Jaroslav Černý and his Work at Deir el-Medîna

Jac. J. Janssen† & Rosalind M. Janssen

Back in the Autumn of 1990, a six-part Subscription Lecture Series on or by the first six holders of the Edwards Chair was held with the aim of raising funds for the then-Department of Egyptology at University College London. Held in the Engineering Theatre, the first lecture, on Flinders Petrie, was given by the late Margaret Drower, that on Stephen Glanville by Harry Smith, and that on Walter Emery by the late David Dixon. All three were thus delivered by the subjects’ erstwhile students. The same was the case with the lecture on Jaroslav Černý, the third holder of the Edwards Chair, which was given by my late husband on 10 November 1990 and was recently discovered as a handwritten text among his surviving manuscripts. The last two lectures were delivered by the fifth and sixth Edwards Professors, with Harry Smith and Geoffrey Martin detailing their current excavation works in Egypt. Each lecture was also recorded since the original idea – mine as it happened – was to sell cassette tapes to those unable to attend the various lectures. While this was at the time a somewhat disappointing exercise, it does mean that the tape of my husband’s lecture is still in my possession, while copies of all six reside in the archives of the Petrie Museum.

My hope is that the contents of the Černý lecture will appeal to John as seventh holder of the Edwards Chair. The final words of my husband’s lecture apply as much to John as they did to Černý: “He is a great scholar, and more than that: he is an admirable personality”. This contribution comes with my grateful thanks to my erstwhile colleague for his friendship and support during our five years spent together at the Institute of Archaeology, and my good wishes to him now on his retirement.

As far as the transcript below is concerned, the text is mostly printed verbatim since the aim throughout is to capture the ‘voice’ of the speaker with all its nuances and repetitions; therefore only essential grammatical changes have been made to the ‘Dutch English’. Any additions made to the original text have been placed in square brackets; all footnotes are mine. RMJ.

It is my turn today [10 November 1990] to speak to you about the third Edwards Professor, Jaroslav Černý. In two respects, Černý was an exception among the six occupants of the chair: he was the only foreigner among them, and he was a philologist, not an archaeologist, let alone an excavator. A foreigner, and so it seems appropriate that it is another alien who is to talk about him; and a philologist, in contrast to all other Edwards professors who, from Petrie onwards, were all archaeologists. Admittedly, Glanville, Černý’s predecessor, was not an excavator. He had indeed taken part in excavations, but he was mainly a museum man. He was strongly interested in objects, whereas Černý’s main interest was in words, the names of the objects, and more generally, in language.

Why was this foreigner chosen to succeed Glanville when the latter was appointed to a newly created professorship in Cambridge in 1946? One reason was that no British Egyptologist suitable for the post was available. Two promising young scholars, Alan Shorter and Paul Smither, had recently met an untimely death, although not as a result of the war, as one would perhaps surmise.

1 The majority of these are now housed in the Griffith Institute, Oxford.

On the other hand, the Petrie collection was in 1946 still in the boxes and crates in the cellars of Foster Court, where it would stay for several more years. And for excavations the time was not yet ripe so shortly after the war. So it was no disaster for once to deviate from the tradition that the Edwards professor should be an archaeologist. Moreover, it was particularly Gardiner, supported by Glanville, who strongly recommended his former collaborator and his friend for the chair, wanting to bind him to Britain, and the common pressure of Gardiner and Glanville could not so easily be resisted. So it happened that, in the summer of 1946, Černý was elected to a professorship at UCL.

The title of this lecture, which was not chosen by me but by others, shows that it is not my task to present you an extensive biography of my hero. Nor shall I devote much time to his personality, his character, or his career. The title is: Jaroslav Černý and his work at Deir el-Medîna. The stress will be on his work, and especially on that particular aspect. A few remarks about his life, however, seem to me indispensable.

Jaroslav Černý was born in 1898 in Plzeň, the Czech city that gave its name to a famous type of beer: pils. In my language ’pils’ is the word for a glass of beer. Despite the German name by which it was known in the time of the Austrian Empire, before World War I, Plzeň was principally a Czech city, with only a small German-speaking minority. A few weeks ago my wife and I made a pilgrimage to Černý’s birthplace, looking among other things for the place where the house stood in which he lived. The building itself was destroyed by a bomb during the Second World War, but by walking through the area we attempted to get a picture of the surroundings in which he grew up.

