AFRICAN MATHEMATICAL UNION

COMMISSION ON THE HISTORY OF MATHEMATICS IN AFRICA

AMUCHMA-NEWSLETTER-19

TABLE OF CONTENTS

Universidade Pedagógica (UP), Maputo (Mozambique), 27.12.1997

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 Papers presented at recent meetings

* At the 1996 Oberwolfach Meeting on the History of Mathematics (Oberwolfach, Germany, November 3-9, 1996), Jan Hogendijk (Utrecht University, Netherlands) and Ahmed Djebbar (Algeria) presented the theme "Mathematics in the Medieval Islamic world" and Marcia Ascher (Ithaca, USA) gave a talk "Historical Studies on Ethnomathematics" during which she analysed mathematical aspects of divination in Madagascar. Her related paper "Malagasy Sikidy" will be published in "Historia Mathematica" (New York, USA).

* At the Winter University in Douze (Tunisia, December 24-30, 1996), Ahmed Djebbar (Algeria) presented the lecture
  * "Astromic activities in Ifriqya during the Middle Ages";
  At the Colloquium on "Creation and Critique" in Hammamet (Tunisia, March 15-21, 1997) he presented the theme
  * "Mathematical creation in the medieval Arab scientific tradition";

At the International Colloquium on "Geometrical Reasoning, Teaching and Learning" in Marakesh (Morocco, May 28-31, 1997), Ahmed Djebbar presented the theme

* "Geometrical reasoning in Arab Mathematics (9th-15th centuries)".

* During the first semester of 1997, Paulus Gerdes (Mozambique) gave various talks on ethnomathematics and the history of mathematics at universities in the USA and Canada. Related to the history of mathematics in Africa, were the following:
  * "Looking for alternative sources in the historiography of Mathematics: Example of the reconstruction of mathematical aspects of the 'sona' tradition in southern-central Africa" (University of Georgia, Athens, 21 January);
  * "Mathematics, in particular geometry, in the history of Africa south of the Sahara" (Columbia University, New York, 3 February);
  * "Reflections on Ethnomathematics and the History of Mathematics" (Institute for the History and Philosophy of Science and Technology, University of Toronto, 25 March);
  * "Finding and developing the geometric content of traditional "sona" sand drawings" (Mathematics Colloquium, University of Toronto, 26 March);
  * "On the socio-cultural origin of mathematical ideas" (University of Minnesota, Minneapolis, 17 April);
  * "Geometrical aspects of African cultural traditions" (Georgia College & State University, Milledgeville, 24 April);
  * "Geometry in African cultures" (Spelman College, Atlanta, 28 April);
  * "Women and Geometry in Southern Africa" (Central Connecticut State University, New Britain, 4 May);
  * "On geometrical aspects of African cultural traditions and their use in education" (University of Massachusetts, Amherst, 5 May).

* The CUNY Mathematics Discussion Group (CUNY = City University of New York, USA) organised a conference entitled, "The History of Mathematics/Science and Its Uses in Teaching: A Multicultural Approach" (March 14 and 21, 1997). Coordinator of the conference was Nkechi Agwu. The following talks were related to the history of mathematics in Africa:
  * Jon Ukaegbu: Proto Mathematical Forms as Reflected in the Igbo Calendar;
  * Nicholas Ofiaja: The Existence of Mathematics and Science in Aspects of African History.

* At the Symposium "Ethnomathematics in the Curriculum", organised by Columbia University's Teachers College (New York, USA, April/May 1997), the following talks were related to mathematics in the history of Africa and its use in education:
  * Claudia Zaslavsky (New York, USA): Numbers, discrete math, games and lots more in various cultures;
  * Ron Eglash (Ohio State University, USA): African fractals;
  * Arthur Powell (Rutgers University, USA): Clasroom practice of ethnomathematics: the game of oware;
  * Paulus Gerdes (Mozambique): Ethnomathematics in practice.

* At the XXth International Congress on the History of Science (Liege, Belgium, July 20-26, 1997) Ahmed Djebbar (Algeria) organised together with P. Ihsanoglu the symposium on "Science, Technology and Industry in the Ottoman World". The following two lectures on the history of mathematics in Africa were presented:
  * Ahmed Djebbar (Algeria): Mathematics in the Maghreb during the Ottoman epoch (16th-19th centuries);
  * Youcef Guergour (Algeria): The different numeration systems in the Maghreb during the Ottoman epoch: the example of the numerals in Fez.

