solicitor, Mr. Charles Few, who is comfortably seated in one of the armchairs. Mr. Babbage listens, with growing indignation, as Mr. Few reads from a bundle of legal-looking papers.

## Editors note:

*The Computer Museum presented the premier performance of Pray, Mr. Babbage . . . by Maurice Wilkes on December 10, 1982. It is a character study in dramatic form of Charles Babbage. An English mathematician, 1791–1871, Babbage invented the first programmable computer—the Analytical Engine. Although it was never built, the Analytical Engine was the first computer ever designed. It was a machine without a fixed purpose, designed to do any calculating task the owner wanted it to. Babbage also designed the Difference Engine, an advanced mechanical device for calculating tables of mathematical functions.*

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## Characters in order of Appearance

Charles Babbage	
Charles Few	Solicitor
Payne	Manservant
Sir Edward Ryan	Brother-in-law and life-long friend of Charles Babbage
Henry Babbage	Son of Charles
Min	Henry's wife

## SCENE ONE

**Few:** Middlesex. Dominico Beltoni by Thomas Johnson, his attorney, sues Charles Babbage for that the defendant assaulted the plaintiff and gave him into custody to a policeman and caused him to be imprisoned in a certain police station and to be conveyed there in custody through and along divers public streets to a Police Court and to be there a long time, to wit, from Saturday to Monday, further imprisoned. Thereby the plaintiff incurred great expense in procuring his liberation from such imprisonment and has lost divers gains and profits. And the plaintiff claims 50 pounds.

**Babbage:** Fifty pounds!

**Few:** That is what he demands.

**Babbage:** It is preposterous. During the last ten years the amount of street music has so greatly increased that it has become a positive nuisance to a considerable portion of the inhabitants of London. It robs the industrious man of his time; it annoys the musical man by its intolerable badness; it irritates the invalid, and destroys the time and energies of all the intellectual classes of society by its continual interruptions of their pursuits.

**Few:** I agree with you, Sir, but unfortunately there are many people who don't. Some of your neighbours, I believe.

**Babbage:** The great encouragers of street music belong chiefly to the lowest classes of society. Of these, the frequenters of public houses and beer shops are the worst. I have obtained an unenviable reputation by my determined resistance to the tyranny of the lowest mob, whose love of the most discordant noises is so great that it insists on enjoying them at all hours and in every street.

*Few is about to reply when the manservant enters.*

**Manservant:** Sir Edward Ryan has called, Sir, to enquire when Mr. Henry and Mrs. Henry are expected. He will be happy to wait if you are engaged or could call back later.

**Babbage:** Ask Sir Edward if he will be good enough to step in. (Manservant goes out) You are acquainted with my brother-in-law, I believe. He is a former Chief Justice of the Presidency of Bengal. His advice will be germane.

*The manservant returns and holds the door open for Ryan. Ryan is of exactly the same age as Babbage, and they were at Cambridge together. His long career in public service has given him an easy touch in dealing with people that Babbage conspicuously lacks. Also, he did not have the misfortune to lose his wife at an early age.*

**Ryan:** Good afternoon, Charles. (Sees Few) Good afternoon, Mr. Few. (Shakes hands) (Looking quizzically at Babbage) Mr. Babbage closeted with his solicitor! Organ grinders, I presume.

**Babbage:** I am the victim of much persecution, Edward, as you know. An Italian musician of the name of Beltoni is demanding 50 pounds damages of me.

**Few:** Beltoni refused to stop playing and go away when Mr. Babbage desired him to do so. He became abusive and Mr. Babbage fetched a policeman and gave him in charge. The magistrate dismissed the case and found him to be not legally in custody.

**Babbage:** I despair! This new magistrate has yet to convict anyone I bring before him. His predecessor was bad enough, but this one seems to regard all street music as high art!

**Ryan (To Few):** Do the Metropolitan Police Acts sanction the giving of a man in charge in these circumstances?

**Few:** They do not.

**Ryan:** I do not know whether you want my opinion, Charles, but it seems to me that you will have to ask Mr. Few to make as good a settlement as he can—out of court.

