Linguistic implications of contacts between (agriculturalists) Bantu and Hunter-Gatherers

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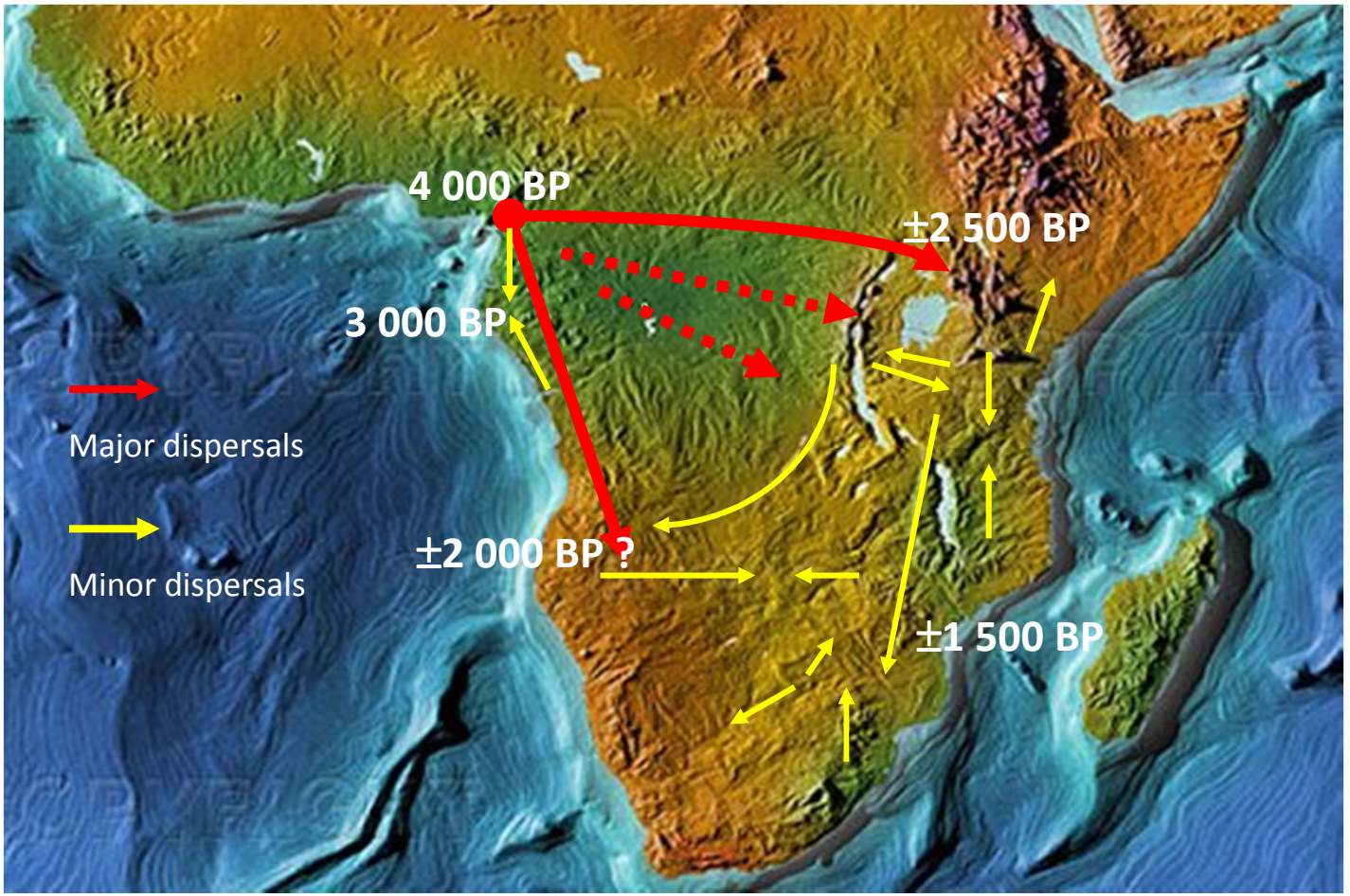
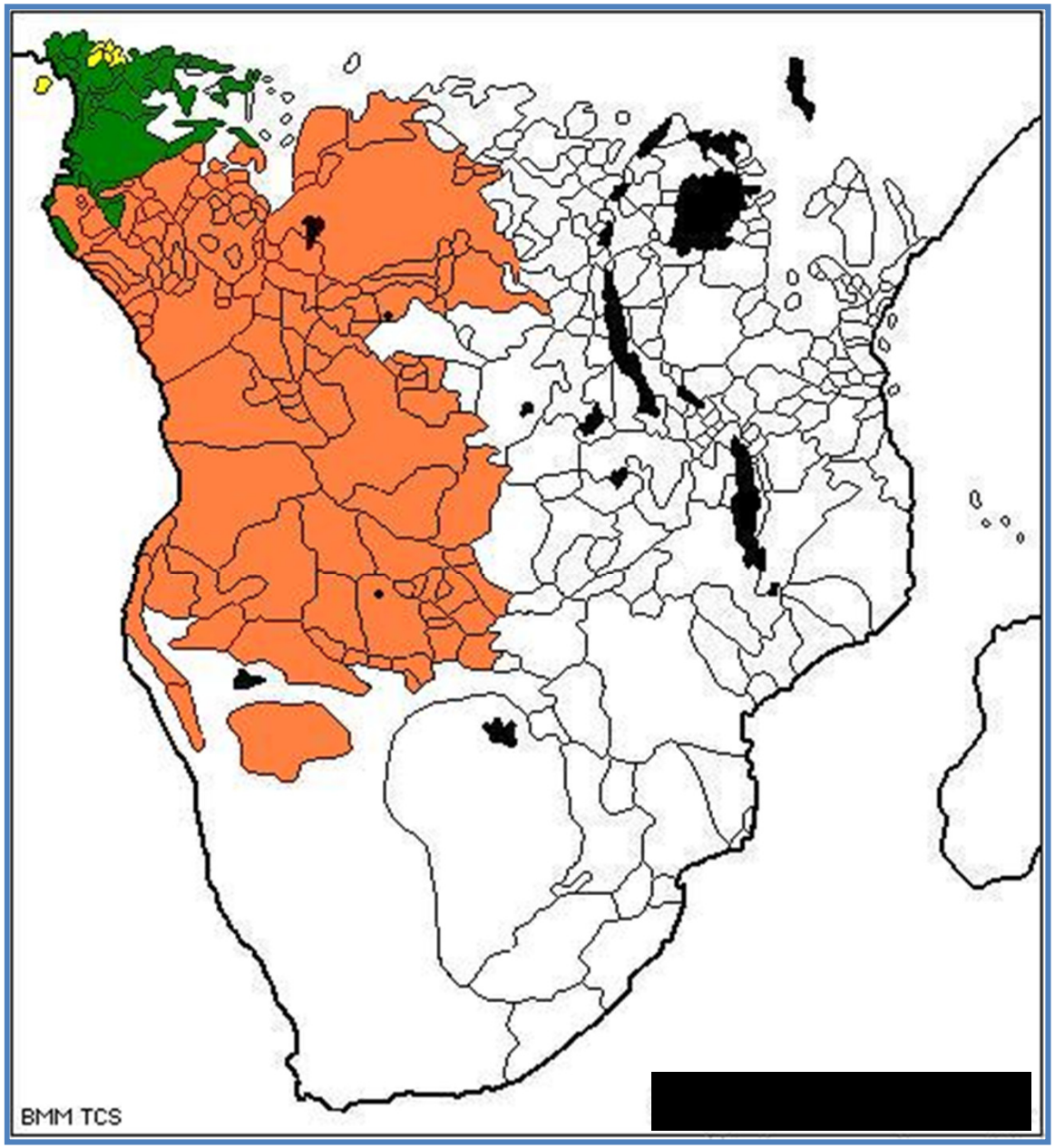
Berlin, October 15-16, 2011