2.2 Study Days in Casablanca (Morocco)

* The Research and Study Group on the History of Mathematics (GREHS) (cf. AMUCHMA 18:6.3) at the *École Normale Supérieure* of Casablanca (Morocco) organized two study days on the history of mathematics (May 26-27, 1997). The first session, presided by A. Al-Moutamassik was dedicated to a debate on the status of research on the history of mathematics in the Maghreb. A second session, presided by M. Rachdi, consisted of a lecture by Ahmed Djebbar (Algeria) on the theme "Algebra and Combinatorics in Arab mathematics: the example of the Maghreb". The third session was dedicated to a analysis of the activities of GREHS and preparation of the research programme for the academic year 1997-98.

2.3 International Colloquium in Béjaïa (Algeria)

* The Study Group for the History of Mathematics in Béjaïa (GEHIMAB) organised (University Centre of Béjaïa, November 9-11, 1997) an international colloquium on "Béjaïa and environment during the ages: History, Society, Sciences, Culture".

3. CURRENT RESEARCH INTERESTS

* Ron Eglash (Ohio State University, USA) is writing a book entitled *"African Fractals: traditional culture and modern computing"* to be published by Rutgers University Press (New Brunswick NJ, USA) in 1998.
* Arthur Powell (Rutgers University, USA) is preparing a biography of Galeb Gattegno (1911-1988), the Egyptian born mathematician and educator. He prepared a first draft for AMUCHMA.

4. THESES

4.1 Doctoral thesis: Number systems and calendars of the berber populations of Grand Canary and Tenerife in the 14th-15th centuries

José Barrios García defended successfully (Apt cum Laude) his doctoral thesis, entitled "Number systems and calendars of the berber populations of Grand Canary and Tenerife in the 14th-15th centuries" at the Faculty of History (Department of Anthropology) of the University of La Laguna (Tenerife), on June 5, 1997. The thesis directors were F. Estévez (Department of Anthropology, University of La Laguna, Tenerife, Spain) and M. Ziolkowski (Department of Historical Anthropology, Warsaw University, Poland).
Follows the thesis abstract by José Barrios García:

> Grand Canary and Tenerife were inhabited in 14-15th centuries by Berber populations, called Canarians in Grand Canary and Guanches in Tenerife, coming from the nearby continent presumably on different occasions between the first millennium BC and at least the first millennium AD. These populations remained relatively isolated until the European rediscovery of the Islands in late 13th century. At this time the population of each Island were of about 40-60,000 inhabitants, sustaining a notably developed agricultural (barley, wheat) and stock raising (goats, sheep, pigs) economy. After two centuries of struggles the Islands were finally incorporated to the Spanish crown in late 15th century.
>
> The above mentioned economical characteristics necessarily involved a certain number of arithmetical and calendrical activities, and ethnographic written sources available from c. 1300 AD on certainly certified it. With this in mind, in 1990 I began a research on the mathematical and astronomical practices of these people, who have finally crystallised in the doctoral dissertation I have just presented at the University of La Laguna (Tenerife).
>
> After some preliminary chapters establishing the theoretic frame, the methodology and sources used, etc., the thesis proceeds to investigate the

number systems and calendars, first for Grand Canary and then for Tenerife.

For each Island the study proceed in the same way: 1) summary of the economical, social, political and religious organisation of the Island 2) written and archaeological evidences pointing out the recording of numerical and calendrical information 3) study of the number systems in relation to the economical and sociocultural context 4) study of the calendars in relation to the economical and sociocultural context.

My analysis of the notices preserved about the number systems lead in both Islands to a pure 10-based system, deeply related with both proto-Berber and ancient Egyptian numeral systems (without discarding a possible concurrent use of a 12-based system related with calendrical counts), as well as to the existence of systematic census of the inhabitants of each Island, due to the economical constraints imposed by isolation. With respect to the calendars, drawing evidence from ethnographic written sources I establish for both Islands the existence of systematic records of lunar, solar and sidereal counts.

The research for Grand Canary is complemented with an archaeo-astronomical study of the mountain of Cuatro Puertas, usually considered of a very great religious importance. From the collected evidence I infer that at its top there is a summer solstice marker which works by mean of the shadow a certain rock casts at sunrise upon a great sign carefully carved on the opposite wall.

