



# **INTERDISCIPLINARY APPROACH TO RESEARCH**

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# INTERDISCIPLINARY APPROACH TO RESEARCH

## 1. DEFINITION OF INTERDISCIPLINARY RESEARCH

- ❑ An interdisciplinary approach to research is an approach which integrates information, data, techniques, tools, perspectives, concepts or theories from two or more academic disciplines.
- ❑ It also occurs where the contributions of different academic disciplines are integrated to provide holistic or systemic outcomes.

# INTERDISCIPLINARY APPROACH TO RESEARCH

## 2. MOVITATIONS OF SETTING UP INTERDISCIPLINARY RESEARCH PROJECTS

- The nature of the project is interdisciplinary
- Researcher intends to transfer information from the laboratory to the real world
- The research is particularly relevant to the policy making in complex areas
- When single discipline research has encountered a bottle neck and more than one discipline is needed to make a breakthrough
- It tackles socially relevant issues
- It contribute to the advancement of academic disciplines.

# INTERDISCIPLINARY APPROACH TO RESEARCH

## 3. SKILLS NEEDED BY INTERDISCIPLINARY RESEARCHERS

- Flexibility, adaptability and creativity.
- Curious about and willingness to learn from other disciplines.
- Open minded to ideas coming from other disciplines and experiences.
- Good communication and listening skills.
- Good team worker.

# INTERDISCIPLINARY APPROACH TO RESEARCH

## 4. SELECTED BENEFITS OF INTERDISCIPLINARY APPROACH TO RESEARCH

- It gives research strength.
- It provides researchers more funding opportunities.
- It enables researchers to be more flexible in thinking.
- It helps researchers to establish connection between concepts in different academic disciplines.
- It enhances the transfer of skills such as critical thinking, communication and analysis from one academic discipline to the other.
- It leads to greater creativity.
- It helps to identify patterns or intersection between and among academic disciplines.
- It enables researchers to tackle problems that do not fit neatly into one discipline.

# INTERDISCIPLINARY APPROACH TO RESEARCH

## 5. PERCEIVED PROBLEMS IN CONDUCTING INTERDISCIPLINARY RESEARCH

- Language and communication issues.
- Institutional structures and procedures.
- Divergence in world views across disciplines.

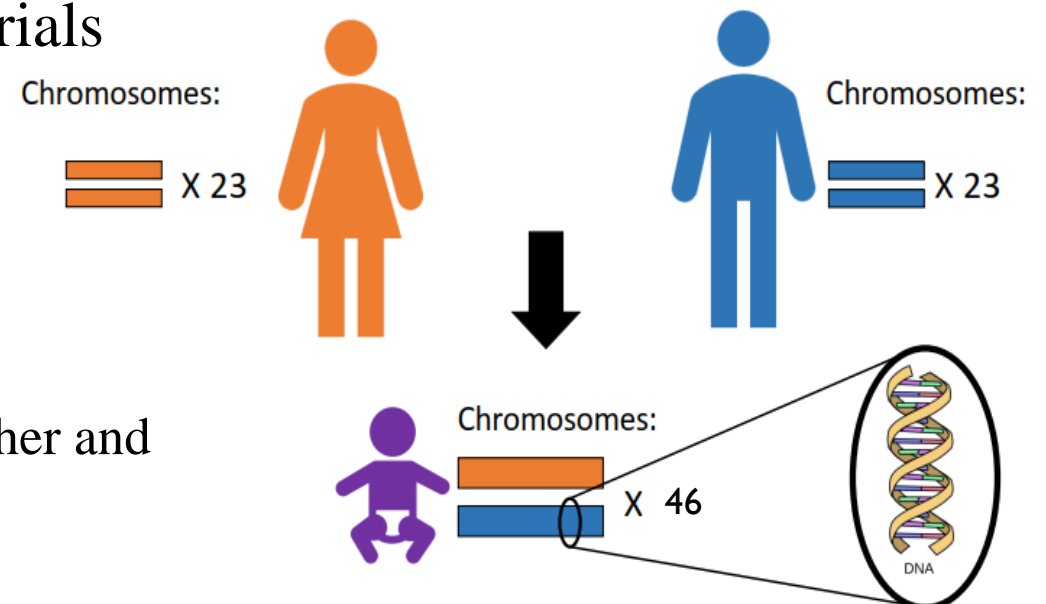
# INTERDISCIPLINARY APPROACH TO RESEARCH

## 6. GENETIC HISTORY Y CHROMOSOME

- ❑ All human cells (except mature red blood cells)

possess a nucleus which contains genetic materials (DNA).