Černý’s father was a civil servant; he was certainly not rich, but sufficiently well-off to give his son a solid middle-European education. Jaro, as he was called, attended the Gymnasium (the Grammar School) where he learnt Latin and ancient Greek, as well as French and English. He also learnt Italian from a friend of the family. In all these languages he became later in his life really fluent.

His fascination with ancient Egypt originated from those early years, as is the case with so many Egyptologists. In order to stimulate it, and to give it also a practical turn, his father presented him with what was in that time a famous German book: Steindorff’s *Die Blütezeit des Pharaonenreiches* (The Flowering Period of the Pharaohs’ Kingdom), from which the young schoolboy picked up a lot of German. No wonder that the later Egyptologist became an expert on language.

In 1915, still during the First World War – Černý never seems to have been drawn into the army, probably because of his poor eyesight – he began his studies in ancient history at the University Karlovy (the Charles University) at Prague, under the famous Hittitologist Hrozný, with František Lexa as his teacher of Egyptian. After the war, but still during his studies, he was able to pass some time in Berlin, where he worked under Adolf Erman. In 1922, just 24 years old, he received his doctor’s degree on a thesis dealing with the subject to which henceforth such a large part of his life would be

---

3 See now for this aspect Růžová 2010.
4 We had been previously informed by Professor Eugen Strouhal (letter dated 29 May 1992) that the address was 2 Jagellonská Street.
5 My husband experienced a similar Gymnasium education in the Netherlands in the 1930s. As well as Latin, Ancient Greek, French, and English, he acquired, thanks to his pro-Nazi female teacher, fluent German. RMJ.
devoted, namely, the community of necropolis workmen on the Theban West Bank. I will say more about this in a moment.

Černý was obliged to earn his living and, since there was no chance in his country to find a position in Egyptology, he was glad to find employment in a bank. Yet, he continued to devote all his free time to his studies. Černý was by nature a real scholar. He once told me that he used to travel up and down to his work in the tram and for some months he took with him in his briefcase a photograph of a text in the Leiden museum written in an extremely difficult script which we call ‘abnormal hieratic’. As soon as he was seated, he took the photograph and stared at the text, trying to decipher words and sentences. After a long time he understood almost every sentence; he was later able to publish it. Who of us would try to read abnormal hieratic in a tram when going to or returning from work? Later, when he was professor here at UCL, his students asked him how he passed a Sunday when he wanted to relax, and his answer was: “I translate Coffin Texts in my pyjamas”.

Černý was lucky with his employer, the Trade Bank (Živnostenská banka – ZIBA). Not only that he went every holiday to Turin in order to study there the fantastic collection of papyri and ostraca in the Egyptian Museum, but he also obtained permission, from 1925 onwards, to spend the winters in Egypt, where he studied the ostraca in the Cairo Museum and served, for many years, as epigrapher at the French excavations at Deir el-Medîna. Thus he became not a, but the expert in late New Kingdom hieratic as well as the world’s first ostracologist.

However, the hieratic script and the texts from the workmen’s village were not his only centres of attention. I will not present you with a complete list of all that Černý has written in his life. That would be too dull a catalogue. I therefore restrict myself to a few major points.

As stated before, Černý was fascinated by language, particularly grammar, but also by the historical development of words and their meaning, the etymology. From early in his career on he compiled a slip-index in which he noted the ancestors of Coptic words: mainly, of course, Egyptian words from older stages of the language, especially that directly preceding Coptic, the Demotic; but also Greek ones, and words from a range of Semitic languages: Akkadian, Aramaic, Arabian, Hebrew, Syriac, etc. I stated before: Černý was a polyglot!

The result of this aspect of his studies was a book, the Coptic Etymological Dictionary, the last major work which he handed over to the printer himself, shortly before his death. Friends of his had to see it through the press. At least, this part of his studies reached a worthy conclusion. That has not been the case, unfortunately, with his grammatical work. In his later years Černý lectured on Late Egyptian grammar at various universities all over the world, and a whole series of his pupils compiled extensive notes from these lectures. Moreover, he left after his death notebooks that he had used for his lecturing. These were not, however, written with the intention to publish them as such. On account of all this material one of his pupils, Sarah Israelit-Groll, composed a grammar that bears his and her name, as if they had been co-authors. Indeed, much of what the volume contains is due to Černý, but the book as it is printed is not his but Mrs Groll’s work.  