Bantu migrations

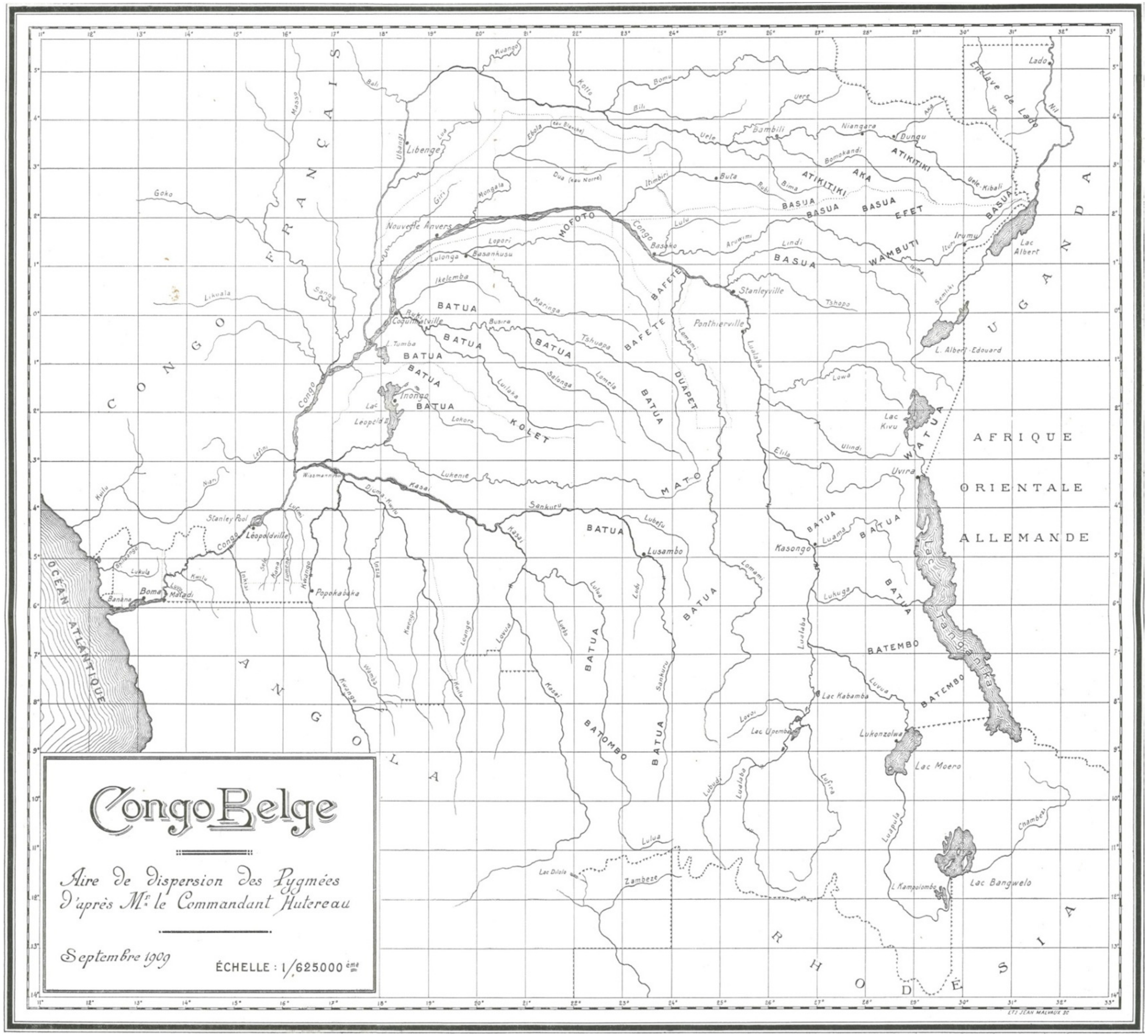


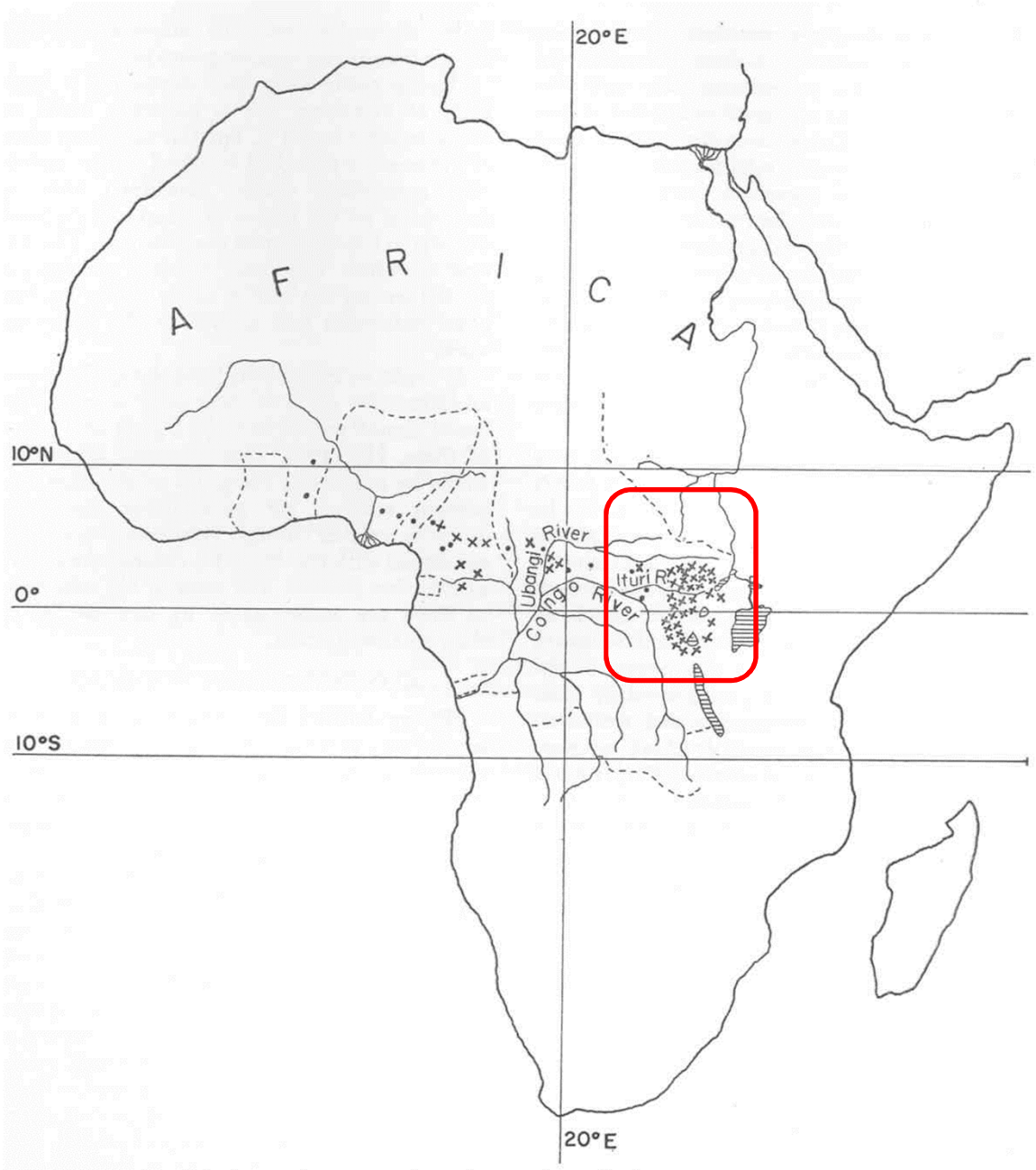


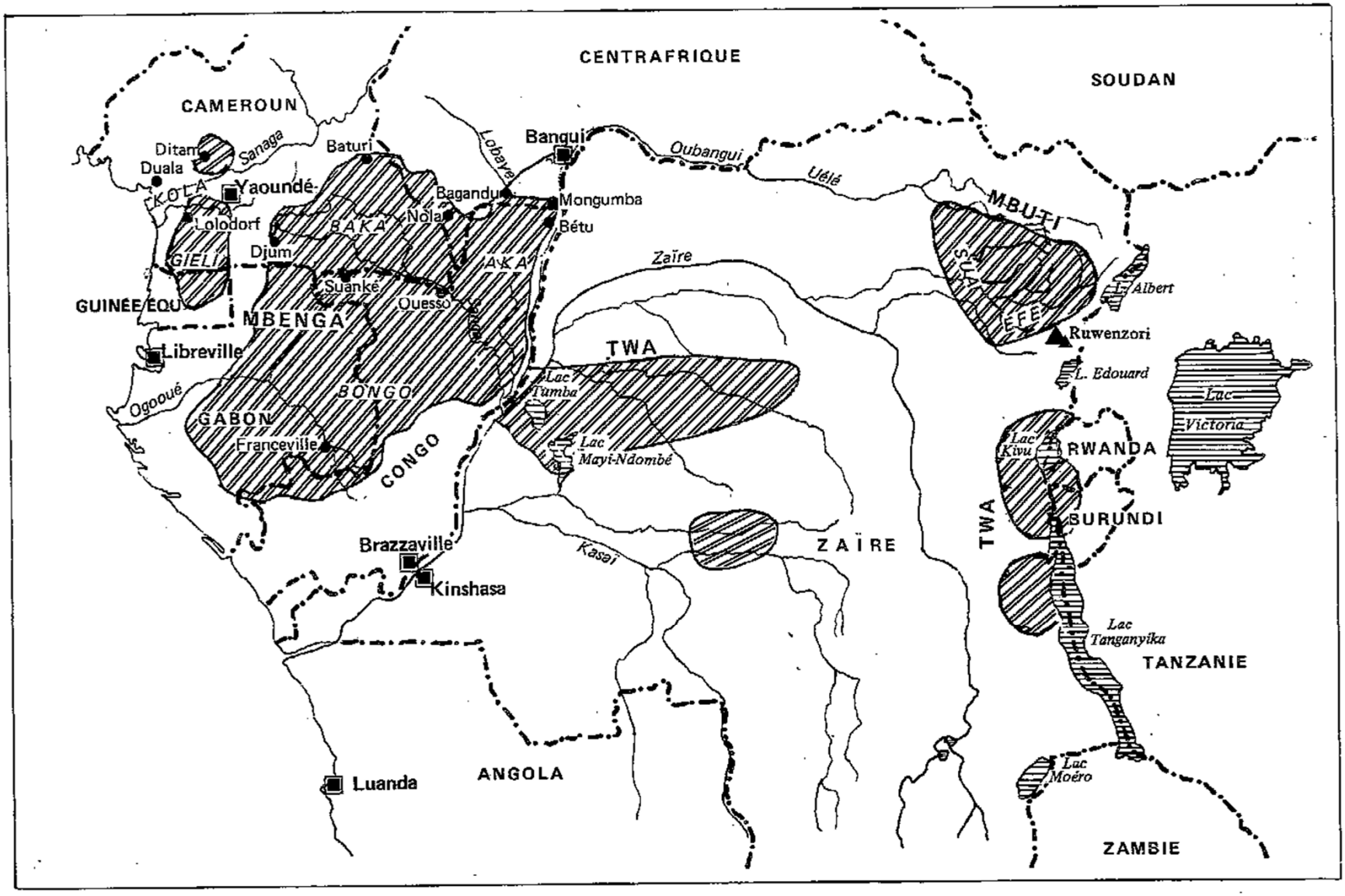
Major Bantu subdivisions
Bastin and Piron 1999

Hunter-gatherers

- How many different groups?
- Pygmies?
- Khoe San ?
- Other groups?