On the other hand, collected archaeological, ethnohistorical and linguistic evidences led me to propose that the Canarians systematically recorded numerical, astronomical and calendrical data by mean of geometrical figures (squares, triangles, circles, etc.) painted in white, red and black on wood planks and on the walls of certain caves. Evidence from the decoration of the Painted Cave of Galdar (the main preserved painted cave of the Island), led me to propose they use a chessboard of 3 (vertical) x 4 (horizontal) squares, named acano, to represent 12 moons. On this base, I proceed to study the acano as a lunar calendar, showing how the vertical numeration of its squares force the solstitial, equinoctial and eclipse moons to move across the board with very simple and stable patterns. These patterns provide a safe and clear mnemonic guide for performing on the acano an easy arithmetical calculus of seasonal and eclipse moons over extended periods of time, just using the difference in days of the lunar year with either the solar year or the eclipse year to perform an elementary saw function on the squares.

The proposed calculus establish the octaeteris and the 135-moon eclipse cycle as basic periods of the acano. It is well known that the Canarians observed the summer solstice and had important festivals on the crescent

moon that followed, so to complete the evidence I present two notices from ancient written sources supporting that they measured one and half eclipse year as 520 days. The proposed calculus on the acano would reveal an unsuspected high level of Canarian mathematical astronomy and pose the question of the origin of this set of techniques.

In contrast with some (weak) notices supporting the existence of a Sirius calendar in Grand Canary, my main Thesis with respect to the Guanche calendar is the fundamental role played in it by the phases of the star Canopus. From my analysis its helical rise about middle August fixed the first moon of the Guanche lunar calendar, while its helical set on late April and its acronical rise on late January fixed the two other well documented feasts of the Island. The Guanche cult to this star was later transferred to what have been by far the main Catholic cult of the Island after the conquest: the Virgin of Candelaria. Additional evidence drawn from continental Berbers supports the antiquity and widespread of a Canopus cosmological system in Northwest Africa.

With respect to Guanche record keeping, written sources point out the use of tally woods and, very specially, small clay beads joined with a string to form a sort of necklaces, very usually found in funerary Guanche caves. Nevertheless, the absence of well preserved examples found in a reliable archaeological context completely impede, for the moment, to check these written notices.

The Thesis is closed with an Annex, containing a much needed biobibliographical summary, listing c. 140 manuscripts, copies or editions of the 31 written ethnographic sources supporting the research and ranging from the 14th to the 17th century.

4.2 Magister thesis: Mathematics education in Tlemcen in the 14th century through the Commentary of al-ᶜUqbani (d. 811/ 1408)

Anissa Harbili defended successfully ("Very honourable") her magister thesis in the history of mathematics, entitled "Mathematics education in Tlemcen in the 14th century through the Commentary of al-ᶜUqbani (d. 811/ 1408)" at the École Normale Supérieure of Alger (Algeria), on June 28, 1997. The thesis director was Ahmed Djebbar (Algeria). The first part of the thesis presents the life and work of the Maghrebian mathematician al-ᶜUqbani and the mathematial activities in Tlemcen (Algeria) at his time. The second part is dedicated to a mathematical analysis of his work, that is a commentary of the famous manual of Ibn al-Banna (d. 1321), entitled "Talkis aᶜmal al-hisab" (Manual of arithmetic operations). The third and last part is a critical edition of the only surviving copy of the work of al-ᶜUqbani.

5. 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.

6. HAVE YOU READ?

6.1 On the History of Mathematics in Africa

#234 Aïssani, Djamil: **The mathematics in the medieval Bougie and Fibonacci**, in: Leonardo Fibonacci, Il tempo, le opere, l'eredità scientifica, Pacini Editore, Pisa, 1994, 67-82

The article presents the political, cultural and economic context in which the scientific activities in Bougie were developed during the Middle Ages. It describes certain aspects of the mathematical production in this city (science of calculation and algebra) and it concludes with remarks about the great Italian mathematician, Fibonacci, who had studied mathematics in Bougie.

#235 Djebbar, Ahmed: **Les activités mathématiques dans le Maghreb Central** (Mathematical activities in the central Maghreb), Universités de Paris-Sud, 1997, Preprint No. 97, 43 pp.