**Few:** I would certainly urge that as the most prudent course. A present settlement is infinitely cheaper than fighting a case, even if one is likely to win.

**Babbage:** Well . . .

*Babbage, faced with this solid front, pauses to consider, and he may be on the point of agreeing when a barrel organ opens up with "Rule, Britannia" outside his window. He moves in a determined but dignified manner to the fireplace and rings the bell.*

**Babbage:** You see how this intolerable nuisance starts up at the most inopportune moments and destroys all concentration. On a careful retrospect of the last dozen years of my life, I calculate that one fourth part of my working power has been destroyed by it. When my daughter-in-law was in a delicate state of health after the birth of her son, I could do nothing to protect her from incessant annoyance. The present interruption could continue for a protracted period.

*He rings the bell again. As he does so, the music stops.*

**Babbage:** (Taking a memorandum book from his waistcoat pocket) Pray excuse me. I keep a careful record of each and every occasion on which I am disturbed. (He writes in the book)

*The manservant enters.*

**Manservant:** I crave your pardon, Sir, for not answering the bell immediately, but I thought it would be your wish that I should desire the person to go away.

**Babbage:** He was abusive, I presume.

**Manservant:** Well, Sir, not exactly abusive, as you might say. When I offered him a shilling to go away, he merely observed that you did not know the value of peace and quiet, and demanded another sixpence. (He goes out)

**Ryan:** When you bought this house I seem to remember that the neighbourhood was a quiet one.

**Babbage:** It was. I chose the house for that reason, and because it had an extensive plot of land on which I could erect the workshop and drawing office I needed for my work on Calculating Engines. Unfortunately, despite all protests, the street was invaded by a hackney coach stand. The immediate consequence was obvious. The most respectable tradesmen, some of whom I had dealt with for five and twenty years, sold their property and left. Coffee shops, beer shops, and lodging houses filled the adjacent small streets. The character of the new population may be inferred from the taste they exhibit for the noisiest and most discordant music.

**Ryan:** Have you thought of leaving yourself?

**Babbage:** I may yet be forced to do so. But it would mean the end of my work. Why should I be driven from a house on which I have expended a considerable fortune, and which exactly suits my purposes? I have provided many comforts. For example, soon after com-

ing here one of my first steps was to install Mr. Perkins' patent hot water warming apparatus.

**Ryan:** Ah, there you have something out of the ordinary. A home that is always comfortably warm, whatever the weather.

**Few:** I noticed it as soon as I came in. Even the entrance hall is warm. I hope, Sir, you will pardon my curiosity as to how it is contrived.

**Babbage:** It is very simple. There is a furnace in the cellar, and pipes of welded iron filled with hot water convey heat to the various parts of the house.

**Few:** The usual function of a fire in causing the air in a room to be renewed does not seem to be missed. I detect no lack of ventilation or odour of burnt air.

**Babbage:** I agree with you, Sir, that ventilation is of equal importance to heating. Mr. Perkins, by my direction, provided for fresh air to be admitted from the garden and conveyed by ducts to the several rooms; it emerges after being heated by the pipes. My desire was to secure uniform warming and ventilation, with strict economy of fuel.

**Ryan:** How much fuel do you use, Charles?

**Babbage:** During the winter of 1838, I caused my servant to keep accurate records. From 30 to 85 pounds of strong coke were consumed in 24 hours, depending on the temperature outside.

**Ryan:** Certainly the system produces much comfort. I believe the time will come when every gentleman's house of the better sort will be warmed in this way.

**Babbage:** You understand why I do not wish to leave Dorset Street. In any case, there are street musicians to be found everywhere. I compute that there are no fewer than one thousand of these artists plying their abominable trade in London at any one time. If the Metropolitan Police Acts do not help, is there any other remedy open to an honest citizen?

