AFRICAN MATHEMATICAL UNION

COMMISSION ON THE HISTORY OF MATHEMATICS IN AFRICA

AMUCHMA-NEWSLETTER-5

Instituto Superior Pedagógico, Maputo, Mozambique, 25.05.1990

Chairman: Paulus Gerdes (Mozambique)
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1. OBJECTIVES OF AMUCHMA

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 an 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 eurocentristic bias in the historiography of mathematics;
d. to cooperate with any and all organisations pursuing similar objectives.

The main forms of activity of AMUCHMA are as follows:
a. publication of a newsletter;
b. setting up a documentation centre;
c. organisation of lectures on the history of mathematics at national, regional, continental and international congresses and conferences.

2. MEETINGS

2.1 PAPERS PRESENTED AT RECENT MEETINGS

* At the 41st Meeting of the International Commission for the Study and Improvement of Mathematics Education [CIEAEM] (Brussels,Belgium, July ,1989) Hilda Lea presented a paper entitled 'Informal Mathematics in Botswana'. The paper analyses ways of recording number, ways of comparing, measurement of length, area, capacity, speed, direction and time, and notes the development of spatial concepts in Bushmen hunters in the Kalahari and the geometry of boating in the Okavango.

3.CURRENT RESEARCH INTERESTS

* Continuing her research on 'Traditional Mathematics in Botswana' (Cf. AMUCHMA3: 6 #40), Hilda Lea (University of

Botswana) concluded a study entitled 'Mathematics in a Cultural Setting - the Bushmen'.

* Together with four students, Abdulcarimo Ismael (Higher Pedagogical Institute, Mozambique) did fieldwork (July 1989) in the Nacala district of the northern Nampula province on practical mathematical knowledge of Macua artisans. A report is in preparation.

* Paulus Gerdes concluded a paper on the appearance of fivefold symmetry in traditional craftwork, especially from Mozambique. The study is entitled 'Fivefold Symmetry and (Basket) Weaving in Various Cultures' to be published in: I. Hargittai (ed.), Fivefold Symmetry in a Cultural Context, VCH Publishers, New York, USA.

4. SUGGESTIONS FOR FURTHER RESEARCH

4.1 HYPATIA OF ALEXANDRIA (c. 370-415 A.D.)

Hypatia of Alexandria (Egypt) is referred to as "the first woman in mathematics of whom we have considerable knowledge" (Osen, p.22) or "the first woman mathematician to be mentioned in the history of mathematics" (Iacobacci, p.318). It would be interesting to search for all possible sources on Hypatia of Alexandria and prepare a monograph on her life and works. As a starting point the following (secondary) sources are listed by Else Hoyrup [Women of Science, Technology, and Medicine: a Bibliography, Roskilde University Library, Roskilde (Denmark), 1987, p.51-52]:
* Kingsley, Charles: Hypatia - Or New Foes with Old Faces, W.B.Conkley, Chicago, 1853.
* Scholasticus, Socrates: Ecclesiastical History, London, 1853, VII, p.15.
* Heath, T.L.: History of Greek Mathematics, Oxford, 1921, II, p.528-529.
* Rome, A.: Le troisième livre des commentaires sur l'"Alma- geste" par Théon et Hypatie, Presses Universitaires de France, Paris, 1926.
* Adler, Ada (ed.): Suidae Lexicon, Leipzig, 1928, I, p.618.
* Richeson, A.W.: Hypatia of Alexandria, in: National Mathematics Magazine, Vol.15, No.2, 1940, p.74-82.

* Schrek, D.: Hypatia van Alexandrie (in Dutch), in: Euclides, Vol.21, 1945-46, p.164-173.
* Coolidge, Julian L.: Six Female Mathematicians, in: Scr.Math., Vol.17, 1951, p.20-31.
* Van der Waerden, B.L.: Science Awakening, New York, 1961, p.290.
* Alic, Margaret: Women and Technology in Ancient Alexandria: Maria and Hypatia, in: Women's Studies Int.Quart., Vol.4, 1981, p.305-312.
* Vogt, Kari: The Rightful Mistress of Philosophy: Hypatia from Alexandria (370-415) (in Norwegian), in: Vogt, K., The Hidden Tradition: Creative Women in the History of Civilization (in Norwegian), Sigma, 1982, p.9-23.
* Eskilsson, Lena and Wennström, Elsy: Hypatia (in Swedish), in: Kvinnovetenskaplig Tidskrift, 1983, No.4, p.75.
We may add:
* Osen, Lynn: Women in Mathematics, MIT Press, Cambridge Ma (USA), 1974, p.21-32. She remarks on Kingsley's book: "Her life and times have been romanticized by Charles Kingsley..., but his novel almost totally ignores Hypatia's significant work in mathematics. Neither is it to be recommended as a reliably authentic source of information, either about Hypatia or life in Alexandria during the fifth century A.D." (p.31).
* Perl, Teri: Math Equals: Biographies of Women Mathematicians, Addison-Wesley, Menlo Park Ca (USA), 1978, p.8-27.
* Iacobacci, Rosa: Women of Mathematics, in: The Arithmetic Teacher (USA), 1970, p.316-324. (editors)