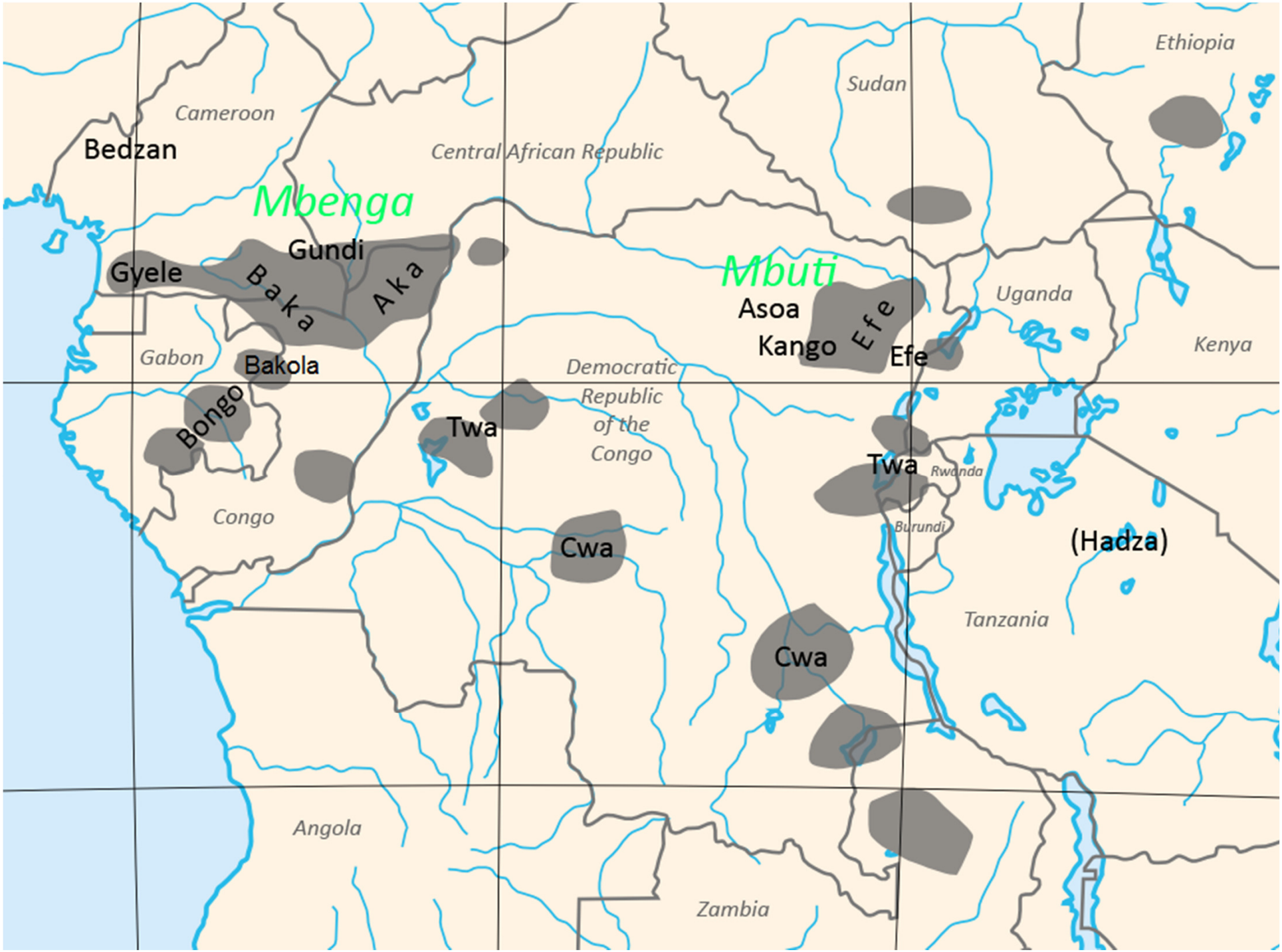

Congo Belge
Aire de dispersion des Pygmées d'après Mr. le Commandant Hutereau
Septembre 1909
ÉCHELLE : 1/625000ème
CONGO FRANÇAIS
ANGOLA
RHODÉSIA
UGANDA
AFRIQUE ORIENTALE ALLEMANDE
OCÉAN ATLANTIQUE
Enclave de Lado
Lado
Nil
Libenge
Nouvelle Anvers
Basankusu
Coquilhatville
Stanleyville
Ponthierville
Leopoldville
Stanley Pool
Boma
Matadi
Banana
Popokabaka
Lusambo
Kasongo
Uvira
Irumu
Bungu
Niangara
Bambili
Buta
Basoko
Inongo
Lac Leopold II
L. Tumba
Lac Albert
L. Albert-Edouard
Lac Kivu
Lac Tanganika
Lac Moero
Lac Bangwelo
Lac Kabamba
Lac Upemba
Lukonzolwa
L. Kampolombo
Lac Dilolo
Congo
Ubangi
Uele
Kasai
Sankuru
Lualaba
Lomami
Lukenie
Lulonga
Lopori
Ikelemba
Mongala
Aruwimi
Lindi
Ituri
Lowa
Elila
Ulindi
Luama
Lukuga
Luvua
Luapula
Lufira
Lulua
Lubefu
Kwango
Kwilu
Zambeze
Chambezi
Sanga
Likuala
Goko
Bomu
Uere
Bili
ATIKITIKI
AKA
BASUA
EFET
WAMBUTI
MOFOTO
BAFETE
BATUA
DUAPET
KOLET
MATO
WATUA
BATEMBO
BATOMBO
ETS JEAN MALVAUX SC.