**Few:** Well, there is the common law. It would be possible to seek counsel's opinion as to the propriety of applying to the magistrate to state a case for the Queen's Bench. What do you think, Sir Edward?

**Ryan:** It would be possible, certainly. I would not like to say what the outcome would be. The only thing that is certain is that it would cost you a great deal of money.

**Babbage:** How much?

**Few:** I would say about 50 pounds. But in addition, there is Beltoni's action to be defended. I suppose you would wish to have that case heard before a Special Jury. That would cost you 20 pounds, which you would have to pay whether you won or lost. Altogether for the whole affair between 50 and 100 pounds, perhaps near a hundred.

**Babbage:** No amount of common sense will enable a man to comprehend the laws of England. But it would be good economy to purchase my own time at the expense you mention. Pray take all necessary steps without delay. You will be willing to give Mr. Few the benefit of your advice, will you not, Edward?

**Ryan:** Certainly. (To Few) You will find me either at the Civil Service Commission near Westminster Abbey or at the Audit Office nearby.

**Few:** Thank you, Sir Edward. I will call on you as soon as I have drafted a brief for counsel. All is now settled, I think. I will get back to my chambers. Goodbye, Sir Edward. Goodbye, Mr. Babbage.

*He shakes hands and goes out. Babbage and Ryan slip into the easy manner of old friends who were at College together.*

**Ryan:** I called hoping to see Henry and Min, Charles, but I gather from your man that you are not expecting them until later.

**Babbage:** No. They have gone to Folkestone to leave the children with Min's Aunt Rachel.

**Ryan:** Yes, they told me they were going to do that when they came to see me last week. We said goodbye then, but, as I had an hour to spare, I thought I might catch them again. Min will be miserable at parting with the children.

**Babbage:** It is very hard on her, but taking them back to India was out of the question.

**Ryan:** Oh, absolutely. Where they are going in the Punjab is a very inaccessible place, not at all suitable for a baby of one and a little girl of four. They will be able to travel by carriage as far as Uballa, but beyond there they will have to go by doolie, a most uncomfortable form of travel.

**Babbage:** Yes, Henry has described it to me. A doolie is a variety of sedan chair, is it not, fixed to a pole and carried on men's shoulders?

**Ryan:** A long box, really; it is big

enough to recline in but, believe me, one is very stiff and worn out at the end of the day. Henry was telling me that he expects to be appointed interpreter to his regiment.

**Babbage:** Yes. It is very gratifying to me that my son should have been so successful in his profession. It has been entirely on his own merits. I have used no interest whatever on his account. He qualified as an interpreter after less than two years' service in the Indian Army.

**Ryan:** He is a very good one, too. He coached my son in Hindustani, you remember. (Looks at his watch) I fear I must go now. I have to be at the Exchequer in twenty-five minutes.

**Babbage:** And I shall just have time to do some work on my Analytical Engine. My workmen will need fresh instructions tomorrow.

**Ryan:** Ah, there you have something that interests you. I sometimes wish I had kept to science instead of turning to the law when I left Cambridge.

**Babbage:** (Grimly) You would have been poorer for it.

**Ryan:** I suppose I would. Our fellow student, John Herschel, did not do too badly, though. But then he was Senior Wrangler; that makes a difference. Goodbye, Charles. Give my good wishes for their journey to Henry and Min. (He turns to go, but looks back) By the way, what was that question you were asked? Pray, Mr. Babbage, if you put the wrong figures into your machine, will the right answers come out? By a Member of Parliament, too! (He goes out chuckling)

*When Ryan has left, Babbage goes to his writing table and begins to spread out some large sheets of paper. A thought strikes him, and he crosses to the fireplace and rings the bell. He returns to the writing table and starts to work. The manservant comes in.*

**Manservant:** You rang, Sir?

**Babbage:** Yes. Mr. Henry and Mrs. Henry are leaving early tomorrow morning. We shall require an early breakfast—say six o'clock.

