AFRICAN MATHEMATICAL UNION

COMMISSION ON THE HISTORY OF MATHEMATICS IN AFRICA

AMUCHMA-NEWSLETTER-16

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Universidade Pedagógica (UP), Maputo (Mozambique), 7.9.1995

1. OBJECTIVES

The A.M.U. Commission on the History of Mathematics in Africa (AMUCHMA), formed in 1986, has the following objectives:

a. to improve communication among those interested in the history of mathematics in Africa;

b. to promote active cooperation between historians, mathematicians, archaeologists, ethnographers, sociologists, etc., doing research in, or related to, the history of mathematics in Africa;

c. to promote research in the history of mathematics in Africa, and the publication of its results, in order to contribute to the demystification of the still-dominant Eurocentric bias in the historiography of mathematics;

d. to cooperate with any and all organizations pursuing similar objectives.

The main activities of AMUCHMA are as follows:

a. publication of a newsletter;

b. setting up of a documentation centre;

c. organization of lectures on the history of mathematics at national, regional, continental and international congresses and conferences.

2. MEETINGS, EXHIBITIONS, EVENTS

2.1 The Kairouan study days on mathematics in Arabic arts

The regional bureau of the Tunisian Association of Mathematical Sciences organised study days on mathematics in Arabic arts from March 27 to April 1. During the first two days the following papers were presented:

* Mohamed Souissi: *The human and cultural dimension of Arabic mathematics*;
* Mourad Rammah: *The artistic particularities of Kairouan architecture*;
* Hmida Hadfi: *Explanation of certain mathematical procedures used in Ifriqya*;
* Ahmed Djebbar: *The contribution of the scientists of Ifriqya to the development of Arabic-Islamic mathematics*;
* Marie Bouazzi: *Mathematics and regular decorative compositions: Tunisian mural faiences from the 18th century*;

* Ahmed Djebbar: *Presentation of the book 'The measure of wounds and the determination of unknowns' by the Maghrebian mathematician al-Jitali (death in 1305)*;
* Taha Sboui: *Geometrical problems in Arabic mathematics: the example of Abul-Wafa*.

The subsequent study days were dedicated to a seminar and to workshops organised by Elisabeth Busser (Editor of the Bulletin of the Association of Mathematics Teachers of Public Schools in France) and Gilles Cohen (Chairman of the International Federation of Mathematical Games) in collaboration with Ahmed Djebbar. The themes were the following:

(1) Mathematics and history;
(2) Mathematics and the development of techniques;
(3) Mathematics of daily life;
(4) Mathematics and art.

One of the workshops following the first theme dealt with the analysis of some mathematical problems from the book of the 13th century Maghrebian mathematician, al-Jitali. Parallel to the seminar, three exhibitions were held. They were conceived and realised by pupils from the high school in Kairouan and dealt with the following topics:

* Drawings representing Arabic mechanical objects;
* Models illustrating the relationship between mathematics and art, in particular through the case of the architecture of the monuments in Kairouan;
* An exhibition of paintings on mathematics in figurative art.

A visit to the Raqqada Museum was also organised, where coins from the different dynasties that governed eastern Maghreb or the whole of North Africa, as well as objects of art and mathematical manuscripts, may be seen. These illustrated perfectly the theme of the study days in Kairouan (Report by Ahmed Djebbar).

2.2 Papers presented at recent meetings

* At the International Congress on the Relationships between the Canary Islands and the African Continent: From Prehistory to the Middle Ages, held at La Laguna (November 1994), José García presented the paper *"A new list of Canarian Berber numerals: Cairasco de Figueroa 1582"* (cf. AMUCHMA 12: 3).