5.EDUCATION

* Beniel Seka (Institute of Curriculum Development, Dar es Salaam, Tanzania) described in Mathematics in School (London, 1983, 33-34) what happened when he wanted to use the well known story about Gauss and the sum of the first 100 natural numbers, included in the Tanzanian Secondary Mathematics Book (Vol.3, 230). He asked his pupils to find this sum and expected that after they had toiled for about fifteen numbers he would give them Gauss' quick method. But to his surprise: "Before five minutes had elapsed a young girl raised her hand and claimed she had finished. I went up to her and noticed that she had obtained the correct answer. I appreciated her work and announced her success to the class. Her method was as follows:

0 + 1 + 2+ .... + 9 = 045,
10 +11 +12+ .... +19 = 145,
20 +21 +22+ .... +29 = 245, ...
90 +91 +92+ .... +99 = 945.
She was only left to add 045+145+245+345+445+545+645+745+845 +945, by noticing that 45x10=450, and 100+200+300+...+900 = 4500. She then had to add 4500 to 450 to obtain 4950 as the sum of the first 99 natural numbers. To complete the sum she just had to add 100 to 4950 to obtain the correct answer 5050."

* A 1 semester seminar (2 hours/week) on mathematical aspects of the 'sona' drawings tradition from Angola and Zambia was held at the Department of Mathematics of the Higher Pedagogical Institute (ISP, Maputo, Mozambique). The seminar was led by Paulus Gerdes. Eleven lecturers and students took part.

6.HAVE YOU READ?

#53
Ale, Sam O.: Mathematics in rural societies, in: C.Keitel, P.Damerow, A.Bishop, P.Gerdes (ed.), Mathematics, Education, and Society, UNESCO, Paris (France), 1989, 35-38

Gives examples of the oral mathematics used by the nomadic Fulani (Nigeria): elements of statistics, inequality, probability, geometry, and basic algebra, and suggests that a relevant curriculum for rural communities must build upon the mathematics existing in these communities. The paper shows also how the Fulani use symbols to represent the number of cows or goats they possess: 100 is represented by two short sticks in the form V, 50 by two sticks in the form X, 10 by one stick _ , 3 by three sticks | | |, etc.

#54
Bogoshi, Jonas; Naidoo, Kevin; Webb, John: The oldest mathematical artefact, in: The Mathematical Gazette, London (UK), Vol.71, 1987, 294

"A small piece of the fibula of a baboon, marked with 29 clearly defined notches, may rank as the oldest mathematical artefact known. Discovered in the early seventies during an excavation of

Border Cave in the Lebombo Mountains between South Africa and Swaziland, the bone has been dated to approximately 35 000 B.C.". It has been noted that the bone "resembles calendar sticks still in use today by Bushmen clans in Namibia".

#55
Crane, Louise: African games of strategy, a teaching manual, African Outreach Series, No.2, University of Illinois, Urbana-Champaign (USA), 1982, 53 p.

Informs about and gives detailed playing instructions for some of the most common types of African games involving strategy and mathematical principles: 1. games of alignment [Shisima (Kenya), Achi (Ghana), Murabaraba (Lesotho)]; 2. 'Struggle for territory' games [Sega (Egypt), Kei (Sierra Leone)]; 3. 'Mankala' games: a. two-row versions [Oware (Ghana) and variations Adi (Ghana), Awele (Ivory Coast), Ayo (Nigeria), Okwe (Nigeria)], b. four-row versions [Omweso (Uganda), Tshisolo (Zaire)].