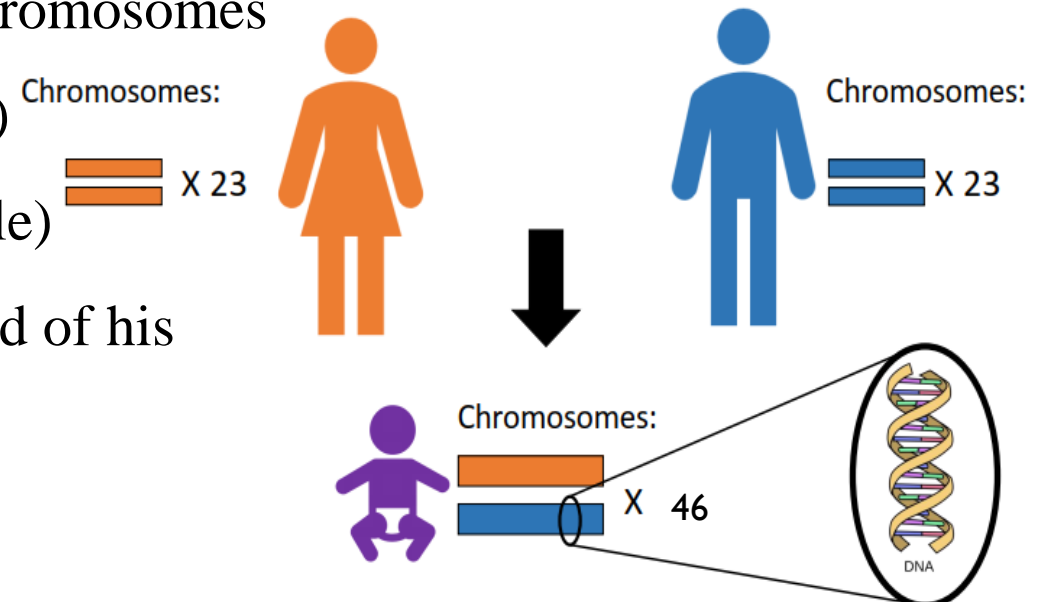
- ❑ Genetic material arranged in 46 chromosomes.
- ❑ 46 Chromosomes grouped into 23 pairs.
- ❑ 22 pairs out of 23 are autosomes derived each from mother and each from father.
- ❑ The 23 pair is made up of XX in females and XY in males.
- ❑ Egg produced by females contain X chromosomes.



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## 6. GENETIC HISTORY Y CHROMOSOME

- Sperm produced by males contains an X and Y chromosomes
- Y sperm fertilizing egg leads to XY zygote (Male)
- X sperm fertilizing egg leads to XX zygote (female)
- Y Chromosome of a man represent a unique record of his paternal inheritance
- Y chromosome Adam



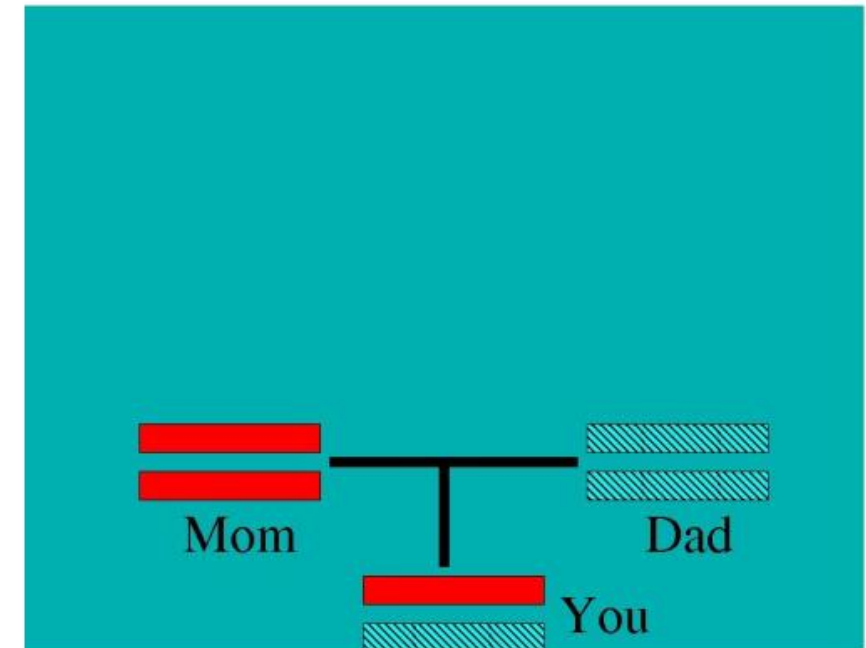


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## 7. MITOCHONDRIA DNA

- ❑ Structure within cells that convert energy from food to the form that the cell can use
- ❑ Strictly maternally inherited by both males and females.
- ❑ Used to infer human female population history
- ❑ There is more variation in African mtDNA

Your DNA



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## 7 - MITOCHONDRIA DNA

- African eve
- Lineages of indigenous people all over the world all branch off from African lines
- Out-of-Africa theory
- Eve had several contemporaries (Males & females)

# INTERDISCIPLINARY APPROACH TO RESEARCH

## 8-PIONEERING WORK

**Title of project: Genetic Diversity Along a North-South Transect of Cameroon.**

Collecting DNA samples from  
Cameroon



UCL



Neil Bradman



David Zeitlyn



Krishna Veeramah



Mark Thomas



Forka Leypey Mathew Fomine



Prof Verkijika Fanso

# INTERDISCIPLINARY APPROACH TO RESEARCH

## GENETIC DATA COLLECTION

- ❑ Over 2.500 DNA donors from Cameroon
  - ❑ >200 ethnic groups
  - ❑ All regions of Cameroon sampled
  - ❑ Background info for individual, parents, maternal grandmother and paternal grandfather:
    - ❑ Birthplace
    - ❑ Ethnic origin
- ❑ First and second language
- ❑ Areas sampled - Buea, Mbo, Foumban, Banyo, Poli, Bafut, Yaounde, Guider, Kousseri , Kribi and Lolodorf