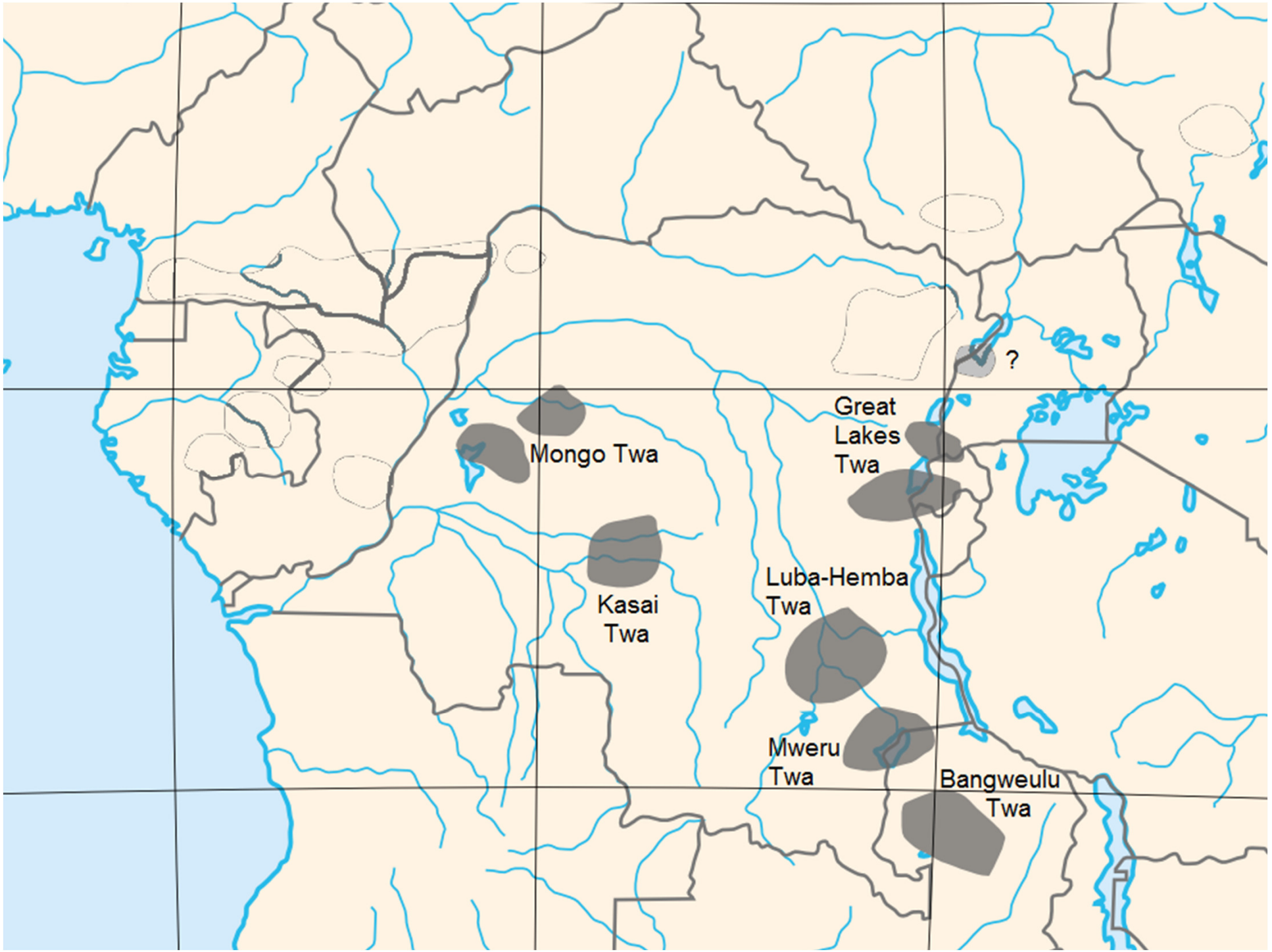

20°E
AFRICA
10°N
0°
10°S
20°E
Ubangi River
Ituri R.
Congo River

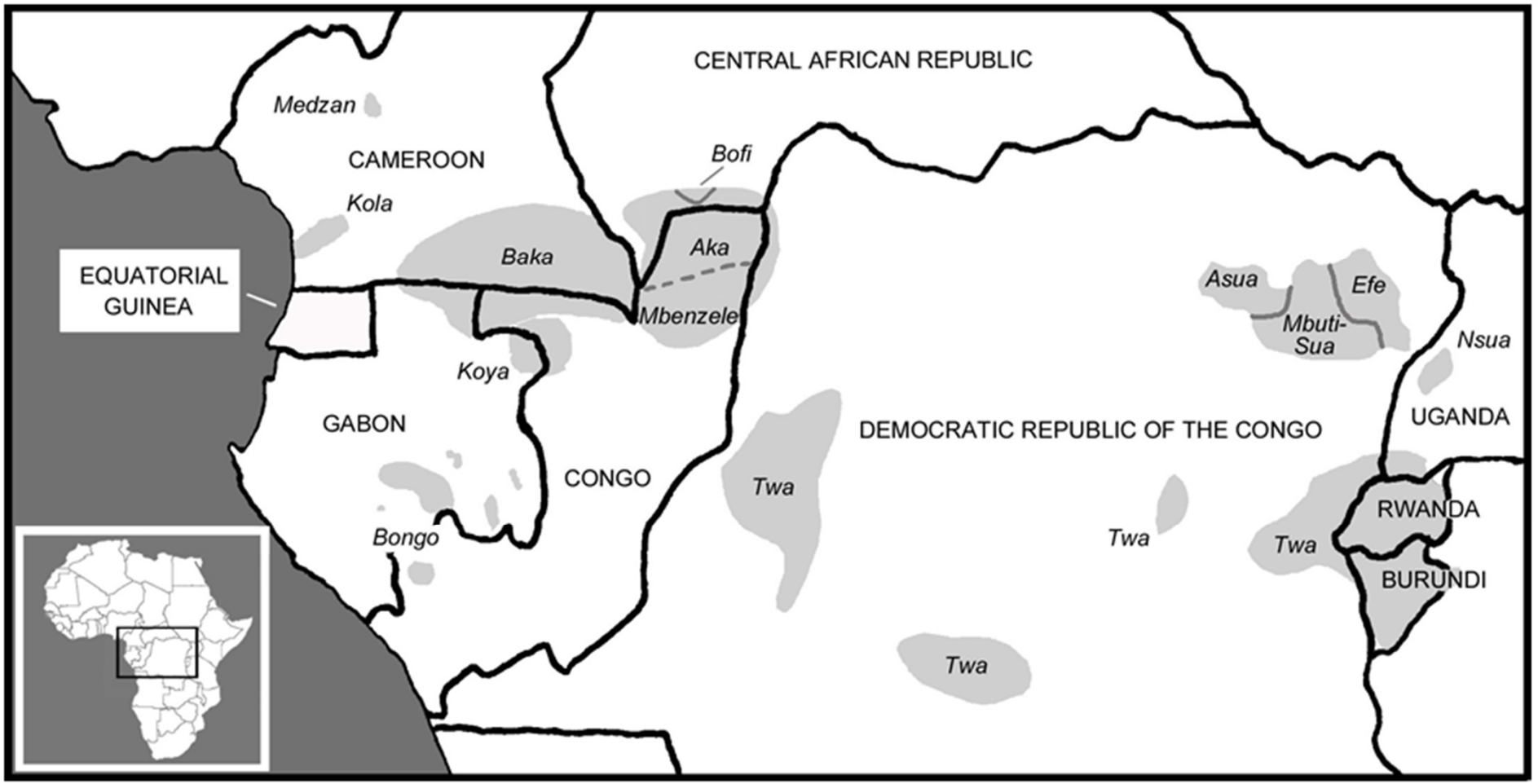


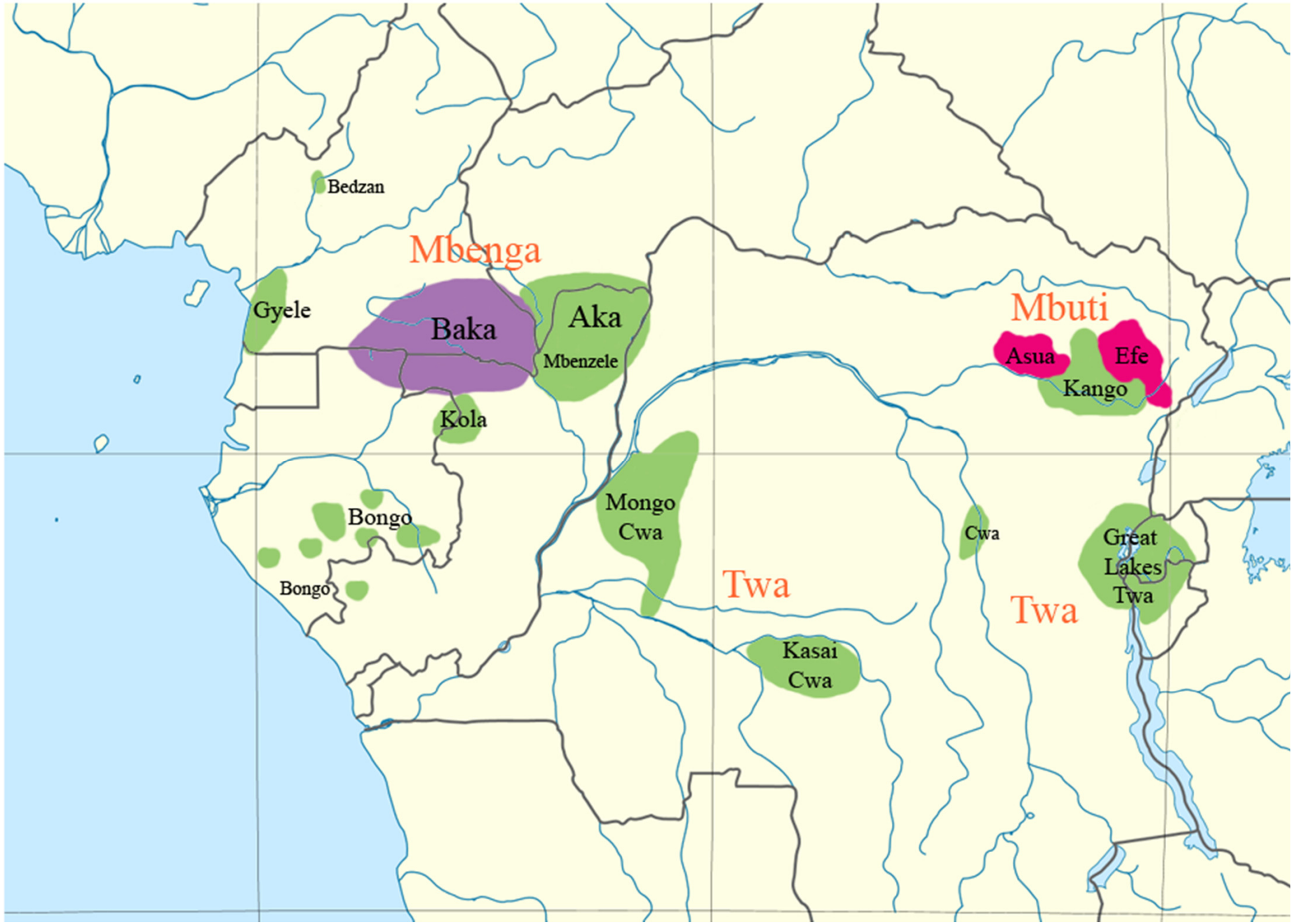
PB *túá «Pygmée»

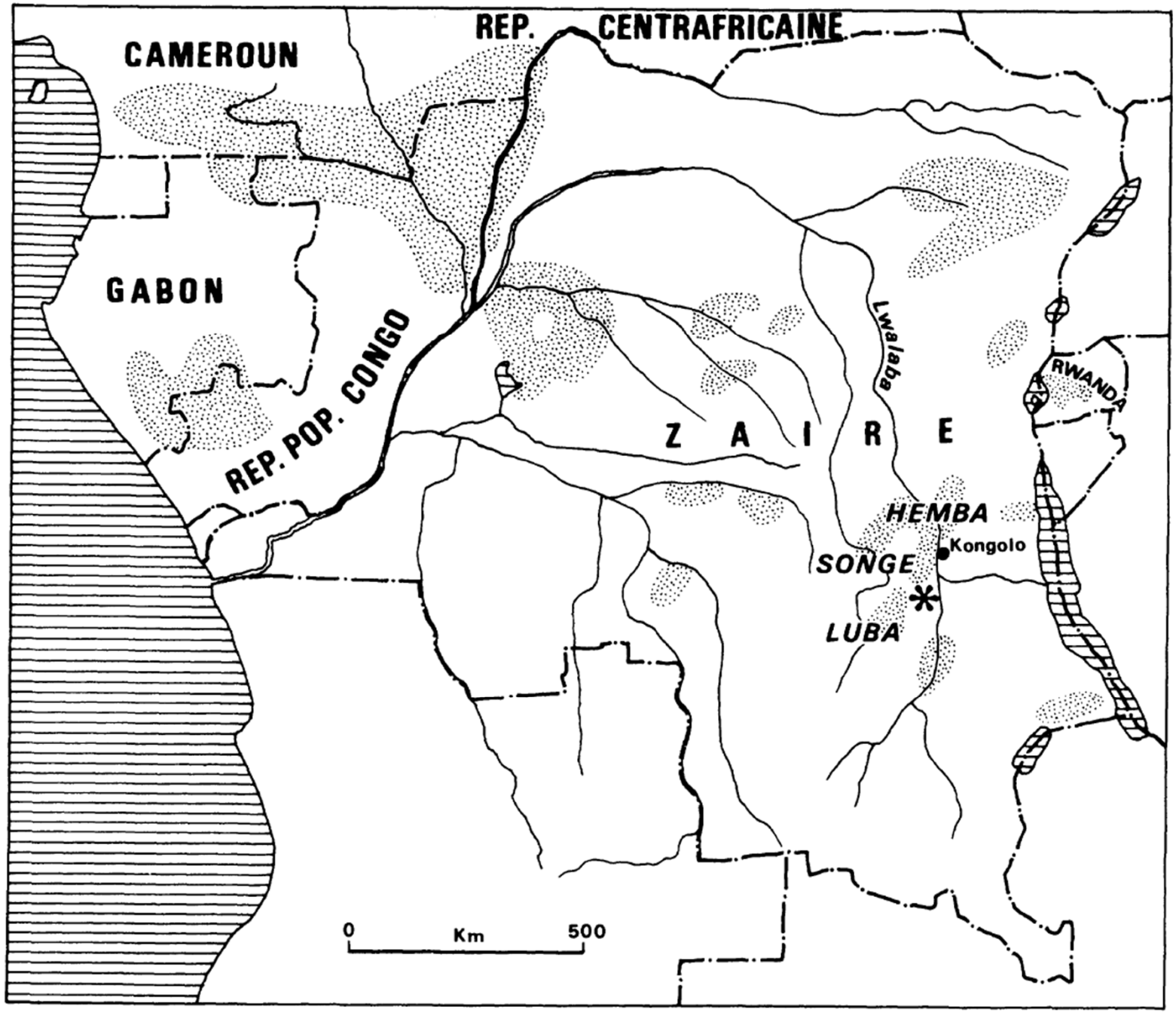
CARTE II — LES PYGMÉES (d'après H. GUILLAUME et d'autres, modifiée)