#56
Djebbar, Ahmed: The contents of mathematics teaching in North Africa in the Middle Ages and its role in present day teaching, in: C.Keitel, P.Damerow, A.Bishop, P.Gerdes (ed.), Mathematics, Education, and Society, UNESCO, Paris (France), 1989, 3-4

Gives a brief overview of the contents of mathematics teaching in North Africa in the Middle ages and demonstrates, using as examples the Arabic-speaking regions of Africa, the possibilities which are offered by the mathematical heritage of these regions to enrich the pedagogy of teaching mathematics today.

#57
Djebbar, Ahmed: Enseignement et recherche mathématiques dans le Maghreb des XIIIème - XIVème siècles, Publications Mathématiques d'Orsay, 1981, no.81-02, 146 p.

This study is based on a series of unpublished manuscripts and has three chapters. The first deals with different classifications of equations of degree inferior or equal to two, the role of geometry in the study of these equations and the contribution of the Maghrebians

in this domain. The second chapter deals with the arithmetical and algebraic symbolism that was used in the Maghreb from the 12th century on and that would be brought to Egypt from the 14th century on. The third chapter reveals and gives an exposition - for the first time - of certain aspects of the contribution to combinatorics by mathematicians from the Maghreb.

#58
Djebbar, Ahmed: Les Mathématiques arabes et leur environment, in: Actes de l'université d'été sur l'histoire des mathématiques (6-13 Juillet 1984), Université du Maine, Le Mans (France), 1986, 36-70

This paper presents the economic, political, cultural and ideological context in which the mathematical activities in the Arab-Islamic civilization were born and developed. It deals equally with the internal and external factors that could explain the retardation, from the 14th century onwards, of the scientific activities of this civilization.

#59
Djebbar, Ahmed: L'Algèbre arabe, in: L'Ouvert, IREM de Strasbourg, Strasbourg (France), Vol. 44, 1986

This is the contents of a public lecture given in Strasbourg in 1986 on the great directions in algebra in the Arabic mathematical tradition from the 9th to the 15th century.

#60
Djebbar, Ahmed: Quelques aspects de l'Algèbre dans la tradition mathématique arabe, in: Actes de l'université d'été sur l'histoire des mathématiques (6-12 Juillet 1986), IREM de Toulouse, Toulouse (France), 1988, 257-286

This paper discusses the origin, the beginnings and the development of algebra in the Moslem East from the 8th century on. Information is given on the contributions of al-Khwarizmi (d.850), Abu Kamil (d.930), as-Samaw'al (d.1175), al-Khayyam (d.1131) and Sharif ad-Din at-Tusi (d.1213) as well as on the contribution of lesser known researchers like Sinan Ibn al-Fath (10th C.), who have participated in the development of this discipline.

#61
Djebbar, Ahmed: Mathématiques et linguistique dans le Moyen Age arabe, in: Résumé des communications du Colloque Sciences au Moyen Age (22-23 Avril 1988), Université d'Orléans, Orléans (France), 1988, 21-24

This communication is a summary of various studies by the author (published between 1981 and 1985) that concern the combinatorial practice in Arabic linguistics, music and lexicography and also the history of the progressive mathematization of this combinatorial practice in the East and in the Maghreb (between the 9th and the 14th centuries).

#62
Doumbia, Salimata: Mathematics in traditional afican games, in: C.Keitel, P.Damerow, A.Bishop, P.Gerdes (ed.), Mathematics, Education, and Society, UNESCO, Paris (France), 1989, 174-175

The Mathematical Research Institute of Abidjan (IRMA, Ivory Coast) classified the traditional games of the country into five categories: verbal games, games of memory, calculating games, games on a checkerboard and games of chance. IRMA studies the mathematics involved in these games and looks for ways to integrate this mathematics into the curriculum. As an illustration the knowledge of probabilities in the 'Nigbe Alladian' game is described.

#63
Gerdes, Paulus: Desenhos tradicionais na areia em Angola e seus possíveis usos na aula de matemática, in: BOLEMA, Rio Claro (Brasil), Special no.1, 1989, 51-77

Translation into Portuguese of 'On possible uses of traditional Angolan sand drawings in the mathematics classroom' (cf. AMUCHMA 3: 6 #37)

#64
Hebert, Elisabeth (ed.): Decouvrir les mathématiques arabes, IREM de Rouen, Rouen (France), 1989, 149 p.

A document elaborated by a group of Moroccan students at the Institute for Research in Mathematics Education (IREM) in Rouen under the responsibility of E.Hebert. Describes the development of numeration, algebra, number theory, combinatorics, trigonometry, geometry, numerical analysis and calculus in the Arab countries and its diffusion to Europe.