# INTERDISCIPLINARY APPROACH TO RESEARCH

## Statistical Methods

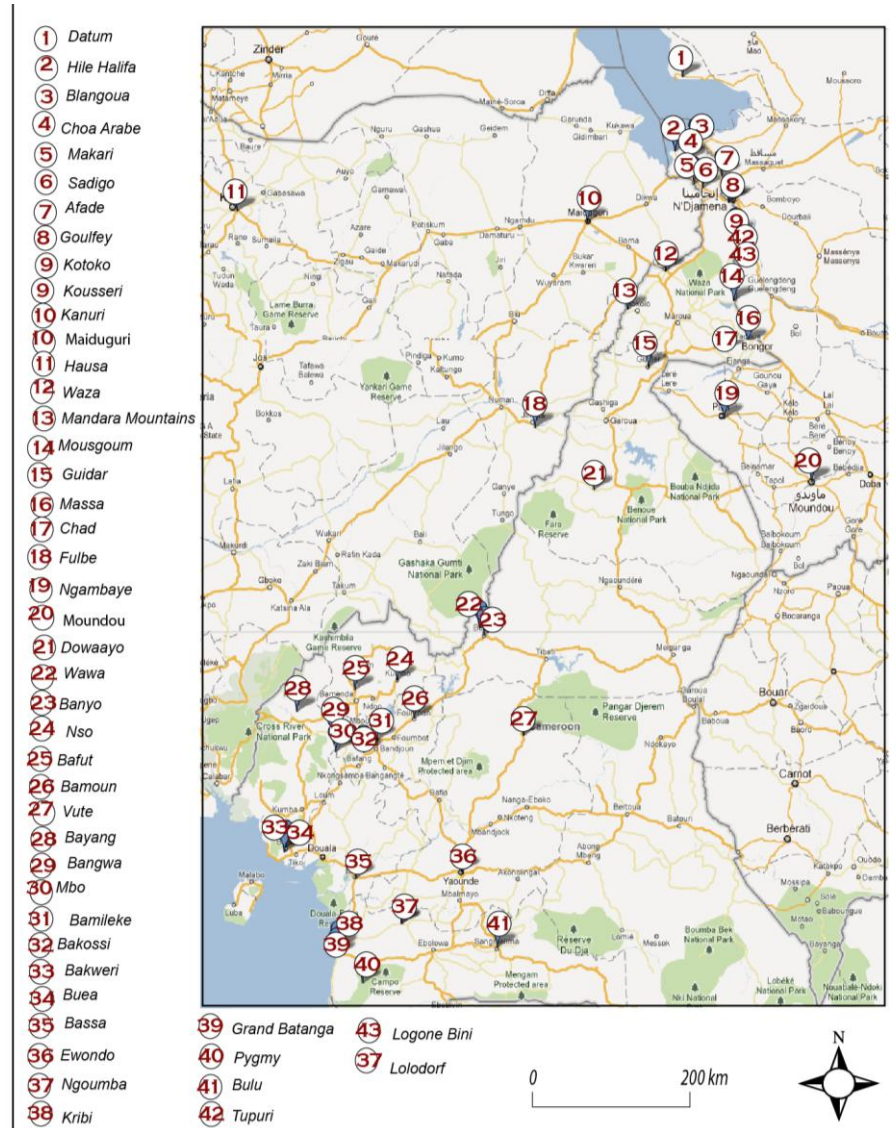
**hNRY** and **hmtDNA** were calculated as Gene Diversity, ( $h$ ).

Formulae used was the Nei 1987 that is

$$h = n(1 - \sum \chi_i^2)/(n-1),$$

where  $n$  is the sample size and  $\chi_i$  is the squared frequency of the  $i$ th allele. Calculations were performed in Excel.

