Revue d'histoire des mathématiques
28 (2022), p. 183–286
doi:10.24033/rhm.240

CONTRASTING AIMS AND APPROACHES IN THE STUDY OF ANCIENT EGYPTIAN MATHEMATICS IN THE 1920s

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Abstract. — The modern academic study of ancient Egyptian mathematics emerged in the mid-nineteenth century as the decipherment of ancient texts revealed the arithmetical and geometrical notions and processes employed by the ancient Egyptians; most of what is now known stemmed from the discovery and study of the Rhind Mathematical Papyrus in the 1860s and 1870s. However, despite the unearthing of a small number of additional sources, the study of ancient Egyptian mathematics remained quite closely focused on the Rhind Papyrus, with many texts simply restating what had already been written about it. In this paper, we discuss how the topic re-emerged in the 1920s in a more fully contextualised form. Particular attention is paid to the contributions of the Egyptologist Thomas Eric Peet (1882–1934) and the historian of mathematics Otto Neugebauer (1899–1990). We argue that by the end of the 1920s, a topic that had hitherto largely been the preserve of Egyptologists had passed into the hands of mathematicians.

Texte reçu le 1er juin 2022, accepté le 9 octobre 2022.

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2000 Mathematics Subject Classification : 01A16, 01A85.

Key words and phrases : Ancient Egyptian mathematics, Thomas Eric Peet, Otto Neugebauer, Rhind Mathematical Papyrus.

Mots clefs. — Mathématiques de l'Egypte ancienne, Thomas Eric Peet, Otto Neugebauer, papyrus mathématique Rhind.

Résumé (L'étude des mathématiques de l'Égypte ancienne dans les années 1920 : des objectifs et des approches contrastés)

L'étude des mathématiques de l'Égypte ancienne s'est constituée en champ académique au milieu du XIXᵉ siècle lorsque le déchiffrement des textes anciens a révélé les notions et les processus arithmétiques et géométriques employés par les anciens Égyptiens; la majorité de nos connaissances actuelles découle de la découverte et de l'étude du papyrus mathématique Rhind dans les années 1860 et 1870. Cependant, malgré la découverte d'un petit nombre de sources supplémentaires, l'étude des mathématiques de l'Égypte ancienne est restée assez étroitement centrée sur le papyrus Rhind, de nombreux textes ne faisant que reprendre ce qui avait déjà été écrit à son sujet. Dans cet article, nous discutons de la façon dont le sujet a réémergé dans les années 1920 sous une forme davantage contextualisée. Une attention particulière est accordée aux contributions de l'égyptologue Thomas Eric Peet (1882–1934) et de l'historien des mathématiques Otto Neugebauer (1899–1990). Nous soutenons qu'à la fin des années 1920, ce sont les mathématiciens qui se sont saisis de ce sujet, qui avait jusque-là été largement l'apanage des égyptologues.

1. INTRODUCTION

In October 1926, the British Egyptologist Thomas Eric Peet (1882–1934), then Brunner Professor of Egyptology at the University of Liverpool, wrote a typically wide-ranging letter to his mentor, the Egyptologist Alan H. Gardiner (1879–1963).[1] The letter covered the content of the new issue of *The Journal of Egyptian Archaeology* (of which Peet was editor), Gardiner's forthcoming *Egyptian grammar* [Gardiner 1927], a recent trip by Peet to the Egyptian collections of Turin, and a critique of the work of an Italian amateur Egyptologist. At the end of the letter, Peet turned to the recent work of the young Otto Neugebauer (1899–1990) in Göttingen. Subsequently a very prominent name in the study of the history of mathematics, Neugebauer had just launched his career as a historian of ancient science by completing a doctoral dissertation [Neugebauer 1926] on the methods of fraction-reckoning found in the Rhind Mathematical Papyrus (hereafter, RMP), the most complete and extensive surviving source on ancient Egyptian mathematics, acquired by the British Museum in 1864 [Budge 1898, p. [1]]. During the completion of his doctoral research, Neugebauer had been in correspondence with Peet about the RMP,[2] owing to the fact that Peet's recent edition of the papyrus [Peet 1923a] had

[1] Griffith Institute Archive, Oxford: AHG/42.230.92, Peet to Gardiner, 16th October 1926.

[2] See [Hollings & Parkinson 2020].

been Neugebauer's main source. At the time of writing to Gardiner, Peet had recently received a copy of Neugebauer's completed dissertation, and shared his thoughts on it with his mentor: on the whole, Peet agreed with Neugebauer's interpretations of certain arithmetical problems within the RMP, although he had some doubts about the emphasis that Neugebauer placed on particular features. [3] In conclusion, he wrote:

> In any case his is an admirable piece of work and makes me if possible more dissatisfied with my Rhind than I was before. Still it has served to re-open the study of Egyptian maths.

The 'it' referred to in this last sentence was probably Neugebauer's dissertation, which is the main topic of this passage in the letter, although it could just as easily have meant Peet's own edition of the RMP—both have a claim to being the origin of the 're-opening' indicated by Peet, as we shall see. The assertion that such a 're-opening' of ancient Egyptian mathematics had taken place is one that Peet echoed elsewhere, both privately and in print, such as in the following passage at the start of a review of another text [Vogel 1929] on aspects of the mathematics of the RMP:

> The re-publication of the Rhind Mathematical Papyrus in 1923 has led to a renewed interest in the subject of Egyptian mathematics and provoked a series of valuable works on it [...] [Peet 1930a, p. 270] [4]

The nature and consequences of this "renewed interest," and the role of Peet's work within it, are the main theme of the present paper.