#65
Holgate, Philip: Summation of factorial series by the Egyptians, in: The Mathematical Gazette, London (U.K.), Vol. 72, 1988, 41-43 Suggests an explanation of how the summation method in 'Demotic mathematical papyrus PMD 10520 (British Museum)' could have been obtained.

#66
Hoyrup, Jens: Egyptian mathematics, in: J.Hoyrup; Mathema- tics, Algebra and Geometry: the Mathematical Context of the Bible, Roskilde University Centre, Roskilde (Denmark), 1989, p.20-30

Gives an overview of ancient Egyptian mathematics and discusses its diffusion: "The full range of Egyptian mathematics was probably never diffused to the Palestinian area. From the time when the Israelite Kingdoms began approaching a redistributive economy, however, and when the royal scribes came in need of computational tools, epigraphic evidence shows that they took over the Egyptian hieratic numbers. ...They must have been imported together with at least part of that wider mathematical culture which they served. In all probability, the administration in the Divided Kingdom will thus have been effected by means of Egyptian routines and techniques".

#67
Jaouchi, K.: La théorie des parallèles en pays d'Islam, Vrin, Paris (France), 1986, 266p.

This is the French part of a publication in two volumes, that includes the analysis, critical edition and French translation of the principal investigations of Arabic mathematicians on the 5th Postulate in Book I of Euclides' Elements, i.e. on the Parallel Postulate. In this first part the author analyses and translates 12 texts, in particular those of an-Nayrizi (10th C.), al- Jawhari (10th C.), Thabit Ibn Qurra (d.901), Ibn

al- Haytham (d.1040), al-Khayyam (d. 1131) and Nasir ad-Din at-Tusi (d.1274). In the second part (published by Bayt al-Hikma, Carthage [Tunisia], 1988, 256p.), the author publishes a critical edication of the analysed texts, preceded by an introduction and a presentation of the used manuscripts.

#68
Lumpkin, Beatrice & Zitler, Siham: Mathematicians of the Cairo Science Academy in the Middle Ages, in: Journal of African Civilizations, New York, 1981, Vol.3, No.2, 13p.

Shows that Egypt and North Africa continued during the Middle Ages "their tradition of leadership in science and mathematics, a tradition then already 4,000 years old". Criticizes "most European historians (and North Americans)" who "have denied that Muslim scholars created anything new, merely crediting them with preserving Greek (European) learning during the Middle Ages" (p.1).

#69
Obenga, Théophile: Système opératoire négro-africain, in: T.Obenga, L'Afrique dans l'Antiquité. Egypte pharaonique - Afrique noire. Présence Africaine, Paris, 1973, p.333-353

The author analyses the numeration system and arithmetics (including the use of fractions) and 'cosmical numbers' of the Mbosi (Congo) and makes a comparison with the mathematics of ancient Egypt.

#70
Raum, Otto: Arithmetic in Africa, Evans Brothers Ltd., London (U.K.), 1938, 94 p.

The book is addressed to those responsible for teaching arithmetic to speakers of Bantu languages. It is suggested that "for teaching the African child to handle the system of numbers and to carry out operations in it, tribal activities, both adult and juvenile, with numerical bearing, are the most suitable media". Many examples of such activities, including games, are given. Furthermore, it is suggested that "if generalisations and abstractions are to be acquired by the pupils as lasting instruments of thought, advanced

arithmetical processes must be developed from the numerical problems of their own cultural background".

#71
Sedillot, L.A.: Traité des instruments astronomiques des arabes composé au treizième siècle par Aboul l-Hasan'Ali, de Maroc, Imprimerie Royale, Paris (France), 1834, 630p., Pl. I- XXXVIII. New edition in facsimile by F.Sezgin, I.G.A.I.W., Frankfurt (W.Germany), Series B 2, 1984.

This is the partial translation into French of the important astronomical treatise of the Maghrebian mathematician from the 12th century Abu l-Hassan al- Marrakushi. The translation has been realised by Jean Jacques Sédillot and published by his son Louis Amélie. This treatise includes the description and the utilization of a whole series of astronomical instruments used in the countries of Islam between the 9th and the 13th century. The Arabic manuscript of al- Marrakushi was published last years in facsimile [ed. F.Sezgin, I.G.A.I.W., Frankfurt (W.Germany), Series C 1, 1984, Vol. I, 383 p., Vol. II, 376 p.].