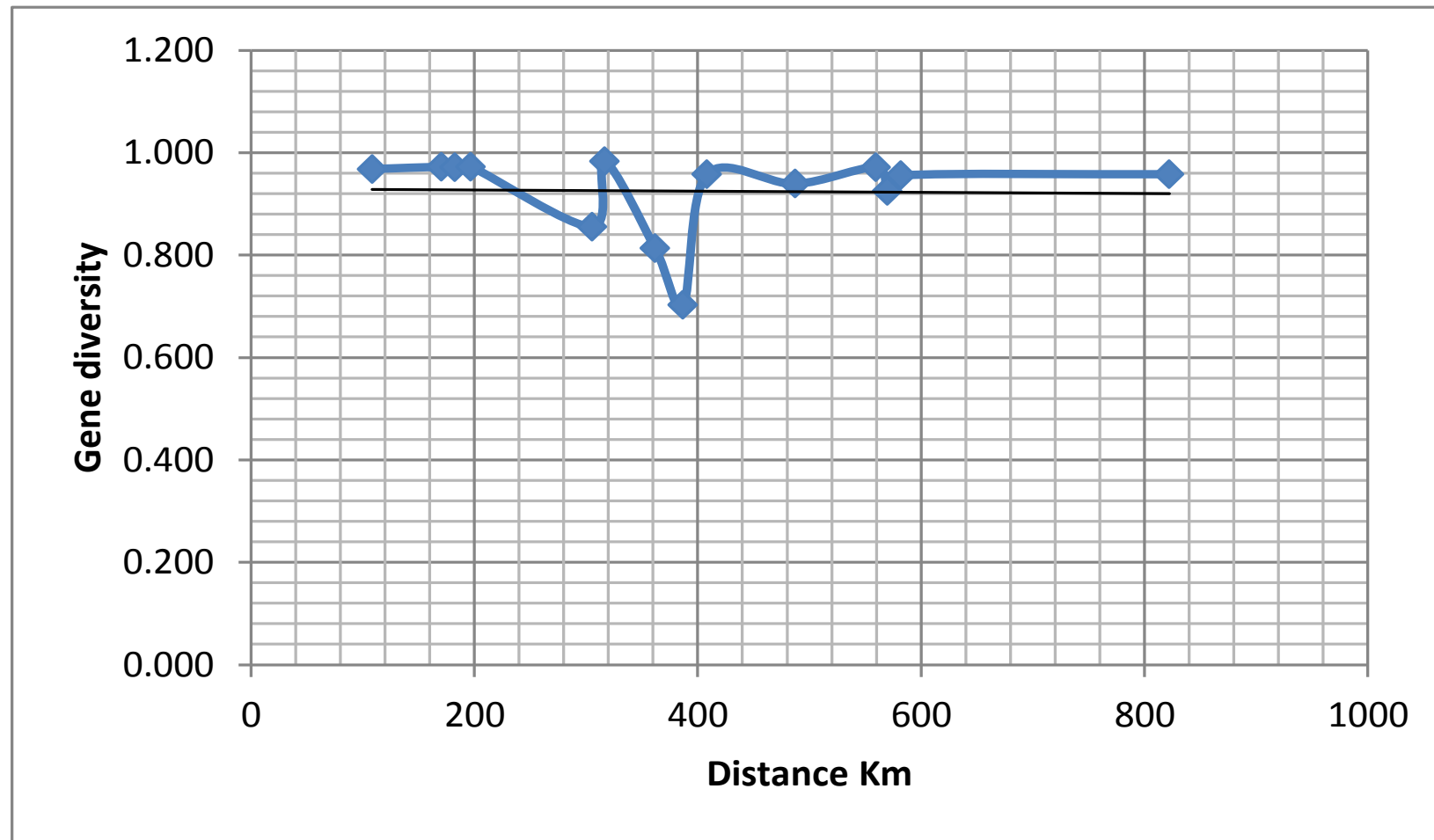
# MAP: CAMEROON GENETIC RESEARCH SAMPLED GROUP LOCATIONS.



Source: Adapted from Google Earth by the author, 2016.