The article describes the conditions under which, between the 9th and the 15th centuries, emerged and developed a series of mathematical activities in some cities in the Central Maghreb. The description includes the links that were woven between these cities and other scientific centres in the west Mediterranean, that exercised mutual influence and stimulated the circulation of ideas and men. The study presents also some mathematicians from this region of the Maghreb, by specifying their various known contributions, both with respect to their publications as to their scientific teaching.

#236 Gerdes, Paulus: **Ethnomathematik dargestellt am Beispiel der Sona Geometrie** (Ethnomathematics through the Example of the Sona Geometry), Spektrum Verlag, Heidelberg / Berlin / Oxford, 1997, 433 pp. [ISBN: 3-8274-0201-8]

German language edition of the three volumes on the geometry of the "sona" sand drawing tradition in southern-central Africa (cf. #109, 120, 172, 173, 174, 241) [French language edition by L'Harmattan, 1995; Portuguese language edition by the Universidade Pedagógica, Maputo, 1993/4]

#237 Selin, helaine: **Encyclopedia of the History of Science, Technology, and Medicine in Non-Western Cultures**, Kluwer Academic Publishers, Dordrecht / Boston / London, 1997, 1117 pp.

The following papers relate to the history of mathematics in Africa:

* Jacques Sesiano: Abu Kamil (4-5);
* Laurance Doyle & Edward Frank: Astronomy in Africa (96-100);
* Jehane Ragai & Gregg de Young: Calendars in Egypt (167-168);
* Ahmed Djebbar: Combinatorics in Islamic mathematics (230-232);
* Jan Hogendijk: Conics (235-236);
* Bala Achi: Construction techniques in Africa (236-240);
* Marcia Ascher: Ethnomathematics (326-330);
* Paulus Gerdes: Geometry in Africa: Sona Geometry (367-368);
* Emilia Calvo: Ibn al-Banna (404);
* Rosdi Rashed: Ibn al-Haytham (Alhazen) (405-408);
* Ahmed Djebbar: Ibn Al-Yasamin (414-415);
* A. Djebbar: Ibn Munᶜim (427-428);
* Yousouf Guergour: Ibn Qunfudhi (428-429);
* J. Sesiano: Magic squares in Islamic mathematics (536-538);
* Thomas Bassett: Maps and mapmaking in Africa (554-558);
* P. Gerdes: Mathematics in Africa south of the Sahara (611-613);
* A. Djebbar: Mathematics in Africa: The Maghreb (613-616);
* Salimata Doumbia: Mathematics in west Africa: Traditional mathematical games (616-619);
* James Ritter: Mathematics in Egypt (629-632);
* Jens Hoyrup: Practical and recreational mathematics (660-663);
* Lawrence Robbins: Namoratunga [archaeoastronomical site] (755);
* P. Gerdes: Numeration systems in Africa (781-784);
* Gregg de Young: Pyramids (828-829);
* A. Djebbar: Al-Qalasadi (830-832);
* Georges Niangoran-Bouah: Weights and measures in Africa: Akan gold weights (1005-1007);
* Ruth Willard: Weights and measures in Egypt (1012-1014).

#238 Ssembatya, Vincent & Vince, Andrew: **Mathematics in Uganda**, in: The Mathematical Intelligencer, New York, 1997, Vol. 19, No. 3, 27-32

Overview of the development of mathematics at the Makerere University since its creation in 1922; brief information on the Uganda Mathematical Society established in 1972 under the leadership of Paul Mugambi - "the grandfather of mathematics in the country" (p.30).

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

#239 Broline, Duane & Loeb, Daniel: **The Combinatorics of Mancala-Type Games: Ayo, Tchoukaillon, and 1/π**, in: *UMAP Journal*, Vol. 16, 1995, 21-36

"Certain endgame considerations in the two-player Nigerian Mancala-type game Ayo can be identified with the problem, of finding winning positions in the solitaire game Tchoukaillon. The periodicity of the pit occupancies in s stone winning positions is determined. Given n pits, the number of stones in a wiinning position is found to be asymptotically bounded by n^2/π."