**Manservant:** Very good, Sir. (He prepares to leave)

**Babbage:** Oh, and Payne—

**Manservant:** Yes, Sir?

**Babbage:** Be sure to go for a cab in good time. I shall accompany Mr. and Mrs. Henry to Waterloo station and see them into the train.

**Manservant:** Very good, Sir.

*Babbage settles to work, writing on one of the sheets while referring to the others. Very shortly, the noise of a hackney cab is heard and it is clear that Henry and Min are arriving. Babbage gives a sign of annoyance at having his work interrupted. He continues, and after a few moments Henry comes in. As might be expected of an officer in the service of the East India Company, Henry, who has recently celebrated his 32nd birthday, has a soldierly bearing, although he is lightly built and of medium height.*

**Babbage:** You are earlier than you said you would be, Henry.

**Henry:** Yes, the train left sooner than we thought. Min has gone to take her coat off. She will be down in a minute. (Seeing the work on Babbage's table) I am afraid I interrupted your work, Sir.

**Babbage:** I was working on the notation for my new method of multiplication by means of precomputed multiples—the one we talked about before you left. I am not sure even now that I have achieved the best possible, but you will see that I now take three fewer turns of the hand than before. (Putting the paper he had been working on in Henry's hand, he goes out on some brief errand, leaving the library door open. Henry studies the paper with signs of approval as he proceeds.)

*Min enters. She will be 23 in a few days' time, having been only 18 when Henry met her on a river steamer in Central India and married her in the garrison church at Mirzapur shortly afterwards. She is, as we shall see later, a true Memsahib. At present, however, as she stands in the doorway, she looks very young and helpless.*

**Henry:** (Going to her) Are you all right, Minnie?

**Min:** Yes, but I have just been up to the nursery. How empty it is! Oh, Henry!

*Henry just has time to squeeze her hand and give her what comfort he can before Babbage returns.*

**Min:** Never mind. I shall be all right.

*She pulls herself together, and no-one would know what she is feeling.*

**Babbage:** Ah, there you are, my dear. (He takes her hands in his) Back just in time to say goodbye! If only you were not leaving tomorrow. (It is obvious that he is very fond of her, although he does not quite know how to show it)

**Min:** Yes, it is sad we are leaving. The time had to come, I suppose. I have been so happy here. Thank you for everything. The nursery with so many conveniences, and—

**Babbage:** You have put me in your debt. It is a great boon that you have conferred on me—both of you—by coming and joining in all of my pursuits. I shall be very miserable when you have gone.

**Min:** You have done so much for us.

**Babbage:** And it has given me great satisfaction that my son should have entered so fully into my work.

**Henry:** If only I could have found some feasible way of leaving the Indian Service and staying in England! I could find nothing tempting enough, or certain enough, to entertain, especially as we now have the children to think about.

**Babbage:** Yes, I too had hoped . . . It is hard to believe that I shall not have you and the children with me anymore. At any rate, they will be well looked after. They will be under the eye of your aunt, and you have every confidence in Jane. You need not worry about them in any way. (To Henry) You remember the time when Jane came running downstairs to tell us Harry had been born? We were at dinner.

**Min:** (Half to herself) It was just a year ago.

**Henry:** Yes, how glad we were that it was a boy. I shall be eligible to apply for a Civil appointment later this year. If I could contrive to be posted to one of the larger stations, it might be possible for the children to join us. It would be out of the question where we are going. The journey, for one thing . . .

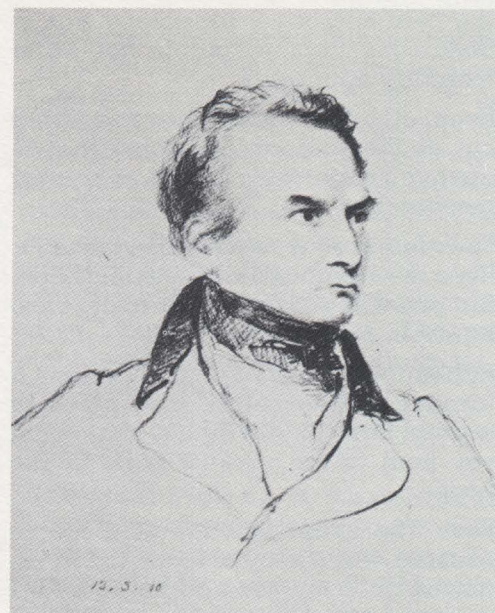
**Babbage:** It would be a great convenience to you if the new railway from Calcutta to Delhi were open.