# INTERDISCIPLINARY APPROACH TO RESEARCH

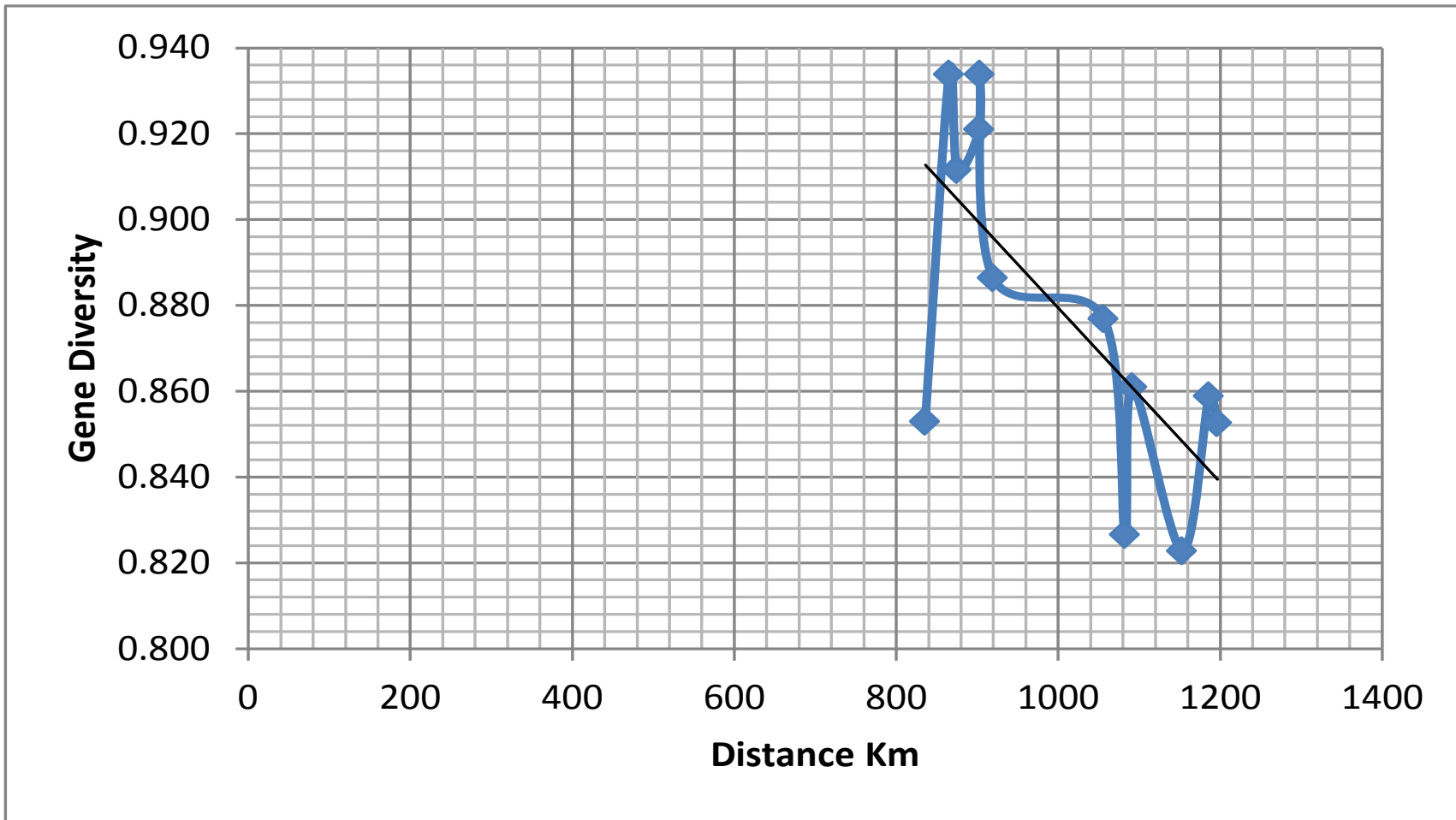
**Figure A: hNRY IN THE NORTHERN SET**



**Source: Computed by author in collaboration with geneticists at University College London.**

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**Figure B: hNRY IN THE SOUTHERN SET**