3. CURRENT RESEARCH INTERESTS

* Ron Eglash (Oregon State University, USA) returned to the USA after a year of fieldwork in west and central Africa, continuing his "African fractals project" (cf. AMUCHMA #8: 4.1, #11: 3). He produced software and a draft paper entitled "AFRACTALS: math education software from

African ethnomathematics". In its introduction, the author states that the project "began with the visual observation that aerial photos of traditional African settlements tend to have a fractal structure (scaling in street branching, recursive rectangular enclosures, circles of circular dwellings, etc.). This was quantitatively confirmed in Eglash and Broadwell (1989), where we applied a 2-dimensional Fourier transform to digitized photo images to estimate the fractal dimension from the slope of the spectral density function. Subsequent study showed that these architectural fractals result from intentional designs, not simply unconscious social dynamics, and that recursive scaling structures can be found in other areas of African material culture (art, religion, indigenous engineering, games). In the design rationales and cultural semantics of many of these geometric figures, as well as in indigenous quantitative systems (additive progressions, doubling sequences, binary recursion) and symbolic systems (iconic symbols for feedback loops, equiangular spirals, infinity), there are abstract ideas and formal structures that closely parallel some of the fundamental aspects of fractal geometry". The project will provide also a "computer-based multimedia lab in which these mathematical aspects of traditional African culture can be used as a basis for modern mathematics education".

* J.Anamauh-Mensah (University of Cape Coast, Ghana) is coordinating a research project on the mathematical aspects of traditional Ghanaian games and toys, and their possibilities for use in schools.

* Kgomotso Garegae-Garekwe (University of Botswana) concluded her Masters thesis on *'Cultural games and mathematics teaching'*. She also "carried out some mini-research on what men and women do in Botswana which is mathematical. Included are decorations on floors, walls, mud pots, wooden spoons and dishes, chairs, patterns in basket weaving, hair plaiting, knitting, etc. It is interesting to know that the expertise passes from one generation to another just through observation". She wants to continue her research and writes "I am still seeking funding from institutions or any avenues that could support the study I am undertaking".

* D.Huylebrouck (Universiteit Gent, Belgium) is conducting research on aspects of 'traditional mathematical knowledge' in Rwanda and Burundi. He concluded a paper *'Traditional scientific knowledge in Burundi and Rwanda'* (to be published in *Mathematics in School*, Great Britain) and prepared a draft on *'Puzzles, patterns, drums: the dawn of mathematics in Rwanda and Burundi'* (15 pp.).

* Debate on the Relationship between Egyptian and Greek mathematics

Victor Katz, editor of the Newsletter of the International Study Group on the Relations between History and Pedagogy of Mathematics (HPM, cf. AMUCHMA #2) included — in the July 1995 edition (No.35, 10-13) — two contributions to the debate on the relationship between Egyptian and Greek mathematics, written by himself and by Beatrice Lumpkin. He introduces the debate as follows:

"There has been a debate in the pages of history of science journals over the past several years on the historical relationship of Greek and Egyptian science in general, and mathematics in particular. The opening salvo in this debate was the article by Martin Bernal entitled 'Animadversions on the origins of Western Science', *ISIS* 83 (1992, 596-607. Bernal is the author of the multivolume work *Black Athena*, which claims that significant portions of classical Greek culture were strongly influenced by ancient Egyptian civilization, partly, in fact through the colonization of parts of Greece by Egypt. Bernal further asserts that although the classical Greeks themselves recognized and acknowledged this influence (the 'Ancient Model'), European scholars of the eighteenth and nineteenth centuries 'rewrote' history to deny African influence on the progenitors of European civilization (the 'Aryan Model'). *Black Athena* is a massive (and still incomplete) work, which brings together evidence from linguistics, theology, philosophy, archaeology and other disciplines, but does not deal specifically with the history of science itself. Thus the article in *ISIS* was Bernal's attempt to summarize his views on that history in particular, in relation to his general thesis about the relationships of Greek and Egyptian civilizations. The ISIS article was answered a year later by Robert Palter in his '*Black Athena*, Afro-Centrism, and the History of Science,' *History of Science* 31 (1993), 227-287. Bernal responded in 'Response to Robert palter,' History of Science 32 (1994), 445-464; and Palter answered Bernal in the same issue on pp. 464-468. ...The arguments of Bernal and Palter can be separated into two basic claims concerning Egyptian science and its relation to Greek science. Palter summarizes these as follows: "First, Bernal maintains that there were scientific elements in Egyptian medicine, mathematics, and astronomy long before there was any Greek science at all; and, second, he maintains that Egyptian medicine, mathematics, and astronomy critically influenced the corresponding Greek disciplines." As far as mathematics goes, although Palter argues with Bernal on many specific points and seems to deny both of Bernal's claims, he does not give a clear and definitive response to them."