**Henry:** Yes, it would, indeed. Min and I have just been talking about it. I was telling her of the deep interest you took in railways when I was still a boy.

**Babbage:** (To Min, eagerly taking up the topic) Yes. I naturally became interested at the commencement of the railway system, not only for its bearing on mechanism, but also for its bearing on political economy.

**Min:** Henry told me that you did some experiments on the Great Western Railway.

**Babbage:** Yes, I did. It was the wish of Mr. Brunel and the directors that I should give my opinion on the question of the gauge, and I felt that I could not speak with confidence without making certain experiments. The directors put at my disposal a disused second class carriage which I fitted up with recording apparatus.



**Henry:** And the experiments confirmed you in your view that the broad gauge was to be preferred.

**Babbage:** They did. I have been told that the statement I made at a meeting of the proprietors held at the London Tavern had a considerable influence on their decision to adopt the broad gauge.

**Min:** That was the 'battle of the gauges,' wasn't it?

**Babbage:** Yes. Strong feelings were held on both sides. The battle has long since been won by the standard gauge, as it is now called.

**Henry:** Do you wish, Sir, that you had advised the Great Western Railway in the opposite sense?

**Babbage:** No, I do not. It is still my decided opinion that all the advantages of economy of management, as well as of safety, lie with the broad gauge.

**Henry:** But the inconvenience and expense of converting to the narrow gauge has been great.

**Babbage:** True, but at the time no one could foresee that Mr. Stevenson's influence in favour of the narrow gauge would prevail.

**Henry:** He was the father of the railways, when all is said. I would have thought . . .

**Babbage:** (Who does not like being contradicted) I have given you my opinion. Even a few inches more than 4 feet, 8½ inches would have been preferable. Mr. Stevenson himself admitted as much to me at the British Association meeting in Newcastle.

**Henry:** His son has adopted 5 feet, 6 inches for the Calcutta railway. That is quite a lot more—9½ inches.

**Babbage:** It is certainly an improvement.

*The manservant enters.*

**Manservant:** Excuse me, Sir. Mr. Wight was hoping that you would have time to go to the workshop before he leaves.

**Babbage:** Oh yes, I will go now. Perhaps you would like to come too, Henry. I think that you would be interested in my latest experiment.

**Henry:** I am sure I would, Sir. I will come along directly.

*Babbage goes out.*

**Min:** It has been a wonderful three years furlough. We have done so many things, seen so many people, haven't we?

**Henry:** Yes, we can indeed look back

on it with pleasure and satisfaction. I have lost time for my pension, and we have spent some of our savings, but it has been well worth it.

**Min:** And yet, when we left India, you were by no means sure that it would be agreeable to your father to have us in his house.

**Henry:** No. During my furlough I have met him on more equal terms than ever before. As a boy I feared him, and often left the house to avoid meeting him.

**Min:** That was when you lived with your grandmother?

**Henry:** Yes. She was much affected when I left for India. My father said goodbye to me here in his library and did not even come down to the cab. I could not help contrasting my experience with that of another cadet travelling in the same ship. His father went down to Portsmouth to see him aboard. Still, I did learn to respect my father during that period, and earning his approval became important to me. It was with great satisfaction that I wrote to tell him that I had qualified as an interpreter.

**Min:** You have done other things to please him while you have been here, Henry. For example, the drawings of the Swedish Difference Engine that you took to the British Association meeting at Newcastle.