Ethiopia
Sudan
Cameroon
Bedzan
Central African Republic
Mbenga
Gundi
Gyele
Baka
Aka
Mbuti
Asoa
Kango
Efe
Efe
Uganda
Kenya
Gabon
Bakola
Democratic
Republic
of the
Congo
Bongo
Twa
Twa
Rwanda
Congo
Burundi
Cwa
(Hadza)
Tanzania
Cwa
Angola
Zambia

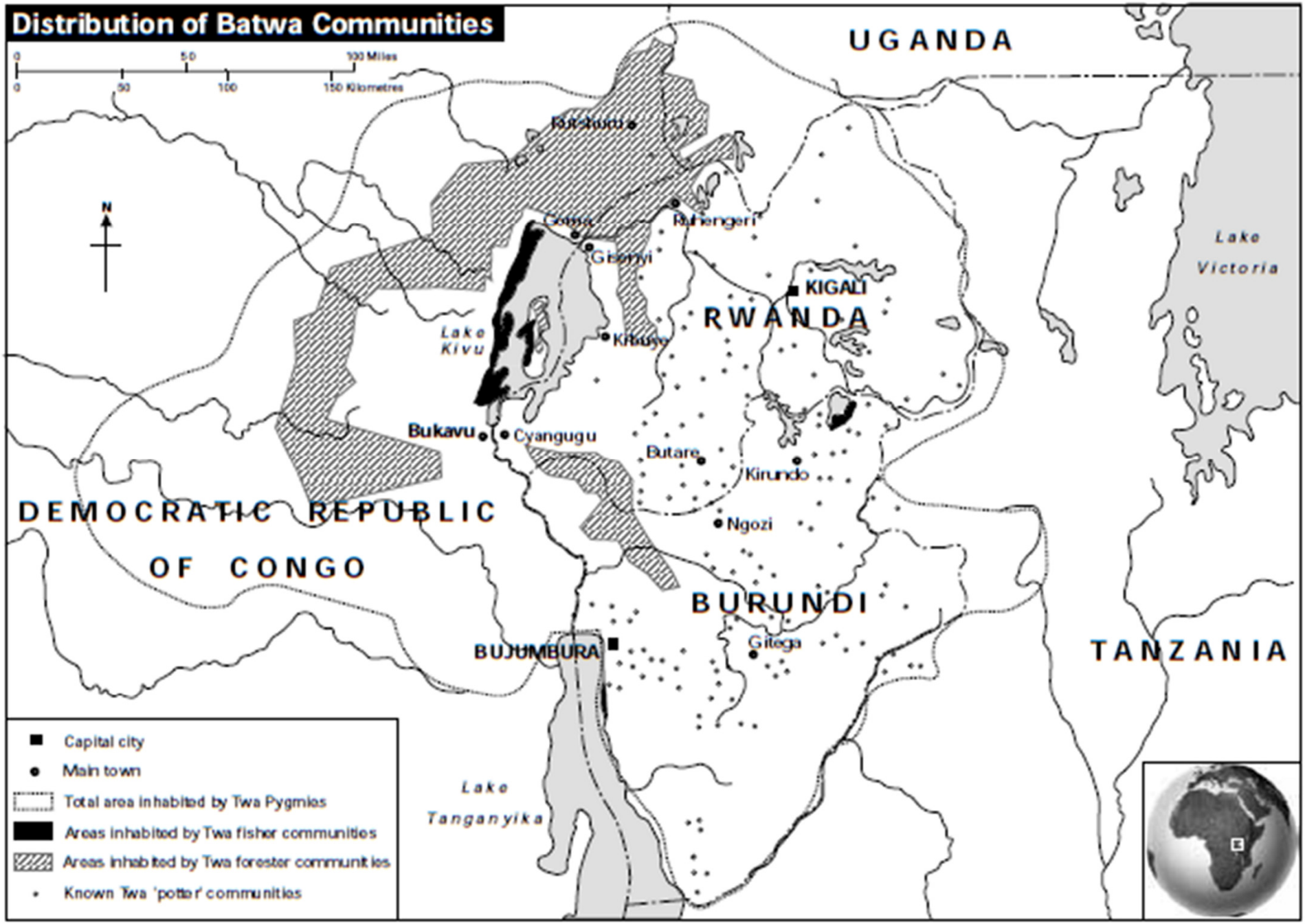

?
Great
Lakes
Twa
Mongo Twa
Kasai
Twa
Luba-Hemba
Twa
Mweru
Twa
Bangweulu
Twa

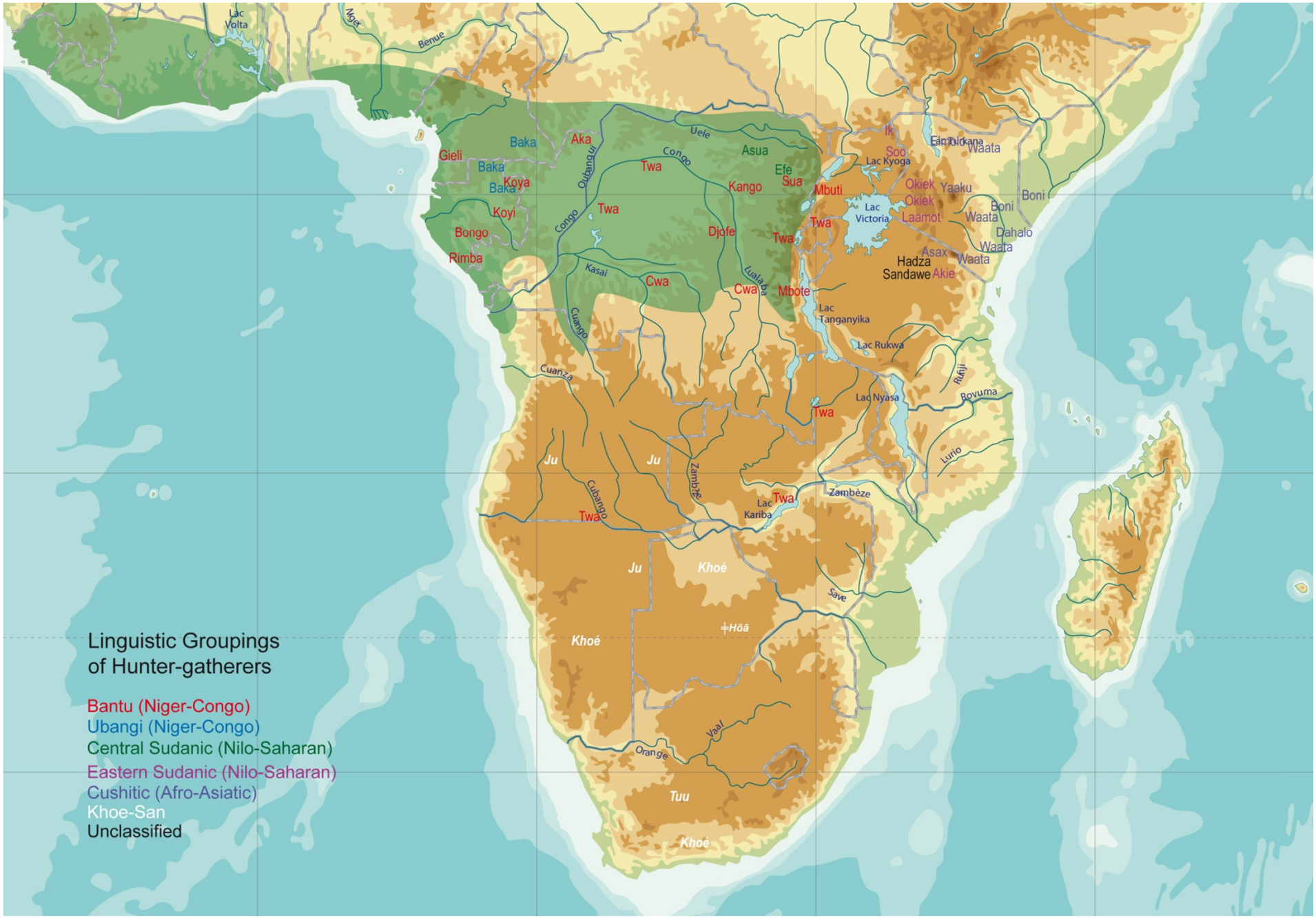

CENTRAL AFRICAN REPUBLIC
Medzan
CAMEROON
Bofi
Kola
Baka
Aka
EQUATORIAL GUINEA
Mbenzele
Asua
Efe
Mbuti-Sua
Nsua
Koya
GABON
UGANDA
DEMOCRATIC REPUBLIC OF THE CONGO
CONGO
Twa
RWANDA
Twa
Twa
Bongo
BURUNDI
Twa