#240 Gerdes, Paulus: **On Ethnomathematics and the Transmission of Mathematical knowledge in and outside schools in Africa South of the Sahara**, in: R.Waast (Ed.), *Les Sciences hors d'Occident au XXème Siècle*, Vol.5: (Ed. M.Barrere): *Sciences et développement*, ORSTOM / UNESCO, Paris, 1996, 229-246

Reflects on ethnomathematics and the teaching and learning of mathematics.

#241 Gerdes, Paulus: **Récréations géométriques d'Afrique - Lusona - Geometrical recreations of Africa**, L'Harmattan, Paris (France) / Montréal (Canada), 1997, 127 pp. [ISBN: 2-7384-5168-3]

Presents examples of traditional sand drawings, called (lu)sona, from north-eastern Angola and geometrical recreations inspired by them. In the "Find the missing figures" activities the reader is given certain figures in the style of the sand drawings and invited to draw / create the missing figure(s) in the sequence (cf. #109, 120, 172, 173, 174, 236).

#242 Huylebrouck, Dirk: **Puzzles, Patterns, Drums: the Dawn of Mathematics in Rwanda and Burundi**, Humanistic Mathematics Network Journal, Claremont, 1996, Vol. 14, 9-22

Presents mathematical ideas involved in the igisoro board game (four-row mancala type game), displays decorative patterns from basketry, and analyses mathematical structures in music.

#243 Kovach, Roger: **Oware! 'The National game of Africa'. A Winning Numbers Game**, Sapient Software, Bolinas CA, USA, 1995, 186 pp.

Book and diskette with information on how to play west African versions of the mancala game.

In the second part it contains a reproduction of earlier texts and information about its authors:

* Sawyer, W.W.: The game of oware, in: Scripta Mathematica, Vol. XV, 1949, 159-161 [pp. 59-63];
* Murray, H.: Introduction to Mancala games, in: History of board games other than chess, Oxford University Press, Clarendon, 1952 [partial reproduction, pp. 64-90];
* Cullin, Stewart: Mancala, the national game of Africa, Annual Report of the U.S. National Museum for 1894, Smithsonian Institution, Washington, 1896, 579-607 [pp. 91-110];
* Herskovits, Melville: Adji-boto, an African game of thr Bush-Negroes of Dutch Guiana, in: Man, London (UK), Vol. xxix, no. 90, 1929, 122-127 [pp. 111-120];
* Herskovits, Melville: Wari in the New World, Journal of the Royal Anthropological Institute, London (UK), Vol. lxii, 1932, 23-37 [pp. 121-147];
* Bennett, G.: Wari, in: Robert Rattray (Ed.), Religion and art in Ashanti, Oxford University Press, 1928 [pp. 148-159].

#244 Odeleye, A.O.: **Ayo, a popular Yoruba game**, Oxford University Press, Ibadan (Nigeria), 1977, 54 pp.

Describes ayo, a mancala board game among the Yoruba in Nigeria, and analyses several popular strategies for playing it.

#245 Powell, Arthur B. & Frankenstein, Marilyn (Eds.): **Ethnomathematics: Challenging Eurocentrism in Mathematics Education**, State University of New York Press, Albany (USA), 1997, 440 pp. [ISBN 0-7914-3352-8, ISBN 0-7914-3351-X (hard cover)]

The following chapters or parts of them relate to mathematics in Africa:

* Martin Bernal (author of "Black Athena: The Afroasiatic roots of classical civilization"): Animadversions on the origins of western science (83-99) [originally 1992]:

Presents "arguments for the existence of rich mathematical – particularly geometrical – and astronomical traditions in Egypt by the time Greek scholars came in contact with Egyptian learned priests" (p. 95);

* Beatrice Lumpkin: Africa in the mainstream of mathematics history (101-117):
  Reproduction of #9 [originally 1983] with postscript;
* Herbert Ginsburg: The myth of the deprived child (129-154) [originally 1986 with postscript]:
  Includes references to the author's research on the development of mathematical thinking among the Dioula and Baoulé (Côte d'Ivoire);
* Paulus Gerdes: On culture, geometrical thinking and mathematics education (223-247) [originally 1986];
* Claudia Zaslavsky: World cultures in the mathematics class (307-320) [originally 1991];
* Paulus Gerdes: Survey of current work on ethnomathematics (331-371) [originally 1993].