4. NOTES AND QUERIES

This section is reserved for questions that readers would like to have answered; these are the 'queries'. The answers will be the 'notes'. If you have questions or answers about sources, dates, names, titles, facts, or other such matters related to the history of mathematics in Africa, frame them in clear and concise language and send them to the editors. If you are answering a question, make clear reference to that question. All readers may send both questions and answers. Each will be published with the name of the sender.

5. Publications by B.L. van der Waerden on Egypt

Among the publications by the well-known algebraist and historian of science Bartel L. van der Waerden (1903 - ....), the following articles deal with aspects of mathematics (and astronomy) in Egypt:

1937 Arithmetik und Rechentechnik der Ägypter [Arithmetics and technics of computation of the Egyptians], *Berichte säch. Akad. Leipzig*, Vol.89, 171-172

1938 Die Entstehungsgeschichte der ägyptischen Bruchrechnung [The genesis of the Egyptian arithmetics of fractions], *Quelen und Studien Gesch. Math.*, Vol. B4, 359-382

1947 Egyptian 'Eternal Table', I and II, *Proc. KNAW*, Vol.5, 536-547 and 782-788

1953 Bemerkungen zu den Handlichen Tafeln des Ptolemaios [Remarks on the handy tables of Ptolemy], *Sitzungsber. Bayer. Akad. München*, 261-272

1956 Babylonische Planetenrechnung in Ägypten und Indien [Babylonian computation of planets in Egypt and India, *Biblioth. Orient.*, Vol. 13, 108-110

1957 Tables for the Egyptian and Alexandrian Calendars, *ISIS*, vo. 47, 387-390

1958 Drei umstrittene Mondfinsternise bei Ptolemaios [Three controversial eclipses of the moon in Ptolemy], *Mus. Helv.*, Vol. 15, 106-109

1958 The astronomical Papyrus Ryland 27, *Centaurus*, Vol. 5, 177-191

1959 Die Handlichen Tafeln des Ptolemaios, *Osiris*, Vol. 13, 54-78

1960 Babylonische Methoden in ägyptischen Planetentafeln, *Vierteljschr. naturf. Ges. Zürich*, Vol. 105, 97-144

1971 Ägyptische Planetenrechnung, *Centaurus*, Vol. 16, 65-91

1972 Klaudios Ptolemaios, *Der kleine Pauli IV*, 1224-1229

1972 Die 'Ägypter' und die 'Chaldäer', *Sitzungsber. Heidelb. Akad. (Math.)*, 5. Abhandlung, 201-227

1974 Review of R.A.Parker 'Demotic Mathematical Papyri', *ISIS*, Vol. 65, 110-111

1980 The (2:n) Table in the Rhind Papyrus, *Centaurus*, Vol. 24, 259-274

1988 The motion of Venus in Greek, Egyptian and Indian texts, *Centaurus*, Vol. 31, 105-113

Van der Waerden's books *Science Awakening* (2 vol., Dover, New York [originally 1950 and 1955]) and *Geometry and Algebra in Ancient Civilizations* (Springer, Berlin, 1983) contain chapters on Egypt.

For a full bibliography of Van der Waerden's publications, see: J.Top & L.Walling, Bibliography of B.L. van der Waerden, *Nieuw Archief voor Wiskunde*, Amsterdam, Vol. 12, No. 3, 1994, 179-193.

6. HAVE YOU READ?

6.1 On the History of Mathematics in Africa

#168 Abas, Syed Jan & Salman, Amer Shaker: **Symmetries of Islamic geometrical patterns**, World Scientific, Singapore, 1995, 396 pp.

Contains five chapters: 1. Islamic patterns and their geometrical construction (1-28), 2. In praise of pattern, symmetry, unity and Islamic art (29-44), 3. The gateway from Islamic patterns to invariance and groups (45-72), 4. Classification, identification and construction of the seventeen types of two-dimensional periodic patterns (73-134), 5. Islamic patterns and their symmetries (135-139), Examples (140-388). Includes various examples from North Africa.