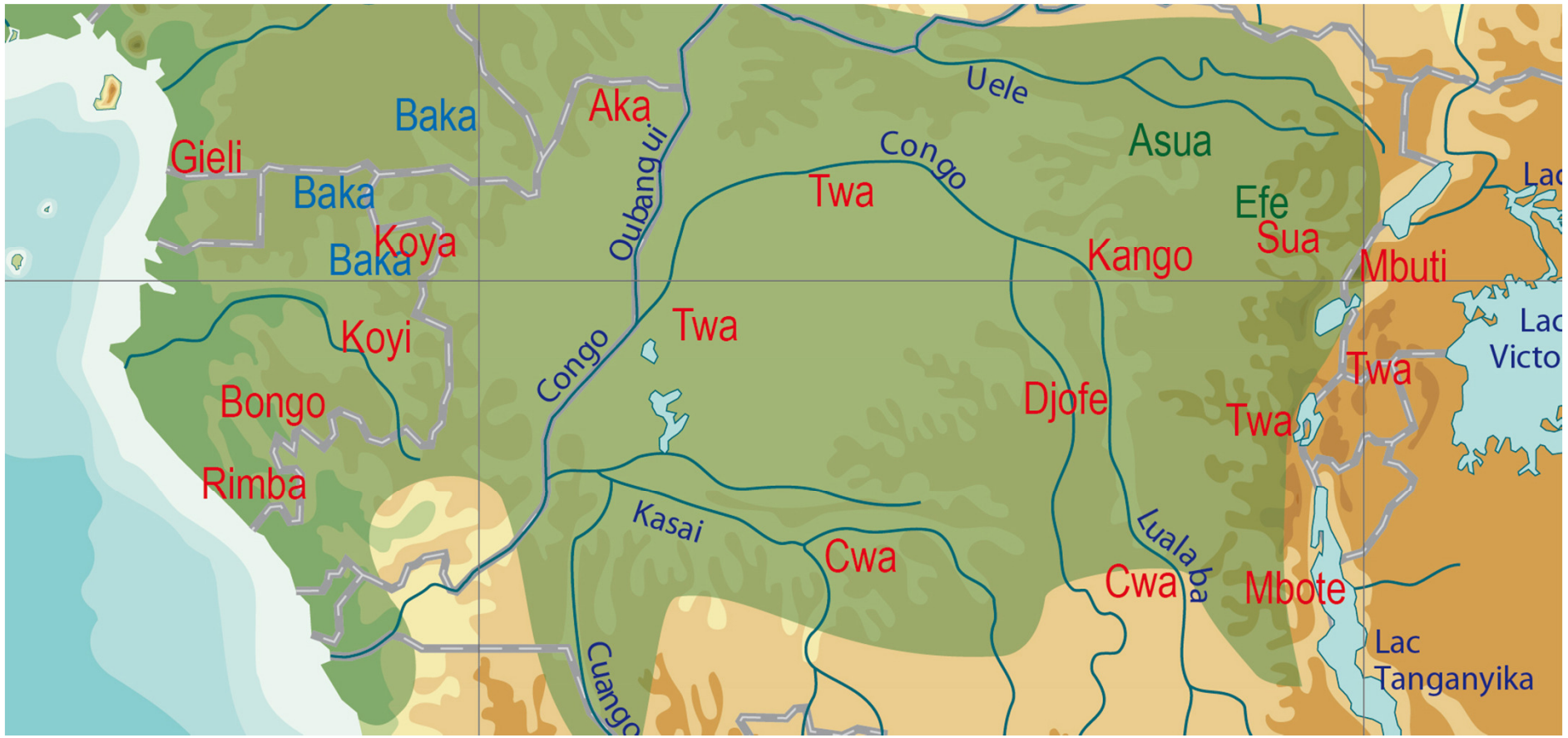

Bedzan
Mbenga
Gyele
Baka
Aka
Mbenzele
Kola
Mbuti
Asua
Efe
Kango
Mongo
Cwa
Bongo
Bongo
Cwa
Great
Lakes
Twa
Twa
Twa
Kasai
Cwa



Repartition des Pygmées Afrique centrale


Distribution of Batwa Communities
0
50
100 Miles
0
50
100
150 Kilometres
N
UGANDA
Fort Portal
Goma
Ruhengeri
Gisenyi
KIGALI
RWANDA
Lake Victoria
Lake Kivu
Kibuye
Bukavu
Cyangugu
Butare
Kirundo
Ngozi
DEMOCRATIC REPUBLIC
OF CONGO
BURUNDI
BUJUMBURA
Gitega
TANZANIA
Lake Tanganyika
Capital city
Main town
Total area inhabited by Twa Pygmies
Areas inhabited by Twa fisher communities
Areas inhabited by Twa forester communities
Known Twa 'potter' communities


Linguistic Groupings
of Hunter-gatherers
Bantu (Niger-Congo)
Ubangi (Niger-Congo)
Central Sudanic (Nilo-Saharan)
Eastern Sudanic (Nilo-Saharan)
Cushitic (Afro-Asiatic)
Khoe-San
Unclassified
Lac Volta
Benue
Gieli
Baka
Aka
Koya
Koyi
Bongo
Rimba
Oubangui
Congo
Uele
Asua
Efe
Sua
Twa
Kango
Djofe
Kasai
Cwa
Lualaba
Mbote
Cuango
Cuanza
Ju
Cubango
Zambèze
Lac Kariba
Khoé
Save
ǂHõã
Vaal
Orange
Tuu
Mbuti
Ik
Soo
Lac Kyoga
Okiek
Yaaku
Laamot
Waata
Boni
Dahalo
Asax
Hadza
Sandawe
Akie
Lac Victoria
Lac Tanganyika
Lac Rukwa
Lac Nyasa
Rovuma
Rufiji
Lurio


Baka
Aka
Gieli
Baka
Oubangui
Uele
Asua
Congo
Twa
Efe
Sua
Baka
Koya
Kango
Mbuti
Twa
Koyi
Congo
Djofe
Bongo
Twa
Twa
Rimba
Kasai
Lualaba
Cwa
Cwa
Mbote
Lac
Tanganyika

Ethnic Group	Approximate Population	Linguistic Family
Aka (Mbenzele dialectal subgroup)	35,000	Bantu
Asua	3,000	Sudanic
Efe	10,000	Sudanic
Baka (known as Bangombe in some areas)	40,000	Oubanguian
Bofi	3,000	Oubanguian
Bongo (also known as Akoa)	2,000	Bantu
Kola (also known as Gyeli)	3,500	Bantu
Mbuti-Sua	7,500	Bantu
Medzan (also known as Tikar)	250	Bantu
Nsua	1,000	Bantu
Twa (Ntomba region)	14,000	Bantu
Twa (Kasai region)	?	Bantu
Twa (Rwanda and Burundi region)	10,000	Bantu

Table 1. Major ethnolinguistic groups of Congo Basin hunter-gatherers.

Linguistic Classification of Pygmy groups

• Gyeli (Cameroon)	Bantu A80
• Baka (Cameroon, Gabon)	Ubangian
• Kola (Gabon)	Bantu B20
• Bongo (Gabon)	Bantu B30, 40, 50, 60, 70
• Aka (CAR, Congo)	Bantu C10
• Twa (Mongo) (DRC)	Bantu C60
• Cwa (Kuba) (DRC)	Bantu C80
• Bambote (Lake Tanganyika, DRC)	Bantu D20
• Sua-Mbuti (Ituri, DRC)	Bantu D30
• Twa (Rwanda, Uganda, DRC)	Bantu J60
• Cwa (Luba) (Katanga, DRC)	Bantu L30
• Sua-Efe (Ituri, DRC)	Central Sudanic
• Asua (Aka) (Ituri, DRC)	Central Sudanic

Genetic Study

- Large scale genetic study of North Western Bantu populations from 2002-2005 :
  (over 1000 samples from 18 ethnic groups and 5 pygmy groups)

- Interdisciplinary collaborations :
  genetics, linguistics, anthropology

- Choice of populations made on the basis of « historical » questions

- Choice of « subjects » on the basis of genealogies

- Data treated and analyzed in three laboratories
  (Franceville, Paris (Mt DNA), Barcelona (Y Chromo))

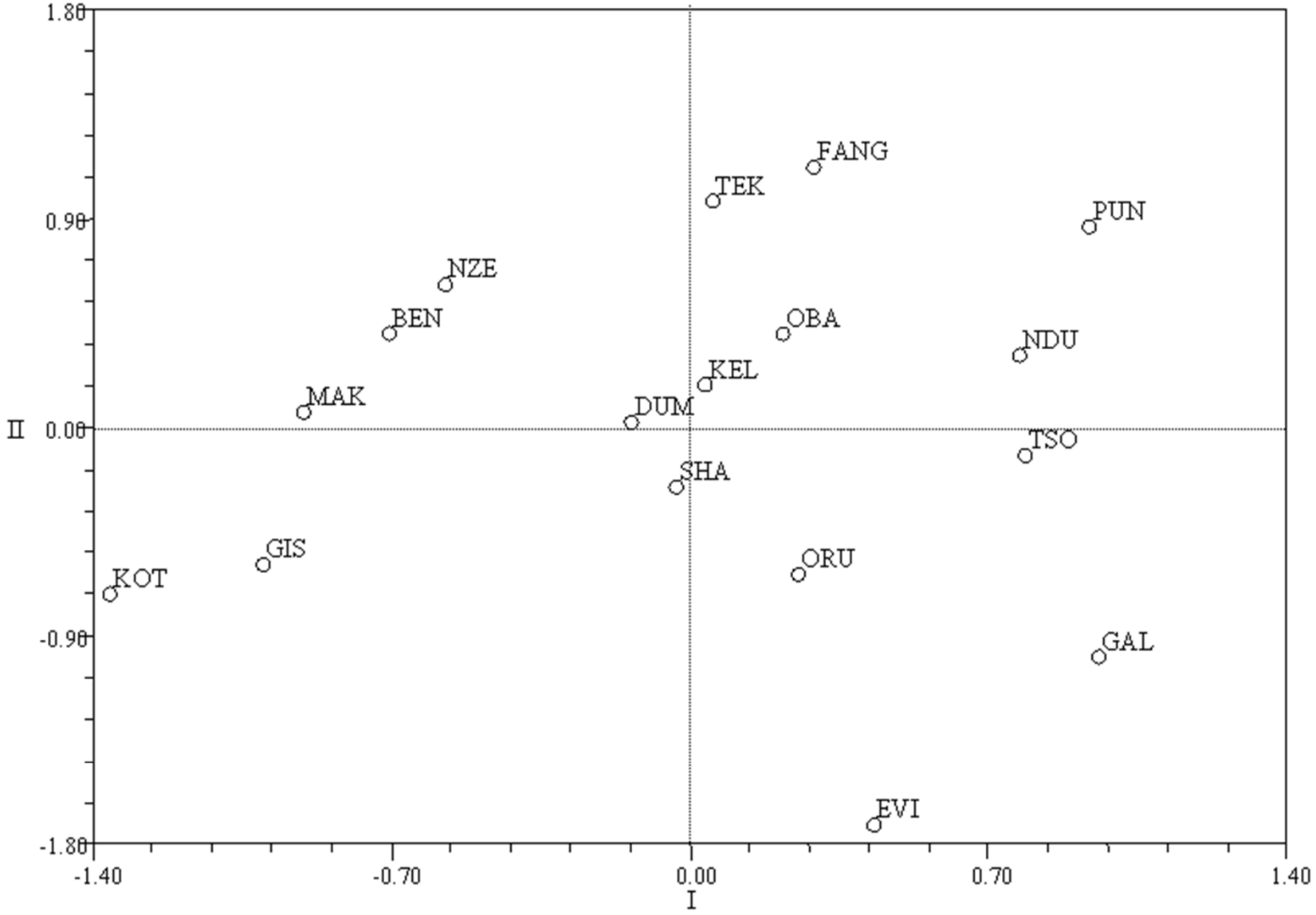
Publications

- Berniell-Lee, G., Calafell, F., Bosch, E., Heyer, E., Bertranpetit, J., Van der Veen, L., Hombert, J.M., Quintana-Murci, L. & Comas, D., 2009, "Genetic and demographic implications of the Bantu expansion: insights from human paternal lineages", *Molecular Biology and Evolution*, 26:7, pp. 1581-1589