---

6 This anecdote originally related to me by Černý’s student Judith Walker (Mrs. Hatton) was subsequently published in R.M. Janssen 1992: 56.
7 It was published by the Cambridge University Press in 1976.
8 Perhaps a salutary warning to the co-author of the present article!
When he was professor at UCL, Černý ventured, on request of a publisher, to write a book on Egyptian religion. That was not his own special field of study, and although he worked hard on it – his friend Sir Alan Gardiner called it “a tour de force” – and it is certainly a valuable piece of work, many Egyptologists regret the large amount of time spent on its preparation. His was not a particular or a new point of view on the subject. Therefore, it became a more or less chronological survey, full of valuable remarks on a range of subjects, but hardly presenting a deeper insight into that difficult world of Egyptian religion as a whole.

Self-evidently, Černý also wrote on history, almost unavoidable to an Egyptologist. Best known in this respect is his chapter in the second and third editions of the Cambridge Ancient History, covering the period from the death of Ramesses III to the end of the Twenty-First Dynasty. From his study of the texts he was able to bring forward many an interesting detail especially on the time of the later Ramessides. Here too, as in his book on religion, he did not show a striking personal point of view, but that would not have suited this major survey of ancient history.

Before I now turn to what I see as the core of his activities, Deir el-Medîna, I would like to interrupt the survey of his studies by some remarks on his personality. As I told you before, we were in October in Czechoslovakia, and there, in Prague, we attended the opening of an exhibition devoted to Černý and Deir el-Medîna. On that occasion I had the honour to give an account of the impression Černý made on me in the years I was studying with him. Three points I particularly mentioned, and it seems appropriate to repeat them here: his fantastic memory, his generosity, and his modesty.

The first point, his memory, I have experienced myself. I was at a certain moment, in 1957, preparing my thesis, and for that I studied the occurrences of particular words. When I asked the professor where these words did occur, he could from his memory quote the page and line in various publications. Now, every scholar is in this respect slightly mad: he knows by heart details of the subject he studies that nobody else, even his near colleagues, keeps in mind. In that way we are all what the Germans call ‘Fachidioten’. But Černý did remember details, words or grammatical constructions, which he had never especially studied! His memory was really amazing. And it was always available for his students. I seldom met a scholar who was so generous with his knowledge. And not only with that, but also with the material he had collected. When he saw from my thesis that I was interested in economic history, and particularly in prices of commodities, he immediately offered me all the material he possessed for this subject. He even loaned me one of his famous notebooks in which he had written, in his beautiful handwriting, every sentence from the ostraca and papyri that contains a price. He had planned himself to write a book on them; he had already published a preliminary article on prices and wages; but he realized that he would hardly be able to finish what he intended to do in his life. Yet, how many of us hand over the material we have collected for ourselves? It is our capital, and one has to be careful with that. Not so Černý; he liked to help. Indeed, I have published the study, although, unfortunately, it appeared some years after the death of my master. All I could do was to dedicate it to his memory.

---

9 Černý 1952.
10 The second edition appeared in 1965.
11 This opening took place on 8 October 1992 at the Náprstek Museum; the exhibition was entitled ‘Builders of the Kings’ Tombs. Jaroslav Černý and Deir el-Medina.’
12 Černý 1954.
Lastly, Černý was fundamentally a modest, even a shy man. He certainly would not have liked to be himself the subject of an exhibition, as now in Prague, or of a lecture as the present one. Although ... deep in his heart I think – and hope – that he would have appreciated it. At least, we owe it to him.

Let us now turn to what has been the core of Černý’s scientific work, namely: the texts from the settlement of the necropolis workmen on the Theban West Bank, which is known under the Arabic name Deir el-Medîna. Earlier tonight I called Černý the world’s first and greatest ostracologist, because many of the texts he studied were written on potsherds (Greek: ostraca) or flakes of limestone (also, actually incorrectly, called ostraca by Egyptologists). Černý is the scholar who has published these short texts, in various series: first four large fascicles with ostraca in the Cairo Museum (1930–35), then six volumes of those preserved in the French Institute at Cairo (1935–70), of which the last one, written out by an Egyptian collaborator, appeared after his death, at the end of 1970. Then, he published together with Sir Alan Gardiner a folio volume with ostraca from Gardiner’s own collection, as well as from several other ones (1957). All these texts were non-literary ones: accounts, letters, various sorts of lists, etc.; the literary ostraca, not only those bearing literary compositions in our sense, but also those with religious texts, hymns, and suchlike, he left to others.