**Henry:** I wish I could do something to make my father's work on calculating machines better understood. People confuse the Analytical Engine with the Difference Engine.

**Min:** It is a pity that the Difference Engine was never completed.

**Henry:** Yes, people naturally criticise my father for abandoning it. But it was a big advance that he had made in going to the Analytical Engine.

**Min:** But when the government had spent so much on the Difference Engine, it should have been completed. Surely the disagreement your father had with Mr. Clement, his engineer, could have been overcome.

**Henry:** Yes, you are quite right. But anyone who properly understands the principles on which the Analytical Engine is based can hardly doubt its value to science as a whole—whereas the Difference Engine—

**Min:** But how many people do understand the Analytical Engine?

**Henry:** Not many, it is true. And there are many practical problems still to be overcome in its construction.

**Min:** Will your father succeed in completing it, do you think?

**Henry:** He still has a long way to go. The important thing is that he should go far enough for others to be able to continue the work. I wish he would publish a full account of the various principles and contrivances that he has evolved.

**Min:** The memoir by Menabrea that Lady Lovelace translated and annotated does not go far enough?

**Henry:** No, and it does not make easy reading.

**Min:** Have you suggested to your father that he should prepare a full account?

**Henry:** I have several times resolved to do so, but I have felt diffident about approaching the matter.

**Min:** Yes, I understand that. But if you do not say something you will regret it later. Perhaps you could take an opportunity tonight when I have gone to bed. I shall go early in any case.

**Henry:** You are right, I should. I have felt very close to my father during these last months. He took to you, too, Min, at once. You remember the looking glass he placed on the sideboard so that during dinner he could see you in it without looking in your direction? It is still there.

**Min:** Yes, I had to pretend not to notice it. I took to him too, Henry. He is a bit of an ogre in some ways, but underneath very nice and very sincere. I suppose that is why he has so many friends, and goes so much into society.

**Henry:** It is unfortunate that he has also made some enemies. He is apt to take an unfortunate view of other people's actions and motives. When he does he feels that he must expose them in strong terms.

**Min:** (With a little laugh) As far as strong terms go, he has met his match in the Reverend Charles Sheepshanks. What was it he said in his pamphlet about Mr. Babbage's blundering pertinacity?

**Henry:** He attributed it to a diseased mind! He also said that my father was ill-natured.

**Min:** Oh, that he never is. How could anyone say that he is ill-natured?

**Henry:** My mother's dying when I was a baby had a lasting effect on him. He has lived alone all these years.

**Min:** How glad I am we named Georgie after her, Henry. I am sure it gave him pleasure. (The thought of her little girl

causes her grief to come flooding back) Oh Henry! When will we see her again?

*He goes to comfort her, but there is nothing he can say. She abandons herself to grief for a moment, but then remembers who she is, and the stern duty that fate has laid on her.*

**Min:** I can bear it. Separation from her children is something that all women in my situation must endure. (She pulls herself together and moves away from him) I must talk to Payne about the things that were to be sent to Folkestone. You ought to join your father in the workshop.

**Henry:** Yes, you are right. I will send Payne to you.

*He looks tenderly at her, half hesitates, and goes out. Left alone, she goes over to the looking-glass, wipes her eyes and tidies her hair. She is quite composed when the manservant comes in.*

**Manservant:** You wanted to see me, Madam?

**Min:** Yes, it was about the children's clothes.

**Manservant:** They are packed and all ready to be sent off, Madam. The housekeeper asked me to say that she has given away the clothes the children have grown out of.

**Min:** That is very kind of her.

**Manservant:** Will you permit me to say, Madam, that all of us downstairs wish you a good journey back to India.

**Min:** Thank you. I fear that you must have had much extra work during the last three years. We are very grateful to you for all you have done for us.

**Manservant:** It has been our pleasure, Madam. This old house has been a different place with children in it. I hope Jane will bring them to see us sometimes.