#246 Shirley, Lawrence: **Using Ethnomathematics to find multicultural mathematical connections**, in: House, Peggy (Ed.), Connecting Mathematics across the Curriculum, National Council of Teachers of Mathematics, Reston, 1995, chapter 4, 43-43

Includes suggestions from Africa (e.g. Mancala games, Adinkra textile patterns).

6.3 Other publications on the History of Mathematics by African mathematicians

#247 Oshin, B. Adetokunbo: **Brief History of Mathematics**, TWD Publications, Ijebu-Igbo (Nigeria), 1995, 88 pp.

Short history of mathematics for teachers. The only references to Africa are to Ancient Egypt.

7. ANNOUNCEMENTS

7.1 AMUCME-Newsletter

* The African Mathematical Union Commission on Mathematics Education (AMUCME) published the first issue of its newsletter. Readers interested in receiving the newsletter, may contact the Secretary of AMUCME:

Cyril Julie, Department of Didactics, University of the Western Cape, Private Bag X17, Bellville, 7530 South Africa (Tel: +21 959 2861; Fax: +21 959 3358; E-mail: cjulie@education.uwc.ac.za)

7.2 Seminar Ibn al-Haytham on the History of Arab Mathematics

* The *École Normale Supérieure* of Kouba (Algeria) published (June 1997) the 7th edition of its *Cahier du Séminaire Ibn al-Haytham sur l'Histoire des Mathématiques Arabes.* The publication is in Arabic with a list of contents in French. This issue contains, in particular, a biography of the historian of Arab mathematics A.I. Saïdan (d. 1991) and an introduction to the magister thesis of Anissa Harbili (cf. amuchma 19:4.2). Ahmed Djebbar is responsible for the Bulletin and the Secretariat is led by Youcef Guergour. The bulletin may be obtained free of charge from:

  Youcef Guergour, E.N.S. de Kouba, Département de Mathématiques, B.P. 92, 16050 Vieux Kouba, Alger, Algeria [tel. (2) 583511, Fax: (2) 583142; Telex: 62567; E-mail: ensk@ist.cerist.dz]

7.3 Honorary degrees for James Okoye Chukuka Ezeilo (Nigeria)

* The "father of mathematics" in Nigeria, James Ozeilo, received honorary DSc degrees from the University of Maiduguri (November 1989) and from the University of Nigeria in Nsukka 9April 1996), and a honorary DTech degree from the Federal University of Technology in Akure (November 1995).

7.4 World Mathematical Year (WMY) 2000

* Two major scientific events are planned to be held in Africa in the context of the World Mathematical Year 2000: 1) Organisation of the "First Pan-African Congress on Industrial and Applied Mathematics" and 2) Publication of a book on "African Mathematical Acievements in the 20th century".

  For further information, contact:

  The Secretariat, Pan-African Committee for WMY 2000, c/o Cameroon National Committee for Mathematics, B.P. 12041, Yaounde, Cameroon

7.5 Web sites

* Richard Davies (Swansea, UK) published on the web "**An introduction to shax: a Somali game**", originally written in 1988 and updated in 1996. He describes the three-in-a-row game from Somalia, called shax, indicating the differences with the morabaraba game from Lesotho. See:

http://www.swan.ac.uk/cds/shax.htm

* Jama Musse Jama (Somalia), organised a web-site on ethnomathematics. See:

http://www.dm.unipi.it/~jama/ethno

8. ADDRESSES OF SCHOLARS, INSTITUTIONS AND PUBLISHERS MENTIONED IN THIS NEWSLETTER

* Agwu, Nkechi: Department of Mathematics, Borough of Manhattan Community College, City University of New York, 199 Chambers Street, New York, NY 10007, USA (E-mail: nmabm@cunyvm.cuny.edu)
* Aïssani, Djamil: Association GEHIMAB, Laboratoire LAMOS, Centre universitaire, 06000 Bejaïa, Algeria (Tel. 213 5 211333; Fax: 213 5 211332)
* Bernal, Martin: Department of Government, Cornell University, Ithaca, NY 14853, USA
* Broline, Duane: Department of Mathematics, Eastern Illinois University, Charleston, IL 61920, USA (E-mail: cfdmb@eiu.edu)
* Davies, Richard: Centre for Development Studies, University of Wales Swansea, Singleton Park, Swansea SA2 8PP, UK (E-mail: h.lewis@ swansea.ac.uk, Web site: http://www.swan.ac.uk/cds/cds1.htm)
* Djebbar, Ahmed: Département de Mathématiques, Bâtiment 425, Université de Paris-Sud, 91405 Orsay Cedex, France (Fax: 33-1-47015917; E-mail: ahmed.djebbar@wanadoo.fr, Ahmed.Djebbar@math.u-psud.fr)
* Eglash, Ron: Comparative Studies, Ohio State University, Columbus OH 43210, USA (E-mail: eglash.1@osu.edu)
* Frankenstein, Marilyn: CCPS, University of Massachusetts Boston, 100 Morrisey Boulevard, Boston Ma 02125-3393, USA (E-mail: frankie @umbsky.cc.umb.edu)
* García, José Barrios: Dpto. de Análisis Matemático, Universidad de La Laguna, 38271 La Laguna (Tenerife), Canary Islands,. Spain (Tel.: + 34-22-603547; Fax: +34-22-604023; E-mail: jbarrios@ull.es)
* Gerdes, Paulus: Universidade Pedagógica, P.O.Box 3276, Maputo, Mozambique (Fax: 258-1-422113; E-mail: paulus@up.uem.mz); address during 1997/1998 sabbatical leave: University of Georgia, 105 Aderhold Hall, Athens GA 30602, USA (Fax: 706 542-4551; E-mail: pgerdes@ coe.uga.edu)
* Ginsburg, Herbert: Box 184, Teachers College, Columbia University, 525 West 120 Street, New York, NY 10027, USA (E-mail: hpg4@ columbia.edu)
* L'Harmattan: 5-7, rue de l'Ecole-Polytechnique, 75005 Paris, France (Fax: 33-1-43 25 82 03)

* Humanistic Mathematics Network Journal: c/o Alvin White, HMN Journal, Harvey Mudd College, Claremont, CA 91711, USA (Fax: 909 621-8366; E-mail: awhite@hmc.edu)
* Huylebrouck, Dirk: Aartshertogstraat 42, 8400 Oostende, Belgium (E-mail: dirk.huylebrouck@ping.be)
* Jama, Jama Musse: Via di Pretale 103F, 56100 Pisa, Italy (E-mail: jama@betti.dm.unipi.it)
* Kovach, Roger P.: P. O. Box 1009, Bolinas, CA 94924, USA (E-mail: rkovach@crl.com; Web site: http://www.crl.com/~oware)
* Loeb, Daniel: LaBRI, Université de Bordeaux I, 33405 Talence Cedex, France (E-mail: loeb@labri.u-bordeaux.fr)
* Ofiaja, Nicholas: Center for Ethnic Studies, Borough of Manhattan Community College, City University of New York, 199 Chambers Street, New York, NY 10007, USA
* Oshin, B. Adetokunbo: Hillcrest Secondary Technical School, P.O.Box 60453, Livingstone, Zambia (Fax: 260-3-320068/210400)
* Ozeilo, James: c/o Department of Mathematics, University of Nigeria, Nsukka, Anambra State, Nigeria
* Powel, Arthur B.: Academic Foundations Department, University Heights, 175 University Avenue, Newark NJ 07102 (E-mail: abpowell @andromeda. rutgers.edu)
* Sapient Software: P. O. Box 1009, Bolinas, CA 94924, USA (E-mail: rkovach@crl.com).
* Ssembatya, Vincent & Andrew Vince: Mathematics Department, University of Florida, Gainesville, FL 32611-8105, USA (E-mail: vince@math.ufl. edu)
* State University of New York (SUNY) Press: c/o CUP Services, P.O. Box 6525, Ithaca, NY 14851, USA (Fax: 800-688-2877; E-mail: heidrija @sunypress.edu)
* TWD Publications, P.O.Box 293, Ijebu-Igbo, Ogun State, Nigeria
* Ukaegbu, Jon Ofoegbu: Faculty of Philosophy, Bigard Memorial Seminary, P.O.Box 327, Enugwu, Enugwu State, Nigeria

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or to the Secretary

> Ahmed Djebbar: Département de Mathématiques, Bâtiment 425, Université de Paris-Sud, 91405 Orsay Cedex, France (Fax: 33-1-47015917; E-mail: Ahmed.Djebbar@wanadoo.fr, Ahmed.Djebbar @math.u-psud.fr)

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