#72
Zaslavsky, Claudia: Symmetry along with other mathematical concepts and applications in African life, in: Applications in School Mathematics, National Council of Teachers of Mathematics, Reston Vi (USA), 1979, p.82-97 Examples of bilateral and rotational symmetries, repeated patterns on a strip, tessalations in the plane, occuring in African art, architecture and design (e.g. adinkra clothes of the Asante people, Ghana; adire clothes of the Yoruba people, Nigeria) are given and it is shown how these examples may be integrated in an interdisciplinary approach to the study of mathematics.

7. NOTES AND QUERIES

This section is reserved for questions that readers would like to have answers; 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 a clear reference to the question. All readers may send both questions and answers. Each will be published with the name of the sender.

8.ANNOUNCEMENTS

8.1 3rd Maghrebian Symposium on the History of Arabic Mathematics

The 3rd Maghrebian Symposium on the History of Arabic Mathematics will be held in Alger (Algeria) from 1 to 3 December 1990. The Symposium themes are:
1. Mathematics: algebra, geometry, arithmetic, number theory, combinatorics and trigonomettry;
2. Astronomy: planetary models, astronomical tables, time- keeping sciences, astronomical instruments;
3. Applied Mathematics: science of inheritance, architecture, optics, mechanics, astrology, music;
4. Mathematics and society: mathematical manuals, educational institutions, mathematics and cultural and ideological environment, mathematics and philosophy, pre-Islamic mathematical heritage, transfer of Arabic mathematics to Europe, mathematics and the classification of sciences.
The Symposium languages are Arabic, English and French. For more information, write to: Y.Atik, Département of Mathématiques, École Normale Superieure de Kouba, 16050 Vieux Kouba (Alger), Algeria

8.2 SAMSA Workshop on the History of Mathematics

The Southern African Mathematical Sciences Association (SAMSA) will organize in 1991/2 a workshop on the history of mathematics at the University of Zimbabwe. For more information, write to: A.C.Hitchcock, Department of Mathematics, University of Zimbabwe, P.O.Box MP 167, Mount Pleasant, Harare, Zimbabwe

8.3 Studygroup on the History of Mathematics at IMSP

Jean-Pierre Ezin, Director of the Institute for Mathematics and Natural Science (IMSP) at the National University of Benin informs

that at IMSP a studygroup on the history of mathematics has been formed.

8.4 NASO and SESTA

The Network of African Scientific Organizations (NASO) was conceived in 1986 by the African Academy of Sciences (AAS) as a mechanism for mobilizing the African scientific community in a concerted quest for science-driven development of the continent. The African Mathematical Union (AMU) is one of its founding members. NASO identified two core programmes for reversing Africa's decline by the mobilization of basic scientific research and development:
1. Bridging the gap between scientists, industrialists and policy makers;
2. Development of a sience culture in Africa.
One of the projects under the second programme is: Studies in the Evolution of Science and Technology in Africa (SESTA), which has as objective to document and disseminate success stories in the development and management of science and technology, including studies of indigenous and traditional science and technology, successful individuals and institutions. AMUCHMA will closely cooperate with SESTA. For more information on NASO and SESTA, write to: Executive Secretary NASO, African Academy of Sciences, P.O.Box 14798, Nairobi, Kenya

8.5 TWAS History of Science Prize

In 1987 the Third World Academy of Sciences (TWAS) instituted a Prize for the best research essay highlighting the work of a scientist from a country of the Third World whose achievements had not been previously recognized. Essays on themes in the history of science which are not associated with one particular scientist or individual will also be considered. For more information, write to: TWAS History of Science Prize c/o International Centre for Theoretical Physics, P.O.Box 586, 34100 Trieste, Italy

8.6 Symposium on "Using History in the Teaching of Mathematics"

The International Study Group on the Relations between History and Pedagogy of Mathematics (HPM), together with the Center of Logic, Epistomology and History of Science (CLE) of the State University of Campinas (UNICAMP), near Saâo Paulo (Brazil), will organize a Symposium on "Using History in the Teaching of Mathematics". The event will take place in Campinas on 26, 27, and 28 June, 1990. For more information, contact: Itala L.D'Ottaviano or Ubiratan D'Ambrosio Director CLE UNICAMP UNICAMP Caixa Postal 6063 13081 Campinas, SP 13081 Campinas, SP Brazil Brazil

8.7 UNESCO' document 'Mathematics, Education, and Society'

'Mathematics, Education, and Society' (cf. #53, #56, #57) is the title of document no.35 (192 p.) published by UNESCO in its Science and Technology Education Document Series. It is available free of charge through the Mathematics Education Programme Specialist, Division of Science, Technical and Environmental Education, UNESCO, Place de Fontenoy, 75700 Paris, France.