- Patin, E., Laval, G., Barreiro, L., Salas, A., Semino, O., Santachiara-Benerecetti, S., Kidd, K., Kidd, J., Gessain, A., Van der Veen, L., Hombert, J.M., Froment, A., Heyer, E. & Quintana-Murci, L., 2009, "Origins and population dynamics of African farmers and Pygmy hunter-gatherers inferred from a multilocus resequencing dataset", *PLoS Genet*, 5:e1000448

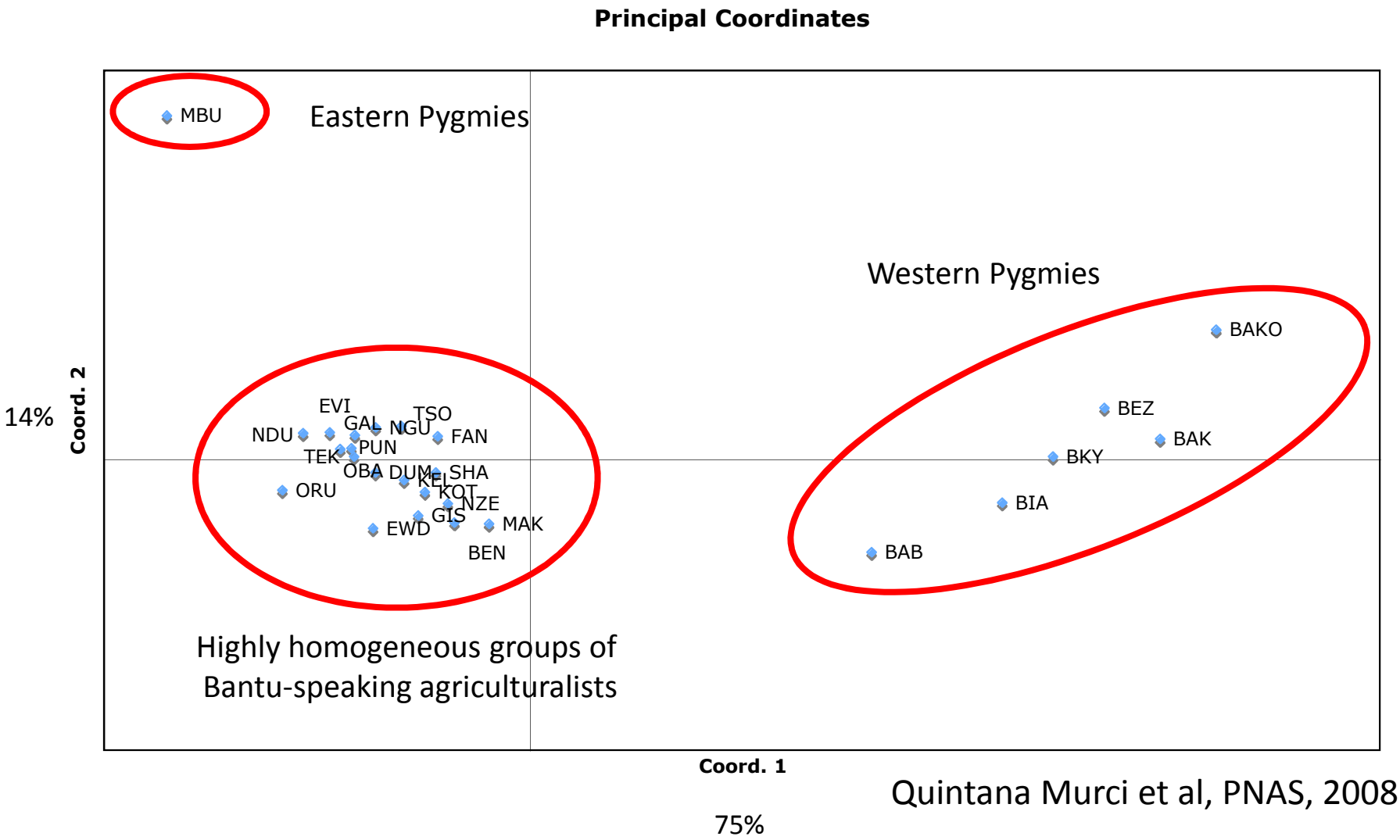
- Verdu, P., Austerlitz, F., Estoup, A., Vitalis, R., Georges, M., Théry, S., Froment, A., Lebomin, S., Gessain, A., Hombert, J.M., Van der Veen, L., Quintana-Murci, L., Bahuchet, S. & Heyer, E., 2009, "Origins and Genetic Diversity in Pygmy Hunter-Gatherers from Central Africa", *Current Biology*, 19:4, pp. 312-318

- Quintana-Murci, L., Quach, H., Harmant, C., Luca, F., Massonnet, B., Patin, E., Sica, L., Mouguiama-Daouda, P., Comas, D., Tzur, S., Balanovsky, O., Kidd, K., Kidd, J., Van der Veen, L., Hombert, J.M., Gessain, A., Verdu, P., Froment, A., Bahuchet, S., Heyer, E., Dausset, J., Salas, A. & Behar, D., 2008, "Maternal traces of deep common ancestry and asymmetric gene flow between Pygmy hunter-gatherers and Bantu-speaking farmers", *Proceedings of the National Academy of Sciences of the USA (PNAS)*, 105:5, pp. 1596-1601



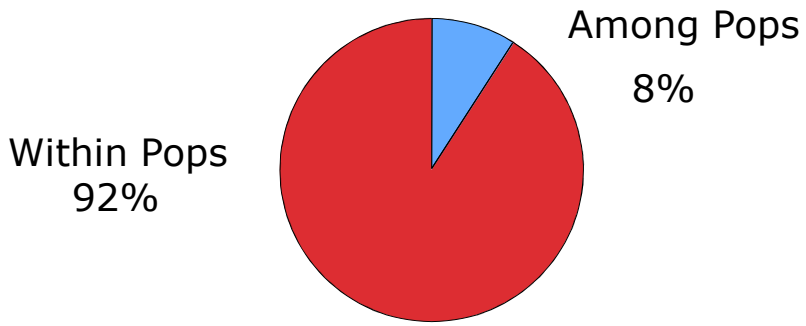
Quintana Murci et al, PNAS, 2008

Stress 0.10 Basal

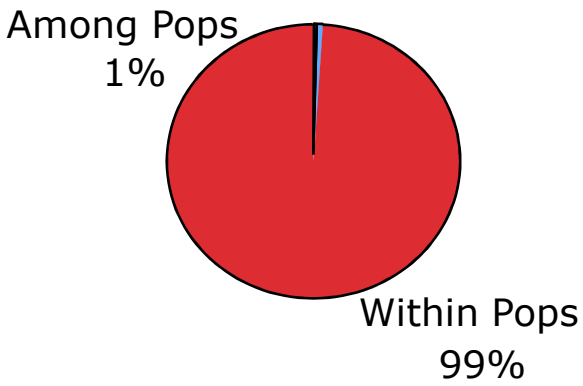


Quintana Murci et al, PNAS, 2008

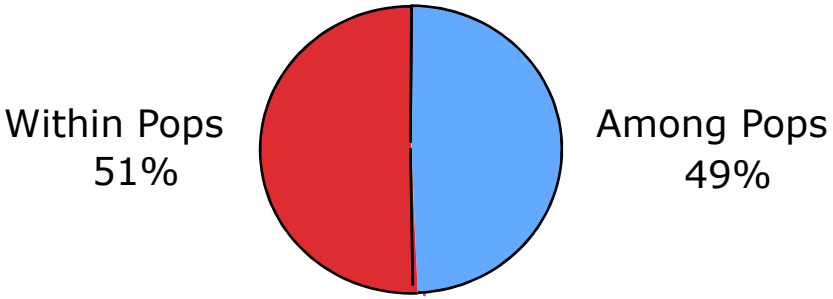
Percentages of Molecular Variance in the entire collection



Percentages of Molecular Variance in Bantu-speakers agriculturalists



Percentages of Molecular Variance in Pygmy hunter-gatherers



Quintana Murci et al, PNAS, 2008

Results from MtDNA analysis

- Three groups : Western pygmies, Eastern Pygmies (Mbuti) and Bantu populations
- Pygmy populations : low level of genetic diversity within pop but high inter-pop diversity
- Bantu populations : high level of internal genetic diversity but low levels of inter-pop diversity

Quintana-Murci et al

- MtDNA, 1404 individuals, 20 Bantu, 9 Pygmy
- L1c (« farmers » L1c, HG L1c1a)
- Initial divergence between « farmers » and HG at 70.000 BP
- Asymetric gene flow
- New contact at 40.000 BP

Berniell-Lee et al.