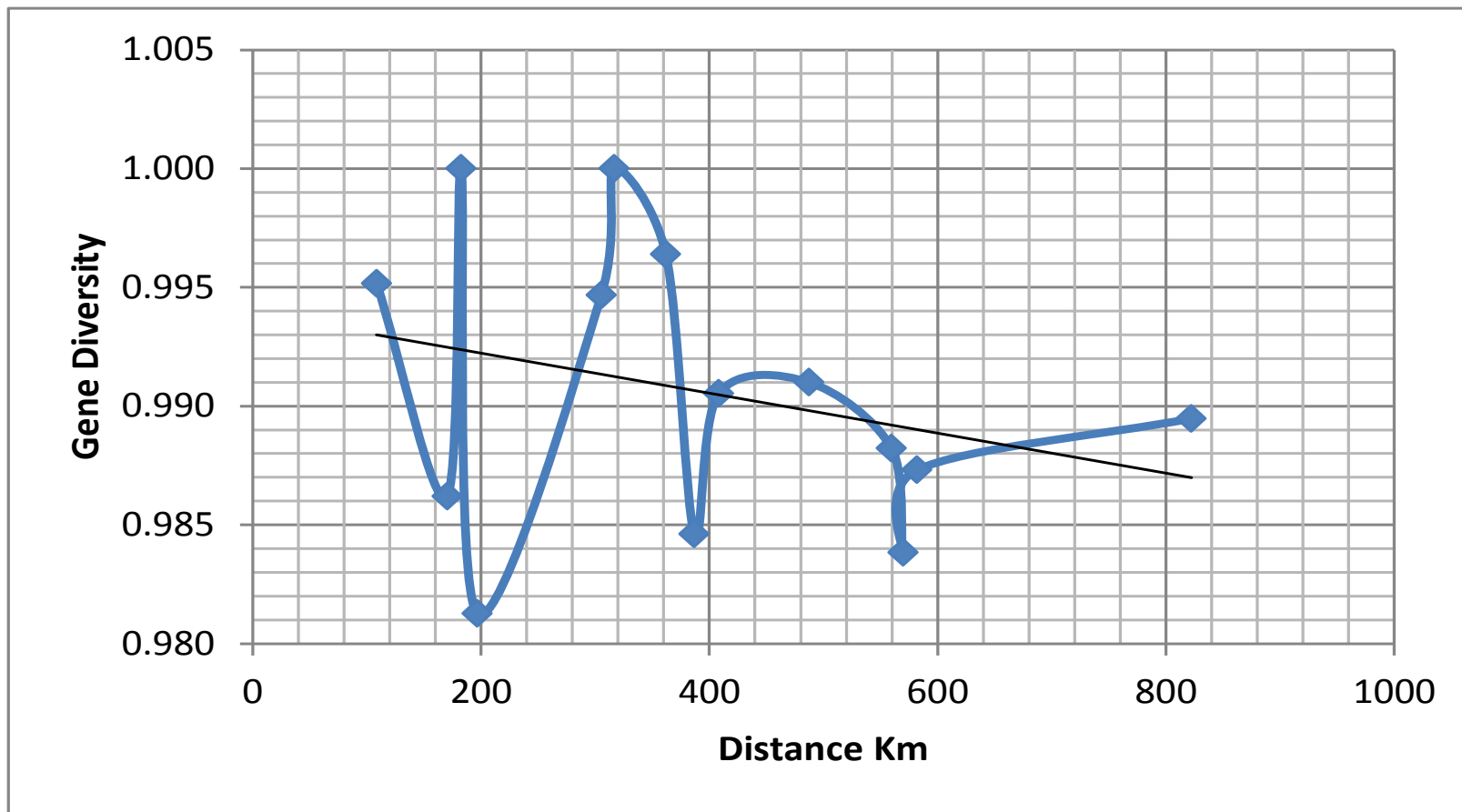


**Source: Computed by author in collaboration with geneticists at University College London.**



# INTERDISCIPLINARY APPROACH TO RESEARCH

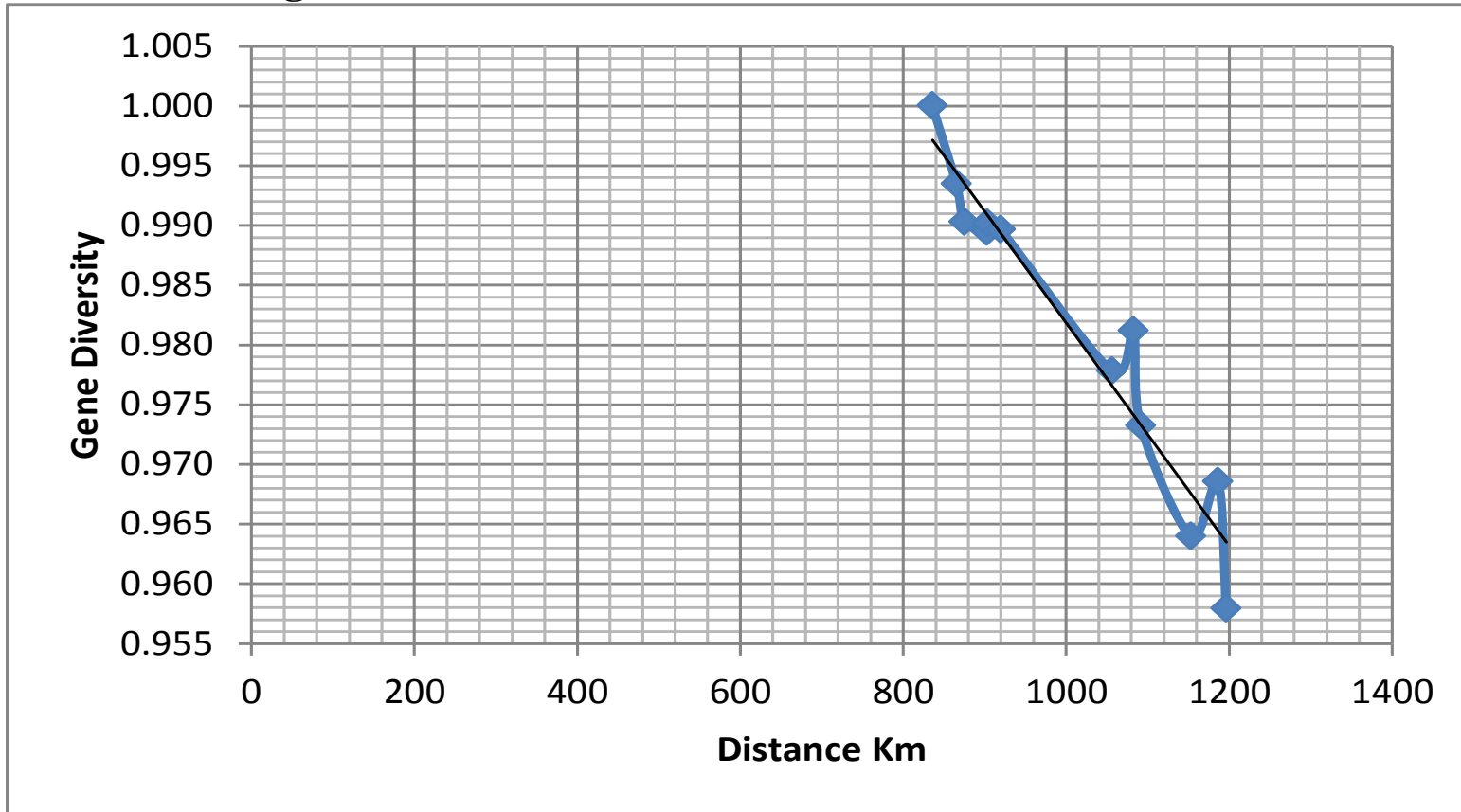
Figure C: hmtDNA IN THE NORTHERN SET



Source: Computed by author in collaboration with geneticists at University College London.

# INTERDISCIPLINARY APPROACH TO RESEARCH

**Figure D: hmtDNA IN THE SOUTHERN SET**



**Source: Computed by author in collaboration with geneticists at University College London.**

## **Results**

- High genetic diversity in the north emanated partly from Fulani Jihads
- Low genetic diversity in the south on its part emanated from Trans-Atlantic slave trade

## PREVIOUS WORK:

Journal List: American Journal of Human Genetics v.92(4); 2013  
Apr4 PMC3617384



Am J Hum Genet. 2013 Apr 4; 92(4): 637.

doi: [10.1016/j.ajhg.2013.03.006](https://doi.org/10.1016/j.ajhg.2013.03.006)

PMCID: PMC3617384

### **An African American Paternal Lineage Adds an Extremely Ancient Root to the Human Y Chromosome Phylogenetic Tree**

Fernando L. Mendez, Thomas Krahn, Bonnie Schrack, Astrid-Maria Krahn, Krishna R. Veeramah, August E. Woerner, **Forka Leypey Mathew Fomine**, Neil Bradman, Mark G. Thomas, Tatiana M. Karafet, Michael F. Hammer\*

(The American Journal of Human Genetics 92, 454–459; March 7, 2013)



# PREVIOUS WORK:

**Title of Project: Which of Cameroon's peoples have members of haplogroup A00?**

**Bonnie Schrack & Matthew Fomine Forka**

*Professor Bonnie Schrack : American Professional Genetic Genealogist*

Matthew Fomine Forka, The University of Buea.