What does it actually mean: Černý published many ostraca? I think for those of you who cannot visualize such a book a brief explanation is needed. The ostraca are written in the hieratic script, which is, when not too carefully written – and accounts and other administrative texts tend to be untidy, quickly made notes – extremely difficult to decipher. Only a few Egyptologists are specialists in this field, the late New Kingdom hieratic. What Černý did was presenting, apart from a photograph and a facsimile of each text, a transcription in hieroglyphs, so that it would be readable to every Egyptologist. That sounds perhaps simple, but I can assure you that it is not. Černý himself once said to me: one can only read these texts when one knows what is there, or at least, what could be there. That means: one has to be very well at home in the material knowing all the words that could appear in the texts, in order to recognize those that indeed are there.

If you ever glance at one of these publications you will be struck by the regular, beautiful signs. Černý was one of the very best Egyptologists in this respect – in contrast, for instance, to Gardiner. It is not for nothing that the latter prepared his text publications to be written out by others, particularly by Černý. So even some of Gardiner’s own books show Černý’s handwriting.

Publishing transcriptions of ostraca is only one side of the work; the other is their translation and interpretation. The books I mentioned before do not contain such translations – although, as stated before, Černý must have known what was written in order to be able to read them. Some of his articles, however, contain both transcriptions and translations, plus a commentary. So, for instance, a series of three on oracles, school texts on ostraca that were put before the divine patron and local saint of Deir el-Medina, the long deceased Pharaoh Amenophis I, when his statue was carried in procession around the Village, or also when he rested in his sanctuary in the neighbourhood of the settlement. All kinds of question were put before the god, such

---

14 Ashraf Abdelaziz Sadek.
15 Similar sentiments were expressed to me by my husband when, in his eighties, he started working on the British Museum’s Baldwin Papyrus. This text was written by a scribe with an appalling hieratic hand and my husband used to invariably say that only a lifetime’s experience with hieratic enabled him to read it.
as: ‘did he steal it?’ Of course, for us such words remain a mystery. Who was ‘he’ and what was ‘it’? But the people present, colleagues and friends of the man who put the question, did very well know what was meant. The god answered, for instance, by nodding, or receding a few steps. The first meant ‘yes’, the latter ‘no’. Of course, it was the carriers of the statue who did it. Why they gave a positive or negative answer, in how far they believed it really was the god who spoke, is a difficult problem. Here we are only concerned with Černý’s publication of these texts, which shed a particular light on the daily life of the Ancient Egyptians.

I would not like to create the impression that Černý’s activity was restricted to the ostraca. He also devoted important articles to some papyri from Deir el-Medina, and prepared the publication of others. In this connection I mention especially a volume of transcriptions of 51 letters from an archive that belonged to the last stage of the workmen’s community, when they were no longer settled in Deir el-Medina. The book appeared just before the Second World War, in 1939. Afterwards, Černý discovered that the British Museum housed more of those letters, which for some reason had escaped his attention. Taking up the mantle that he left, I published them in a continuation of his Late Ramesside Letters as his book was called, adding a few more that he had left aside. Moreover, the British Museum that published this book of mine added photographs of all the letters which Černý had transcribed, so that scholars can now fully appreciate his achievement.

Apart from hieratic texts, Černý also published a slender, elegant booklet on some stelae from Deir el-Medina (1958). These stelae were brought from Egypt in the early Nineteenth Century by William [John] Bankes, the later owner of the Mansion at Kingston Lacy, where he, as is well known, erected the obelisk from Philae that played a rôle in the decipherment of the hieroglyphs. Bankes assembled an important collection of antiquities, which since that time have been housed at his country estate, and it was the stelae among them that Černý published, with important remarks on the genealogies of the workmen.