#169 Bouazzi, Marie: **Mathématiques et compositions décoratives régulières: Faiences murales tunisoises du XVIII^{e} siècle** (Mathematics and regular decorative compositions: Tunisian mural faiences from the 18th century), Institut Technologique d'Art, d'Architecture et d'Urbanisme de Tunis, Tunis, 1995, 28 pp. (mimeographed)

#170 Caveing, Maurice: **Essai sur le savoir mathématique dans la Mésopotamie et l'Egypte anciennes** (Essay on mathematical knowledge in ancient Mesopotamia and Egypt), Presses Universitaires de Lille, Lille, 1994, 417 pp.

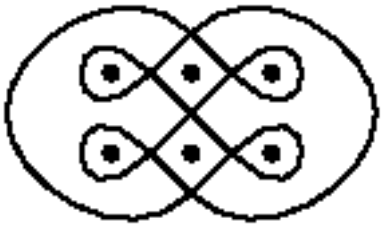
This book is the up-dated version of the first volume of the thesis defended by Maurice Caveing in 1977, entitled 'The constitution of the mathematical type of the ideality in Greek thinking'. The first part of Volume 1 is dedicated to the study of Babylonian mathematical texts (19-236). The second part deals with the art of calculation of the ancient Egyptians (237-404). Two further volumes are at the moment in press: the second will have as title 'Figure and number. Research on the earliest mathematics of the Greeks'' and the third 'Irrationality in mathematics until Euclid'.

#171 García, José Barrios: **La lista de numerales canarios atribuida a Antonio Cedeño** (The list of Canarian numerals attributed to Antonio Cedeño), in: X Coloquio de Historia Canario-Americana, Las Palmas de Gran Canaria, Cabildo Insular, 1994, Vol.2, 859-878

Analyses Cedeño's list (about 1687) of Berber numerals from the Canary Islands and compares it to other reported lists of these numerals (cf. AMUCHMA 12: 3).

#172 Gerdes, Paulus: **Geometria Sona: Reflexões sobre uma tradição de desenho em povos ao Sul do Equador** (*Sona* Geometry: Reflections on a drawing tradition of peoples in Africa South of the Equator), Instituto Superior Pedagógico, Maputo, 1994, Vol. 3. 123 pp.

The first volume (#109) presented a reconstruction of mathematical elements in the Tchokwe sand drawing (*sona*) tradition. The second volume (#120) examines the educational and scientific potential of the reconstructed sand drawing tradition. This third volume presents a comparative analysis, studying traditions from other parts of Africa and the world and/or of other periods which are technically similar to the *sona* tradition. It contains the following chapters: 9. On geometrical algorithms in ancient Egypt, 10. On monolinear motifs in ancient Mesopotamia, 11. On some geometrical algorithms in India, 12. Short excursion to other continents, and 13. Back to Africa.



Example of a Tchokwe sand drawing

Similar ancient Egyptian pattern

#173 Gerdes, Paulus: ***Sona* Geometry: Reflections on the tradition of sand drawings in Africa South of the Equator**, Instituto Superior Pedagógico, Maputo, 1994, Vol. 1. 200 pp.

Translation by Arthur Powell of #109 from the Portuguese into English. Volume 1 is dedicated to the analysis and reconstruction of mathematical elements in the sand drawing tradition of the Tchokwe and neighbouring peoples in Angola, Zambia and Zaire. The volume contains the following sections: 1. The Tchokwe and other Bantu people of the Lunda-Tchokwe group, 2. The sand