## Communities Sampled

- Mbo
- Bangwa
- Bamileke
- Banyang
- Ejagham

## PREVIOUS WORK:

Publication: **NATURE**, Volume 577, Issue 7792, p.665-670

Pub Date: January 2020

DOI: [10.1038/s41586-020-1929-1](https://doi.org/10.1038/s41586-020-1929-1)

### **Ancient West African foragers in the context of African population history**

#### **Authors**

Lipson, Mark ; Ribot, Isabelle ; Mallick, Swapan ; Rohland, Nadin ; Olalde, Iñigo ; Adamski, Nicole ; Broomandkhoshbacht, Nasreen ; Lawson, Ann Marie ; López, Saioa ; Oppenheimer, Jonas ; Stewardson, Kristin ; Asombang, Raymond Neba'ane ; Bocherens, Hervé ; Bradman, Neil ; Culleton, Brendan J. ; Cornelissen, Els ; Crevecoeur, Isabelle ; de Maret, Pierre ; Forka Leypey Mathew Fomine ; Lavachery, Philippe

# PREVIOUS WORK:

## Conference of the European Society of Human Genetics (ESHG) Vienna June 2022

### **TITLE OF PAPER: Dense sampling of ethnic groups within five African countries reveals extensive historical admixture**

Authors: N. Bird<sup>1</sup>, L. Ormond<sup>1</sup>, P. Awah<sup>2</sup>, E. Caldwell<sup>3</sup>, B. Connell<sup>4</sup>, M. Elamin<sup>5</sup>, F. Fadlelmola<sup>6</sup>, **M. Fomine<sup>7</sup>**, S. MacEachern<sup>8</sup>, Y. Moñino<sup>9</sup>, P. Näsänen-Gilmore<sup>10</sup>, N. Nketsia<sup>11</sup>, K. Veeramah<sup>12</sup>, M. Weale<sup>13</sup>, D. Zeitlyn<sup>14</sup>, M. Thomas<sup>1</sup>, N. Bradman<sup>15</sup>, G. Hellenthal<sup>1</sup>

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<sup>2</sup>Faculty of Arts, Letters and Social Sciences, University of Yaoundé I, Yaoundé, Cameroon.

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<sup>8</sup>Division of Social Science, Duke Kunshan University, Kunshan, China.

<sup>9</sup>LLACAN, CNRS, Paris, France.

<sup>10</sup>Tampere Centre for Child, Adolescent and Maternal Health Research: Global Health Group, Faculty of medicine and health technology, Tampere University, Tampere Finland.

<sup>11</sup>Essikado Traditional Council, Essikado, Ghana.

<sup>12</sup>Department of Ecology and Evolution, Stony Brook University, Stony Brook, New York, USA.

<sup>13</sup>Genomics plc, Oxford, UK.

<sup>14</sup>School of Anthropology & Museum Ethnography, University of Oxford, Oxford, UK.

<sup>15</sup>Henry Stewart Group, London, UK

# PREVIOUS WORK

JOURNAL: AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE

**TITLE OF PAPER: Dense sampling of ethnic groups within African countries reveals fine-scale genetic structure and extensive historical admixture**




FORTHCOMING

**Author order:** Nancy Bird<sup>1</sup>, Louise Ormond<sup>2</sup>, Louise Ormond<sup>3</sup>, Elizabeth Caldwell<sup>4</sup>, Bruce Connell<sup>5</sup>, Mohamed Elamin<sup>6</sup>, Forka Leypey Matthew Fomine<sup>7</sup>, Scott MacEachern<sup>8</sup>, Yves Moñino<sup>9</sup>, Pieta Näsänen-Gilmore<sup>10</sup>, Nana Nketsia V, Essikado<sup>11</sup>, Eno-Abasi Urua<sup>12</sup>, Krishna Veeramah<sup>13</sup>, Mike Weale<sup>14</sup>, David Zeitlyn<sup>15</sup>, Mark Thomas<sup>16</sup>, Neil Bradman<sup>17</sup>, Garrett Hellenthal<sup>18</sup>.

1. Nancy Bird, Department of Genetics, Evolution and Environment, University College London Genetics Institute (UGI), University College London, London, UK.
2. Louise Ormond, Department of Genetics, Evolution and Environment, University College London Genetics Institute (UGI), University College London, London, UK.
3. Paschal Awah, Faculty of Arts, Letters and Social Sciences, University of Yaoundé I, Yaoundé, Cameroon.
4. Elizabeth Caldwell, Faculty of Health and Medicine, Lancaster University, Lancaster, UK.
5. Bruce Connell, Department of Linguistic and Language Studies, York University, Toronto, Canada.
6. Mohamed Elamin, University Hospital of Derby, Derby, UK.
7. Forka Leypey Matthew Fomine, Department of History and African Civilisations, University of Buea, Cameroon.
8. Scott MacEachern, Division of Social Science, Duke Kunshan University, Kunshan, China.
9. Yves Moñino, LLACAN, CNRS, Paris, France.
10. Pieta Näsänen-Gilmore, (1) Tampere Centre for Child, Adolescent and Maternal Health Research: Global Health Group, Faculty of medicine and health technology, Tampere University, Tampere Finland. (2) Population health Unit, Department of Public Health and Welfare, Finnish Institute for Health and Welfare. Helsinki, Finland.
11. Nana Nketsia V, Essikado Traditional Council, Essikado, Ghana.
12. Eno-Abasi Urua, Department of Linguistics & Nigerian Languages, University of Uyo, Uyo, Nigeria.
13. Krishna Veeramah, Department of Ecology and Evolution, Stony Brook University, Stony Brook, New York, USA.