In the quotations above, Peet apparently showed a characteristic self-effacing attitude towards the importance of his own works, but positive comments on Peet's edition of the RMP may be found throughout both the Egyptological and the mathematical literatures: Gardiner, for example, later described it as "outstanding" [Gardiner 1934b], whilst the British Egyptologist Battiscombe Gunn (1883–1950), a sometime-collaborator of Peet's, observed that it contains "an excellent survey of Egyptian mathematics as a whole" [Gunn 1926, p. 123]. On the mathematical side, Arnold Buffum Chace (1845–1932), editor of a later edition of the RMP which we will encounter below, welcomed Peet's edition with "keen delight" [Chace 1924, p. 215], and his colleague Raymond Clare Archibald (1875–1955),

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3 For a detailed discussion of these mathematical points, see [Hollings & Parkinson 2020].

4 Among these "valuable works," Peet included Neugebauer's "enlightening if difficult" dissertation.

compiler of a bibliography of ancient Egyptian mathematics, praised the volume in the highest terms:

> The attractive, lucid, and stimulating style of the commentary and the remarkably thorough, judicial and scholarly character of the work as a whole stamp it as a contribution of very high order to our knowledge of Egyptian mathematics. [Archibald 1924, p. 249]

Neugebauer was similarly complimentary, stressing the "fundamental importance" ("grundlegende Bedeutung") of Peet's work for his own, and for any other future investigations, of ancient Egyptian mathematics.[5] Indeed, the historian of science George Sarton (1884–1956) asserted that "[f]rom now on it will be obviously impossible to touch the subject of Egyptian mathematics without a serious study of [Peet's] work" [Sarton 1924, p. 557]. In fact, Peet's edition of the RMP would quickly be superseded, at least for certain audiences, by that of Chace, for reasons that we will explore below.

One of the reasons for the plethora of positive remarks about Peet's edition of the RMP was that by the beginning of the 1920s, its need was badly felt. The RMP was, by this time, a well-known document amongst writers on the history of mathematics, and had already found its position, which it still maintains today, as a text that should always be mentioned at the beginning of any general history of mathematics.[6] Few of these histories, however, had anything new to say about the papyrus, and simply paraphrased the commentary that had been provided by the German Egyptologist August Eisenlohr (1832–1902) at the end of the 1870s [Eisenlohr 1877]. Eisenlohr's edition was completed in collaboration with his mathematically-trained brother Friedrich (1831–1904) and the historian of mathematics Moritz Cantor (1829–1920), and it provided the first glimpse of the processes of ancient Egyptian mathematics, along with a full overview of the content of the RMP. By the end of the nineteenth century, however, developments in the understanding of the Egyptian language, and of the cursive hieratic script in which the RMP is written, meant that a new edition was called for. Writing in 1926, the notoriously meticulous Gunn was particularly critical of Eisenlohr's edition:[7]

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5 Griffith Institute Archive, Oxford: Peet MSS 4.9.2, Neugebauer to Peet, 22nd August 1926.

6 Cf. Robson's comments on the "obligatory Babylonian chapter in every history of mathematics text book" [Robson 2008, p. 271].

7 It was later noted of Gunn that "[h]e demanded the highest standard of accuracy both from himself and from others" [Simpson 2004b].

> Eisenlohr's book, now nearly 50 years old, is both antiquated and unsatisfactory in treatment: not only does it contain a quantity of wrong readings, translations and interpretations, [...] but also the explanations of the exercises are often complicated and abstruse [...] [Gunn 1926, p. 123]

These remarks come from Gunn's review of Peet's edition of the RMP, which Gunn believed "ably supplied" the need for a new version. One of the reasons for the success of Peet's edition was the fact that, like Eisenlohr and his collaborators, he was able to combine his mathematical background (see section 5) with an up-to-date expertise in Egyptology.

As we have already noted, and as we shall see in more detail below, the appearance of Peet's work in 1923 quickly led to an explosion in the number of published works on ancient Egyptian mathematics, mostly by authors approaching the topic from a mathematical background.[8] Indeed, although Peet's edition garnered positive comments from his fellow-Egyptologists, the greater interest seems to have come from mathematicians and from historians of mathematics, a circumstance that Peet all but predicted in a letter to the biologist, mathematician, and classicist D'Arcy Thompson (1860–1948) around the time of the edition's publication: "[t]he interest is almost more mathematical than Egyptological".[9] For most of its readers, Peet's edition provided an up-to-date and accessible entry into source material that would otherwise have been inaccessible to them for reasons of language, script, and cultural context. There was one major exception: Neugebauer, Peet's first and arguably most enthusiastic mathematical follower. Neugebauer was unusual among contemporaneous historians of mathematics for the fact that he made a point of studying the languages in which a range of ancient mathematical texts were written: first Ancient Egyptian, and then Akkadian for the study of Mesopotamian mathematics and astronomy. With the appearance of Peet's edition of the RMP in 1923, the ground was apparently set for

8 The discovery of the tomb of Tutankhamun in 1922 resulted in an increased fascination with ancient Egyptian art and culture ('Tutmania'—see, for example, [Collins & McNamara 2014, pp. 63–87]), but there is no evidence that this was a direct factor in the revival of interest in Egyptian mathematics at this period. The only reference to Tutankhamun known to us among the mathematical sources is a passing mention by Karpinski [1923, p. 529], giving his readers a rough comparative date for the Moscow Mathematical Papyrus.

9 University of St Andrews Library, Department of Special Collections: Papers of D'Arcy Wentworth Thompson, Correspondence to Professor Sir D'Arcy Wentworth Thompson from Thomas Eric Peet, 22 October 1922–27 June 1933: ms23967, Peet to Thompson, 2nd November 1923. The context of this remark is that Peet sought to have his edition reviewed by a Scottish mathematical journal.