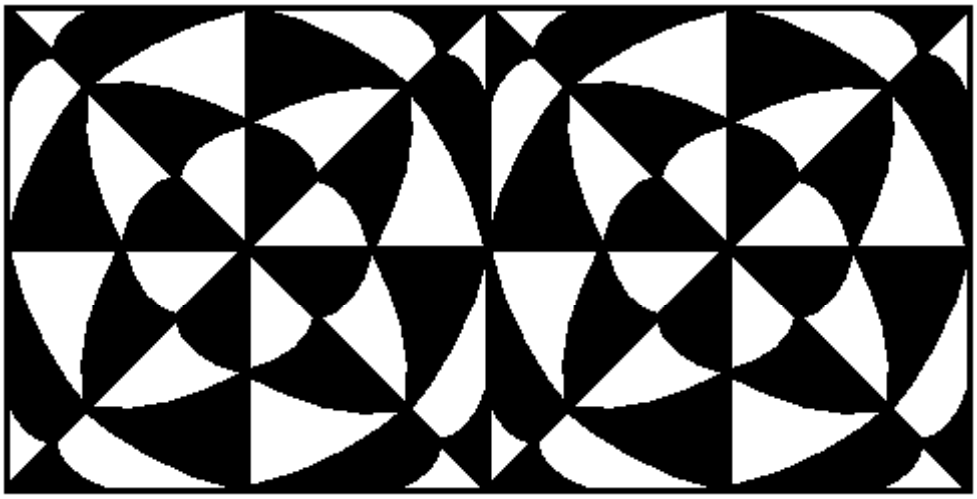
drawing tradition of the Tchokwe, 3. Symmetry and monolinearity as cultural values, 4. Classes and algorithms, 5. Systematic construction of monolinear, triangular patterns with loops, 6. Chain rules, 7. Polylinear or monolinear, 8. Classes with eyes, 9. Construction of sand drawings with rotational symmetry, 10. Bibliography (cf. #174).

#174 Gerdes, Paulus: **Une tradition géométrique en Afrique — Les dessins sur le sable** (A geometrical tradition in Africa — The sand drawings), L'Harmattan, Paris, 1995, 3 volumes, 594 pp.

French language edition of #109 (cf. #173), #120, and #172.

#175 Gerdes, Paulus: **Women and Geometry in Southern Africa: Some suggestions for further research**, Universidade Pedagógica, Maputo, 1995, 201 pp.

The main objective of the book is to call attention to some mathematical aspects and ideas incorporated in the patterns invented by women in Southern Africa. It is meant as a contribution to the valuing, revival and development of traditions which may otherwise vanish. The themes treated in the book are: decorated handbags, coiled baskets, mat weaving, string figures, decorated pottery, grass brooms, tattooing and body painting, bead ornaments, and mural decoration.



Detail of a female house wall decoration from Lesotho

#176 Hadfi, Hmida: **Mathematics in Ifraiqya during the Middle Ages: Jerba** (in Arabic), Diplôme d'Etudes Approfondies (Masters thesis), Faculté des Lettres et des Sciences Humaines, Université de Tunis 1, Tunis, 1989, 258 pp.

This study deals with mathematical activities in the eastern Maghreb and in divided into six parts: 1. Introduction (5-18), 2. Mathematics in Ifriqya (20-51), 3. Mathematics at Jerba (53-62), 4. catalogue of mathematicians from Ifriqya (63-200), 5. Mathematical and historical analysis of the mathematical contents of the *Muqaddima* of Ibn Khaldun (202-232), 6. General bibliography 234-253).

#177 Ritter, James: **Chacun sa verité: les Mathématiques en Egypte et en Mésopotamie** (To each his truth: mathematics in Egypt and Mesopotamia), in: Michel Serres (Ed.), Eléments d'histoire des sciences, Bordas, Paris, 1989, 39-62

The paper contains a comparative study of the Babylonian and Egyptian computing techniques as they appear in the documents which survived and are analysed by the author.

#178 Ritter, James: **Pratique de la raison en Mésopotamie et en Egypte au III^e^ et II^e^ millénaires** (Praxis of reasoning in Mesopotamia and Egypt during the 3rd and 2nd millennia), Doctoral thesis, Université de Paris Nord, Paris, 1993, 446 pp.

The thesis contains five parts: 1. Introduction 85-42), 2. Rational practices (43-95), 3. The delimitation of a rational field: the case of medicine (96-111), 4. The evolution of a rational field: the case of mathematics (112-201). 5. References, tables, general bibliography, index (202-446).