15. David Zeitlyn, School of Anthropology & Museum Ethnography, University of Oxford, Oxford, UK.

16. Mark Thomas, Department of Genetics, Evolution and Environment, University College London Genetics Institute (UGI), University College London, London, UK.

17. Neil Bradman, Henry Stewart Group, London, UK

18. Garrett Hellenthal, Department of Genetics, Evolution and Environment, University College London Genetics Institute (UGI), University College London, London, UK.

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# **CURRENT RESEARCH PROJECT**

## **TITLE: Y CHROMOSOME AND MITOCHONDRIA DNA DIVERSITY AMONG SELECTED CAMEROONIAN POPULATIONS**

**Dr. Forka Leypey Matthew Fomine** (Principal Investigator), University of Buea, Cameroon.

*Collaborating with*

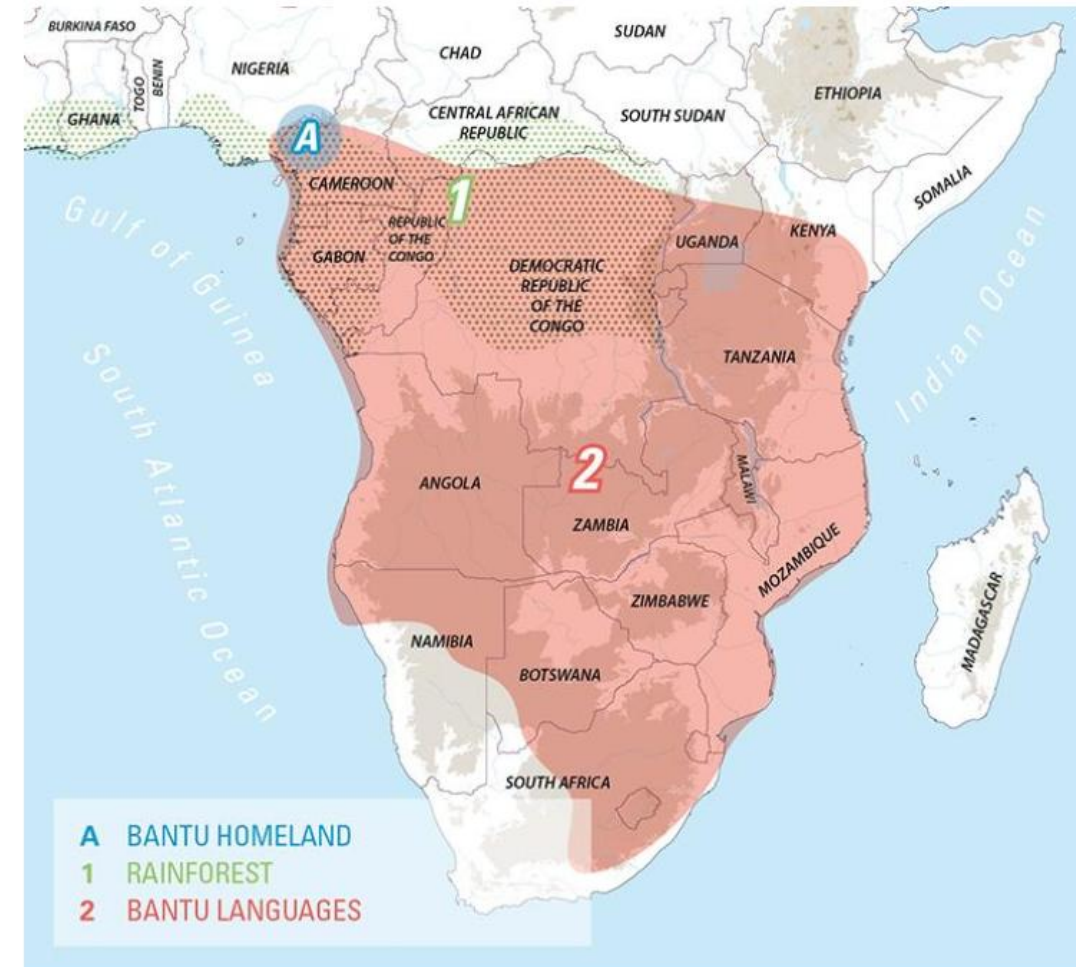
**Prof. Carina Schlebusch**, University of Uppsala, Sweden.

## PREVIOUS KNOWLEDGE:

### The expansions of Bantu-speaking peoples from southern Cameroon

The Bantu languages originated in western Cameroon ~1500BC

- 30% of Africans now speak a Bantu language
- Multiple expansions over different routes involving:
- language, subsistence strategy and metalwork



Source: See Bostoen (2018), Grollemund et al., (2015)

## Objectives of Current Research

- ❑ To collect 300 Saliva samples from groups occupying presumed area of origin of Bantu-speaking languages (Cameroon-Nigeria Border and Kupe Muanenguba Area).
- ❑ To collect 240 Saliva samples from groups in the Shum Laka Area (Bamenda Grassfields).

## Conclusions

- ❑ A mastery of DNA helps to understand variation in drug efficacy within a population.
- ❑ Genetic profiling helps to identify criminals and therefore facilitates the work of law enforcement officials.
- ❑ DNA study helps to illuminate when groups split up within a population.
- ❑ Because of my involvement in this research, The [Y chromosome sequencing Center](#) in Berlin, Germany has offered The University of Buea a DNA sequencer.
- ❑ Paper work to be finalized.

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**THANK YOU  
VERY MUCH FOR  
YOUR KIND  
ATTENTION**