And last, but not least, Černý made extensive study in his later years of the hundreds and hundreds of graffiti which the workmen inscribed on the rocks behind their Village, and widely around in the area of the Theban necropolis. In 1956 he published a volume of these texts and in the mid-1960s he prepared, together with others, a series of volumes that ideally would present all these inscriptions. Mostly they are short, consisting of only a name, or a name preceded by a title, but in a minority of instances they mention also family relations such as: X, son of Y, brother of Z. Of course, it is these that can be useful to better understand the world of the workmen.

Until now I have regularly referred to these men, the necropolis workmen living at Deir el-Medina, to whom Černý devoted so much of his life. Who were these people? It is mainly due to him that we know that. When he began his studies that matter was not at all clear. In 1880-83 the famous French Egyptologist, Gaston Maspero, had published three articles on monuments in the Turin Museum, most of which were stelae and statues from the workmen. Moreover, the German scholar Wilhelm Spiegelberg had also written about them, but his work was particularly based on papyri,

---

17 Notably A.A. Youssef and E. Edel.
18 Graffiti de la montagne thébaine, published by the Centre de documentation et d’études sur l’ancienne Égypte between 1969 and 1983.
ostraca, and graffiti.¹⁹ In the latter those people we now call the artisans of the royal tombs were indicated with the strange term ‘men of the crew’, as if they were sailors, whereas on the monuments, and also in the tombs in the Valley of Deir el-Medina, the owners were called ‘Servant of the Place of Truth’. Therefore, these people were thought to be embalmers, or even priests of the royal cults, whereas the former group was thought to be of a very low social level. In the titles of the leaders of the ‘crew’, scribes and foremen, there occurred sometimes the word hr, which Maspero first thought was an indication of the royal funerary temple. It was Černý’s first and fundamental discovery that these two groups are actually one and the same. In daily life they called themselves ‘the crew’, but they felt that on monuments they needed a more lofty title, and so they chose the indication ‘Servant of the Place of Truth’, which sounds better. Maspero was led astray because they also served as lay-priests in their sanctuaries around their Village, but that was only for Sun- and feast-days. Not a real occupation.

This (and more) Černý demonstrated in his dissertation, but since that was written in Czech it remained hidden from the Egyptological world. Only in 1929 did he publish two major articles in which he made his discoveries known among his colleagues. One of them was called ‘L’identité des “Serviteurs dans la place de vérité”’ (the title is clear!).

Originally, it had been a lecture at the 17th International Congress of Orientalists at Oxford at 1928. The other aspect dealt with a special aspect of the life of the workmen’s community, the cult of the Pharaoh Amenophis I who was, as I told you before, the local saint.²⁰ Earlier, Černý had already devoted a publication to some of the more important ostraca in the Cairo Museum, which he presented with a translation and an extensive commentary, in which he sketched the workmen’s organization and administration. In 1930, at a Congress in Brussels, Černý once more dealt with his subject in general, defending the study of ostraca. By all these he definitely had established his fame as ‘the’ specialist in this field of studies.

We will not follow him further from step to step through his researches; that would lead to some sort of catalogue. One point should be stressed, however. Černý travelled a lot, before and after World War II, everywhere transcribing the ostraca in many collections. Not only did he participate in the excavations of Deir el-Medina, as stated before, transcribing the texts already in the field; he worked in Turin, in Berlin, at various places in the USA, &c. The hieroglyphic transcriptions of hieratic texts he wrote down in a large number of notebooks, which contained his working material. They still exist. Housed in the Griffith Institute in Oxford, they constitute a major source of information for many Egyptologists. Not everyone is able to travel all over the world to study the originals, and hardly anyone is able to read and transcribe the hieratic as he did. Fortunately, every serious scholar is allowed to consult those Notebooks; and consulted they are!

It was based on this material that during the fifties Černý began to write his major study. He planned it in three volumes: one on the organization of the workmen; one on their building and decorating the royal tombs; and those of the members of the royal family in the Valley of the Queens as well, which were also due to the same artisans; and a third one on the daily life of the community. And here begins what I deem to be a minor tragedy. Černý wrote the first volume, in a provisional form, but instead of

---

¹⁹ Spiegelberg’s splendid and very rare two-volume 1921 work formed part of my husband’s library.
²⁰ Contrary to the lecture this was actually published two years earlier in 1927.
continuing, he thought it necessary to revise it, adding from the knowledge he had gained when writing. And that happened again, and again. Each time I met him in the sixties he told me that he had rewritten some chapters. At last, at the end of these years, he handed the manuscript over to the printer of the French Institute at Cairo. Alas, it was too late. His eyesight became worse, despite some operations, and suddenly, on the 19 May 1970, he died, only seventy-two years old.