#179 Sesiano, Jacques: **Quelques méthodes arabes de construction des carrés magiques impairs** (Some Arabic construction methods of odd magical squares), Bulletin de la Société Vaudoise des Sciences Naturelles, 1994, Vol. 83.1, 51-76

General construction methods of magic squares appeared in the countries of Islam in the 9th century, and the science of magic squares arrived there at its zenith in the 11th and 12th centuries. From the 13th century, magical and divinatary applications began to replace of mathematical study. Classical construction methods survived, however, in later treatises of a certain level, as in part of a work by Muhammad ibn Muhammad al-Fullani al-Kishnawi (born in the north of Nigeria and died in Cairo in 1741), on the construction of magic squares of odd order. It is this chapter of the book of al-Kishnawi that is analysed in the paper. In relationship to the contents of the chapter, the author of the paper states that "We find here the explanation of different ways of disposing the numbers in the squares, and with diverse forms of magic. Although the majority of these constructions are already known from the classical period, they are often explained or

applied in an easier way; time has, to a certain degree, served as a filter, and the reported methods are those whose use has been preserved by their simplicity or elegance. One finds also, at the end of the extract, the explanation of a topic that is new in relation to classical treatises (without doubt due to its magic use): that of magical squares of which one square is left unoccupied. All topics are presented by al-Kishnawi with great clarity. He certainly seems to be a person of worth: the biographical note dedicated to him by the historian al-Jabarti (1753-1825/6) in his "Chronicles" (Al-Jabarti 1888-89, II, 39-42) are full of praise for his capacities and merits. Al-Kishnawi seems even to have been the authority in the new field of squares with holes, as he is mentioned elsewhere by the same al-Jabarti in relation to the properties of those squares of order 5".

#180 Vitrac, Bernard: **De quelques questions touchant au traitement de la proportionnalité dans les Eléments d'Euclide** (On some questions dealing with the treatment of proportionality in Euclid's Elements), Doctoral thesis, Ecole des Hautes Etudes en Sciences Sociales, Paris, 1993, 1211 pp. + Introduction

The thesis is in seven parts: 1. Inventory of problems. Historiography (1-64). 2. Foundations of proportionality (65-224). 3. Manipulations and uses of proportions (225-572). 4. The history of the theory of proportions. Critical analysis (573-679). 5. Appendices, general bibliography and index (697-800). 6. Document 1: French translation of Books V to IX of Euclid's Elements (175 pp.). 7. Document 2: Other translations (216 pp.).

6.2 Publications on the History of Mathematics, Ethnomathematics and Mathematics Education

#181 Doumbia, Salimata: **Dossier jeux, mathématiques et sociétés** (File on games, mathematics and societies), in: Plot, Orléans (France), 1994, Vol. 69, 1-31

Contains an introduction on 'Mathematics in the African socio-cultural environment' with information about and examples from the travelling exhibition 'Games, Mathematics and Societies' (cf. AMUCHMA 14: 3.2).

#182 Gerdes, Paulus: **African Pythagoras: a study in culture and mathematics education**, Instituto Superior Pedagógico, Maputo, 1994, 102 pp.

English language edition of a book first published in Portuguese in 1992 (cf. AMUCHMA 10: #108). Contains the following chapters: 1. Did ancient Egyptian artisans know how to find a

square equal in area to two given squares?, 2. From woven buttons to the Theorem of Pythagoras, 3. From fourfold symmetry to 'Pythagoras', 4. 'Pythagoras', similar triangles and the elephants-defence pattern of the Bakuba (Central Africa), 5. A widespread decorative motif and the Theorem of Pythagoras, 6. From mat weaving patterns to 'Pythagoras' and magic squares, 7. A new proof by means of limits, 8. A new proof related to an ancient Egyptian decoration technique.

#183 Gerdes, Paulus: **Ethnomathematics and Education in Africa**, Institute of International Education, University of Stockholm (Sweden), 1995, 184 pp.

Collection of papers published earlier in journals: 1. Introduction (1-4), 2. Ethnomathematical research (5-11), 3. On the concept of ethnomathematics (12-20), 4. How to recognize hidden geometrical thinking (21-29), 5. On culture, geometrical thinking and mathematics education (30-52), 6. A widespread decorative motif and the Pythagorean theorem (53-62), 7. 'Pythagoras' and patterns from the Bakuba (Central Africa) (63-76), 8. On possible uses of traditional Angolan sand drawings in the mathematics classroom (77-102), 9. Exploration of the mathematical potential of 'sona' sand drawings (103-128), 10. Technology, art, games and mathematics education (129-134), 11. On the history of mathematics in Africa south of the Sahara (135-156), references (157-184).