9. ADRESSES OF SCHOLARS AND INSTITUTIONS MENTIONED IN THIS NEWSLETTER

1. African Academy of Sciences: P.O.Box 14798, Nairobi, Kenya
2. African Mathematical Union: c/o A.Kuku, President AMU, Department of Mathematics, University of Ibadan, Ibadan, Nigeria
3. Atik, Y.: Département de Mathématiques, École Normale Supérieur de Kouba, 16050 Vieux Kouba, Alger, Algeria
4. D'Ambrosio, Ubiratan: UNICAMP, Caixa Postal 6063, 13081 Campinas, S.P., Brazil
5. Ale, Sam O.: Mathematics Department, Abubakar Tafawa-Balewa College, Ahmadu Bello University, P.M.B. 0248 Bauchi, Nigeria
6. Bogoshi, Jonas; Naidoo, Kevin; Webb, John: Department of Mathematics, University of Cape Town, Cape Town, South Africa
7. Crane, Louise: African Studies Program, University of Illinois at Urbana-Champaign, 1208 West California, Room 101, Urbana, Illinois 61801, USA
8. Djebbar, Ahmed: Département de Mathématiques, Université Paris-Sud, 91405 Orsay Cedex, France
9. Doumbia, Salimata: Institut de Recherches Mathématiques, 08 B.P.2030, Abidjan 08, Ivory Coast

10. Ezin, Jean-Pierre: Institut de Mathématiques et de Sciences Physiques (IMSP), Université Nationale du Benin, B.P.613, Porto-Novo, Benin

11. Gerdes, Paulus: C.P.915, Maputo, Mozambique

12. Hebert, Elisabeth: Université de Rouen, IREM de Rouen, 1 rue Thomas Becket, 76130 Mont Saint Aignan, France

13. Hitchcock, A.C.: Department of Mathematics, University of Zimbabwe, P.O.Box MP 167, Mount Pleasant, Harare, Zimbabwe

14. Holgate, Philip: Department of Statistics, Birkbeck College, University of London, Malet Street, London WC1 7HX, UK

15. Hoyrup, Else: Roskilde University Library, P.O.Box 258, DK- 4000 Roskilde, Denmark

16. Hoyrup, Jens: Institute of Communication Research, Educational Research and Theory of Science, Roskilde University, P.O.Box 260, DK-4000 Roskilde, Denmark

17. Ismael, Abdulcarimo: Department of Mathematics, Higher Pedagogical Institute, C.P.3276, Maputo, Mozambique

18. Jaouchi, K.: 128 rue de la Croix Nivert, 75015 Paris, France

19. Lea, Hilda: Faculty of Education, University of Botswana, Private Bag 0022, Gaborone, Botswana

20. Lumpkin, Beatrice: 7123 S.Crandon, Chicago IL 60649, USA

21. Obenga, Théophile: CICIBA, B.P.770, Libreville, Gabon

22. D'Ottaviano, Itala: Director CLE, UNICAMP, 13081 Campinas, SP, Brazil

23. Seka, Daniel: Institute of Curriculum Development, P.O.Box 35094, Dar Es Salaam, Tanzania

24. Sezgin, F.: Institut für Geschichte der Arabisch-Islamischen Wissenschaften, Beethovenstrasse 32, 6000 Frankfurt, W.Germany

25. Southern African Mathematical Sciences Association (SAMSA: c/o Department of Mathematics, University of Zimbabwe, P.O.Box MP 167, Mount Pleasant, Harare, Zimbabwe

26. Third World Academy of Sciences (TWAS): c/o International Centre for Theoretical Physics, P.O.Box 586, 34100 Trieste, Italy

27. UNESCO (Division of Science, Technical and Environmental Education): Place de Fontenoy, 75700, Paris, France

28. Zaslavsky, Claudia: 45 Fairview Avenue, 13-1, New York, NY 10040, USA

10. 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.

11. DO YOU WANT TO RECEIVE THE NEXT AMUCHMA NEWSLETTER?

The AMUCHMA Newsletter published in Arabic, English and French is available free of charge upon request. Send requests to the Chairman Paulus Gerdes, C.P.915, Maputo, Mozambique for the English version, or to the Secretary Ahmed Djebbar, Départment de Mathématiques, Université Paris-Sud, 91405 Orsay Cedex, France 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.