The book had to be seen through the press by others. It only appeared in 1973. And that was merely volume I. It bears – one has to admit it – the traces of the numerous writings. It is no unity anymore. For instance, the same text is dated to various reigns on different pages. Evidently, the author did not compose an index while writing; he probably thought he could keep it all in his phenomenal memory, forgetting that he became older. It was too much, even for him. If he changed his opinion concerning a date or a genealogical relation he should of course have done that on all other relevant places, but he did not. The editor, not well at home in Deir el-Medîna studies, also did nothing of this kind. And so, sadly, what in itself is doubtless a masterpiece in Egyptology, lacks the high quality that it almost attained. That it in its printed form still has no index proves my point, and makes it difficult to handle.

Please, don’t misunderstand me. The volume, *A Community of Workmen at Thebes in the Ramesside Period*, as it is called, is *the* fundamental study to the subject. It explains the organization of the workmen; the words used to indicate the area they inhabited; it presents annotated lists of the various officers of the community: chief workmen, their deputies, the scribes, as well as of people closely connected to it: guardians and doorkeepers, policemen and so on. It also gives valuable information about the genealogies of these people. In short, it is *the* work on the subject.

But it is only volume I. Among Černý’s papers there were found after his death a few chapters intended for volume II, on the work in the royal tombs. So far as they were complete – it was the first version, but therefore a unity – they have also been published, at the same time as the main volume. That is all we have today. As for the rest, we do not even know exactly what he wanted to tell. Certainly a lot about life in the community, about which we know more than of any other one in Ancient Egypt. But what subjects he wanted to deal with is forever obscure, unless there are indications in his correspondence which is now preserved, with his papers, in the Griffith Institute. Nobody seems until now to have studied this.  

So the master was snatched away from us, leaving us merely a torso of his life-work. It is the duty of his successors to carry on. One major work was published already in 1985 by a French scholar, Dominique Valbelle, which presents systematically what we know about the workmen, covering those subjects Černý had reserved for his last volume. A splendid book, it is entirely based on Černý’s discoveries – as it should be. For he it was who made the community of necropolis workmen, their life and its vicissitudes, known to the Egyptological world – and to all those who are interested in Ancient Egypt. Everyone who studies and writes on the workmen, even when he or she never met him is Černý’s pupil, and that will remain so for many years. That I have been able to study for some time with him, and through his generosity to publish on one aspect of the community, namely its economy, I owe to him. He was a great scholar, and more than that: he was an admirable personality.

---

21 Twenty years later they were cited in the 2010 publication by Jiřina Růžová.

22 In JJJ’s manuscript the note “Also Eyre, *Work* etc.” (i.e. Eyre 1987) has been inserted above in pencil.
By way of a postscript, it is noteworthy that I have subsequently discovered the sheet for Černý’s memorial service amongst my late husband’s papers. Held in the Queen’s College Chapel on Tuesday 7 July 1970, it is of interest to quote two particular passages. Not only do these corroborate the sentiments expressed in the Janssen lecture, but on a wider scale, they provide a direct link with the A Good Scribe and an Exceedingly Wise Man title of the present Festschrift.

The bidding words following the opening hymn comprised the following:

We are met to give thanks to God for JAROSLAV ČERNÝ, for his dedication to scholarship and sound learning, for all that he gave of himself to so many, for his life and for his death, and for all he was and is; and we shall pray, in confidence and faith, that God will grant him place of light, refreshment, and peace.

Then, following the lesson from the Wisdom of Solomon and an organ voluntary, there was a reading from the Unum Necessarium of the renowned Czech educator Jan Amos Komenský (Comenius). Written in 1668, the relevant passage reads:

The art above all arts is to die well. Only a wise man can depart from this life with honour, for he has known how to conduct his whole life in such a way as to prepare himself for a glorious and blissful stepping into the Beyond. For what is there of more lasting value that a man can leave behind him than an honourable reputation? This is the one thing that is needful in our life.

Černý would have been delighted. Not only with the links to his beloved homeland, but those across the millennia to the Ancient Egyptian Wisdom Literature that he knew and loved so well. RMJ

Bibliography