#184 Lumpkin, Beatrice: **African cultural materials for elementary mathematics**, Educational Equity Services, Illinois State Board of Education, Chicago (USA), 1995 (field test copy), 122 pp. and bibliography

Contains the following chapters: 1. Beginnings of mathematics, 2. Meaning of addition and subtraction, 3. Adding whole numbers, 4. Subtracting whole numbers, 5. Measuring time, capacity, and mass, 6. Multiplication properties, 7. The meaning of division, 8. Fractions, 9. Mixed numbers and decimals, 10. Measure of capacity and mass, 11. Geometry, 12. Multiplication of whole numbers, 13. Dividing whole numbers, 14. Learn with African games. The chapters give examples of how mathematical ideas and practices from ancient Egypt and from other African regions may be used in elementary mathematics education.

7. ADDRESSES OF SCHOLARS AND INSTITUTIONS MENTIONED IN THIS NEWSLETTER

* Abas, Syed Jan: School of Mathematics, University of Wales, Bangor, Wales
* Anamauh-Mensah, J.: Faculty of Education, University of Cape Coast, Cape Coast, Ghana
* Bouazzi, Marie: Institut Technologique d'Art, d'Architecture et d'Urbanisme de Tunis, Route de l'Armée Nationale, 1005 Tunis El Omrane, Tunisia
* Busser, E.: Pr. Lycée de Colmar, Colmar, France
* Caveing, Maurice: 13 Boulevard Beaumarchais, 75013 Paris, France
* Djebbar, Ahmed: Département de Mathématiques, Bâtiment 425, Université de Paris-Sud, 91405 Orsay Cedex, France (Fax: 33-1-47015917)
* Doumbia, Salimata: IRMA, Université Nationale du Côte d'Ivoire, 08 BP 2030, Abidjan 08, Côte d'Ivoire
* Educational Equity Services, Illinois State Board of Education, 100 W.Randolph St. Suite # 14-300, Chicago, IL 60601-3405, USA
* Hadfi, H.: 1, rue H.Cheker, Imm. 1, Le Bardo, Tunis, Tunisia
* Huylebrouck, H.: Aartshertogstraat 42, 8400 Oostende, Belgium
* Garegae-Garekwe, Kgomotso: Department of Mathematics and Science Education, University of Botswana, Private Bag 0022, Gaborone, Botswana (Fax: 356591)
* García, José Barrios: Dpto. de Análisis Matemático, Universidad de La Laguna, 38271 La Laguna, Tenerife, Canary Islands, Spain
* Gerdes, Paulus: Universidade Pedagógica, P.O.Box 3276, Maputo, Mozambique (Fax: 258-1-422113)
* Lumpkin, Beatrice: 7123 S. Crandon, Chicago, IL 60649, USA
* Rammah, M.: A.T.S.M., 43 rue de la Liberté, Le Bardo, Tunisia
* Salman, Amer Shaker: School of Mathematics, University of Wales, Bangor, Wales
* Sboui, T.: A.T.S.M., Lycée de Kairouan, Kairouam, Tunisia
* Sesiano, Jacques: 1, rue Patru, 1205 Genève, Switserland
* Souissi, Mohamed: 7 rue de Teheran, 2000 Le Bardo, Tunisia
* Vitrac, B.: 2, rue Berne, 93200 Saint denis, France

8. SUGGESTIONS

What are your suggestions for improving the AMUCHMA Newsletter?
What are your suggestions for other activities of AMUCHMA?
Send your suggestions, comments, information, questions and any other contributions to the chairman or secretary of AMUCHMA.
Send articles, books and manuscripts for the AMUCHMA Documentation Centre to the Chairman or Secretary.

9. DO YOU WANT TO RECEIVE THE NEXT AMUCHMA-NEWSLETTER?

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Paulus Gerdes
P.O.Box 915, Maputo, Mozambique (Fax: 258-1-422113),

for the **English** version;

or to the Secretary

Ahmed Djebbar
Département de Mathématiques, Bâtiment 425, Université de Paris-Sud, 91405 Orsay Cedex, France (Fax: 33-1-47015917)

for the **French** version;

or to Professor

Mahdi Abdeljaoud,
I.S.E.F.C., 43 rue de la Liberté, 2019 Le Bardo, Tunis, Tunisia,

for the **Arabic** version.

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