**Min:** I am sure she will.

**Manservant:** Perhaps you and Mr. Henry will be coming back, Madam?

**Min:** We would like to, of course. But India is a long way off, and travel is so very difficult.

**Manservant:** Yes, Madam. Seeing that I was interested, Mr. Henry described it to me, and showed me on the map where you are going. Will there be anything further, Madam?

**Min:** No, nothing more, thank you Payne.

## SCENE TWO

*A lamp is burning on the library writing table and the manservant is in the act of lighting another on the opposite side of the room. Babbage enters, followed by Henry.*

**Henry:** You will excuse Min, Sir, for going to bed so early. She is feeling miserable at leaving, and we have to get up early tomorrow.

**Babbage:** We were all three miserable at dinner, I fear.

**Henry:** (Picking up some small objects from the writing table) I presume that these are the results of your latest experiments in casting small wheels, or rather in moulding them under pressure.

**Babbage:** Yes, they are. It is very necessary to my plan that I should have the means of making large numbers of identical parts cheaply and with precision.

**Henry:** (Putting the wheels down and resolving to approach the matter that is on his mind) May I ask, Sir, whether you have plans for adding to what is already in print about the Analytical Engine?

**Babbage:** No. The memoir by Menabrea and the notes that Lady Lovelace appended to her translation of it fully dispose of the mathematical aspects of the engine.

**Henry:** But the details of the mechanism? I could wish that you would write more on that subject.

**Babbage:** I have not the time.

**Henry:** It would be unfortunate if a future generation had to rediscover what you had learnt.

**Babbage:** My best means for ensuring that they do not is to complete the engine.

**Henry:** But the engine itself will only exhibit the one system you have decided to adopt. A critical discussion of the various possibilities you have considered, and your reasons for proceeding as you have done, would be of interest to many people.

**Babbage:** I can hardly undertake to discuss all my rejected arrangements until I have shown that the one I have chosen will meet the demands put upon it.

**Henry:** So you do not feel disposed to add to what has already been published?

**Babbage:** Not at present. At a future time, perhaps.

**Henry:** I must, indeed, agree with you that the Memoir and Notes give very full information about the mathematical use of the engine—that is, to those who are willing to give them the necessary study. I could wish that more men of science had done that.

**Babbage:** English men of science you mean! I have been entirely without recognition in my own country. The Commissioners for the Exhibition of 1851 ignored the Difference Engine and its inventor. As for the Analytical Engine, I have received no return whatever for the time and energy I have expended on it.

**Henry:** I know you feel that you have been unjustly used in regard to your work.

**Babbage:** A report persistently circulates to the effect that I abandoned the Difference Engine in order to proceed with the Analytical Engine. That is entirely false as you know. The Chancellor of the Exchequer himself gave the true reason, namely, expense. Nor did I quarrel with Clement as some have suggested. I considered his demands to be exorbitant, but I never said or wrote an unkind word to him.

**Henry:** It was shortly after I arrived in England that Mr. Sheepshanks published his infamous pamphlet.

**Babbage:** As long as such charges are confined to the Reverend Richard Sheepshanks' pamphlet, they have no effect. It is a different matter when they appear in the public print. I had recently to write to the Morning Chronicle denying a report that had appeared in that paper.

**Henry:** I met Mr. Sheepshanks, you will remember, at Greenwich. You took me with you on the Admiralty barge when you went to attend a meeting of the Visitors.

**Babbage:** What impression did you form of him?

**Henry:** Oh, he was agreeable enough.

**Babbage:** He can be on social occasions. I was unfortunate to be opposed to him in the arbitration concerning the Equatorial Telescope made by Troughton for Sir James South.

**Henry:** That must have been a disagreeable case for you to be involved in.

**Babbage:** It was. I had at first refused to be a witness on behalf of Sir James. However, the late Lord Abinger represented to me that my evidence was necessary to the justice of the case. Otherwise, I would have persisted in my refusal.

**Henry:** Mr. Sheepshanks was a witness on the other side?

**Babbage:** He was more than that. He had studied the law after taking his degree at Cambridge. It was curious to see the energy and vigour with which he applied himself to the exercise of his youthful studies.

**Henry:** You mean he took charge of the case for Troughton?

**Babbage:** He did. But that is not all. After I had given my evidence—but before I had been cross-examined on it—he took occasion to say that because I supported Sir James, I must be discredited. He went on to threaten to attack me publicly on another subject at a future time.

**Henry:** That sounds like tampering with the witness.

**Babbage:** Exactly. I felt that it would be unsafe for the cause of justice—and possibly injurious to myself—if I did not take measures for making known the nature of the weapons that the Reverend Richard Sheepshanks was employing.

**Henry:** That was why you denounced him in your book.

**Babbage:** Yes. His pamphlet was his reply.

**Henry:** I can understand his wanting to make a reply, but I think he went rather far in his personal attack on you.

**Babbage:** Let my detractors say what they will. If I survive some years longer, the Analytical Engine will exist, and its works will be spread over the world. Soon copies will be made, and there will be an Analytical Engine in every capital. They will be in constant employ for investigations in which profound analysis is necessary.

**Henry:** Yes. I realize that calculating machines are not for doing ordinary sums in arithmetic—nor for use by vendors of vegetables and little fishes—as Leibnitz put it. But what would you say are the limits of the Analytical Engine viewed as an automaton?

**Babbage:** The Analytical Engine itself is confined to calculation. But the same principles could be used to construct automata for other purposes.

**Henry:** Games of skill, for example.

**Babbage:** Yes. At one time I gave much thought to that subject for its philosophical interest.

**Henry:** We have talked about tit-tat-to, or noughts and crosses, as it is called.

**Babbage:** That is the simplest of such games. It is easy to make a machine to

play it and always to win, when winning is possible under the rules.

**Henry:** In a game like chess, however, the number of combinations is enormously greater, and foresight is required.

**Babbage:** That is so. But I have, after all, devised for the Analytical Engine means equivalent to foresight, and even allowing a hundred moves for a game of chess, the number of combinations available in the Analytical Engine greatly exceeds what is required. I believe that the principle on which the Analytical Engine is based would allow the construction of an automaton capable of playing chess.

**Henry:** Perhaps such an automaton will one day be built.

**Babbage:** Possibly, but it is hard to see why anyone should want to do so. There would be little profit in it. I am told that even the machine for writing Latin verses was an entire failure from a pecuniary point of view. The most profitable exhibition which has occurred for many years is that of General Tom Thumb, the American midget.

**Henry:** We are truly fortunate to live in a time of such progress: steamships, railways, the electric telegraph . . .

**Babbage:** I would gladly give up the remainder of my life if I could come back for three days in a hundred years' time and have some competent person explain to me the discoveries that had been made.

**Henry:** I am about to make a journey back into the past. India so far has hardly felt the march of progress.

**Babbage:** That will come.

**Henry:** (Looking at his watch) I think I should say good night now, Sir. My furlough has been profitable to me in many ways. Not least has been the privilege of being present when the Analytical Engine was coming into being.

**Babbage:** My fear is that I shall be called to my account before I have accomplished my plan.

*There is no self-importance, no illusions about him now, as he speaks, half to Henry, half to himself, the simple truth.*

**Babbage:** It must be that one day some person will succeed in doing what I have set out to do. He may employ different mechanical means. He may call his machine by some different name. But he and he alone will be capable of appreciating the nature of my efforts and the value of their re-

sults. I shall have no fear of leaving my reputation in his hands.

**Henry:** You can be sure of having the acclaim of posterity, Sir. I pray that you may be spared long enough to receive it in your lifetime. Good night.

**Babbage:** Good night, Henry.

*Henry goes out. Babbage pauses for a moment and then goes over to his writing table and begins to spread out his papers. He is just sitting down when a thought strikes him. He goes out and shortly returns carrying a looking-glass which he puts back in its old place on the wall. He then settles to work.*

THE END