- 41 single nucleotide polymorphism, 18 STR
- 883 individuals, 22 « farmers », 3 HG
- Early paternal traces erased by neolithic expansion
- Presence of R1b1 : trace of southward expansion (before Bantu migrations)

Verdu et al.

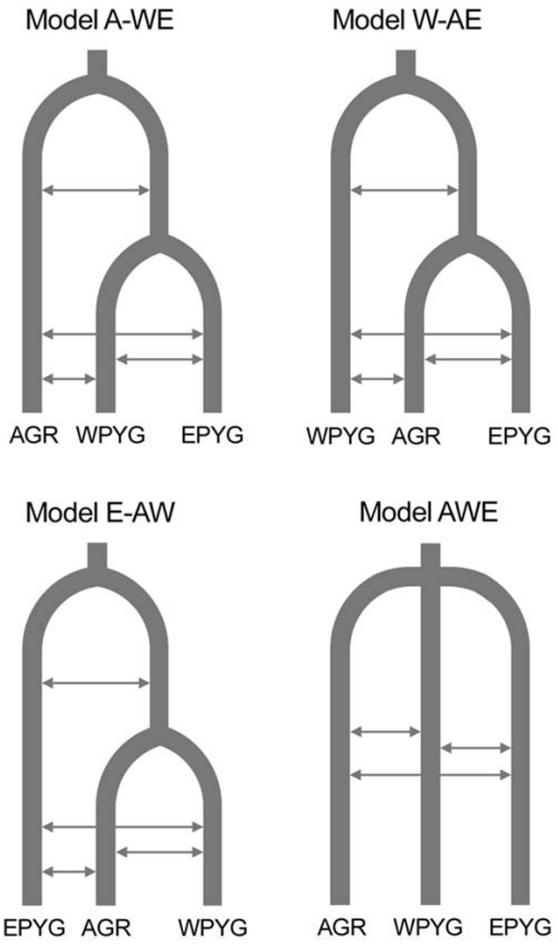
- 28 autosomal tetranucleotide microsatellite loci
- 604 individuals, 12 « farmers » and 9 HG
- ABC
- Diversification of HG around 2800 BP

Patin et al.

- 24 independant non coding regions (33 kb/individual in 236 samples
- 5 « farmers » and 7 HG
- Separation between two groups about 60.000 years ago
- Separation between EHG and WHG about 20.000 years ago

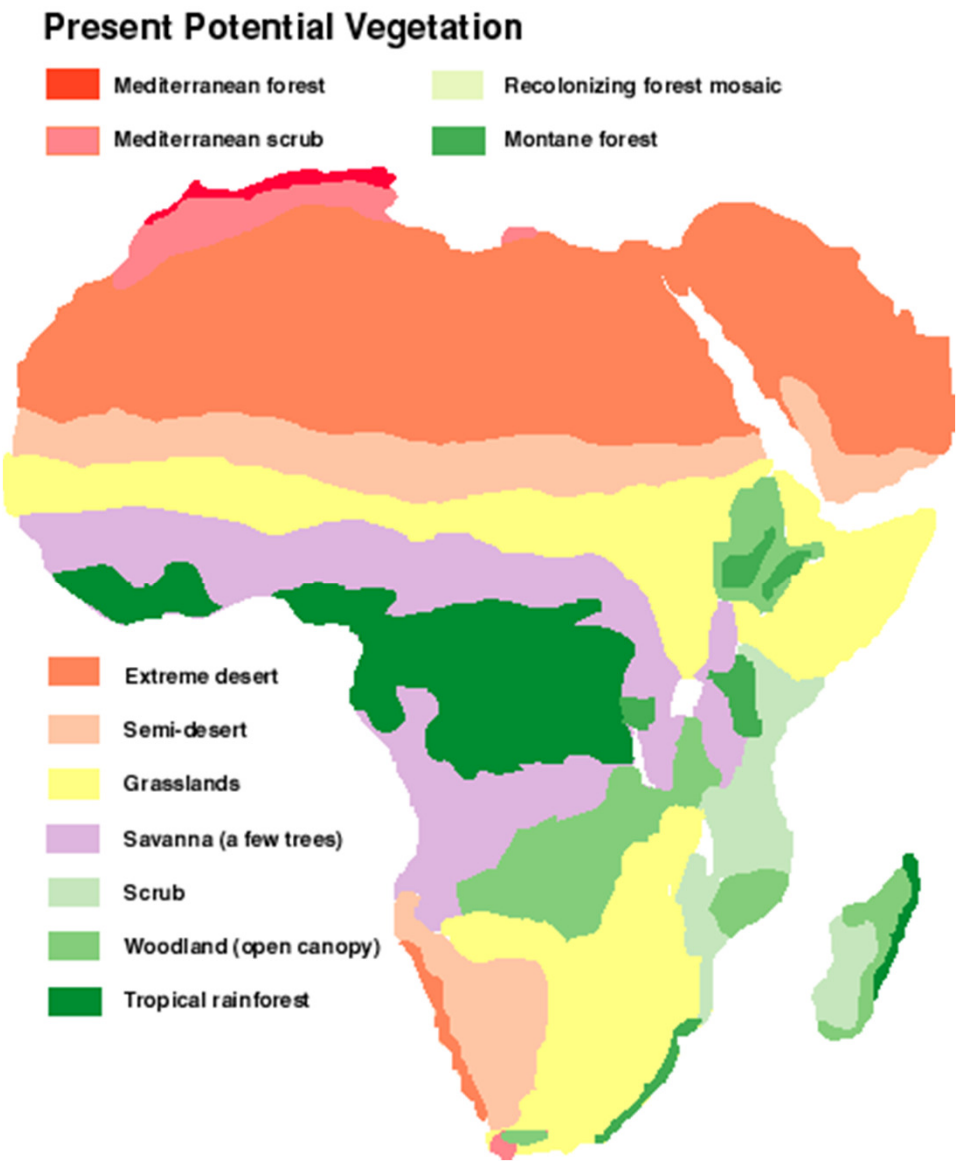
Molecular studies on Bantu migrations

- Bantu language dispersal involves human migrations
- Y-chromosomal diversity in Bantu populations is much lower than mtDNA diversity
- Haplogroups: E3a* and E3a7 (larger than Bantu)
- Role of patrilocality and polygyny (Bantu speaking males marrying local women): L1c1a1a (« pygmy ») and L0d (Ju speaking)

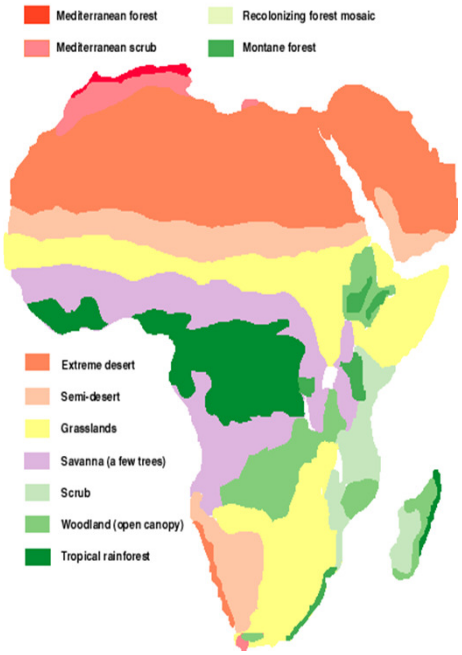

Model A-WE
AGR
WPYG
EPYG
Model W-AE
WPYG
AGR
EPYG
Model E-AW
EPYG
AGR
WPYG
Model AWE
AGR
WPYG
EPYG

Chronological data

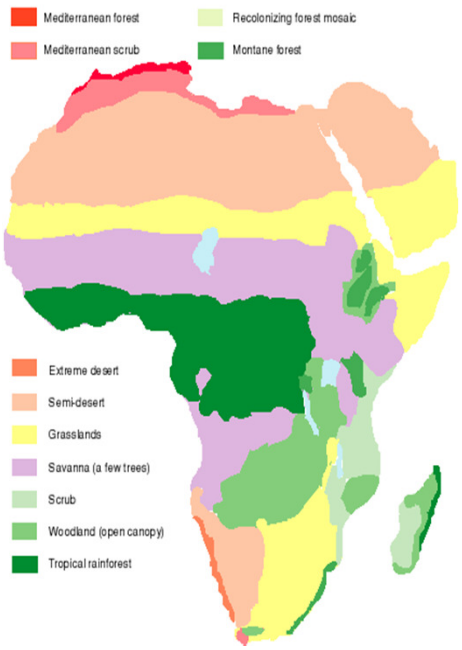
- 70.000 BP: Separation between « Bantu ancestors » and « Pygmy » ancestors
- 20.000 BP: Separation between eastern and western Pygmies
- 3.000 BP: Separation of Western Pygmy groups


Present Potential Vegetation
Mediterranean forest
Mediterranean scrub
Recolonizing forest mosaic
Montane forest
Extreme desert
Semi-desert
Grasslands
Savanna (a few trees)
Scrub
Woodland (open canopy)
Tropical rainforest

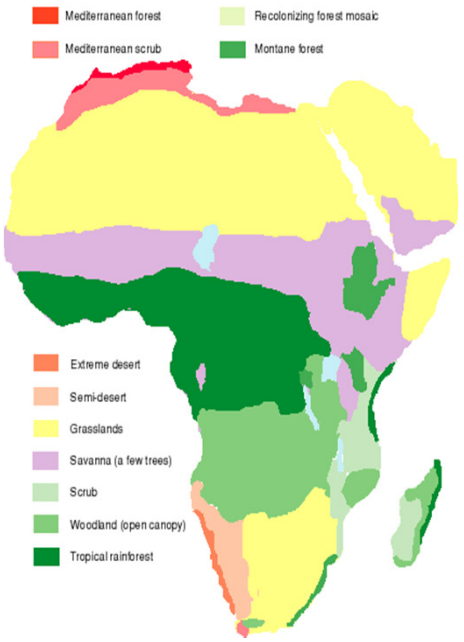
Present Potential Vegetation



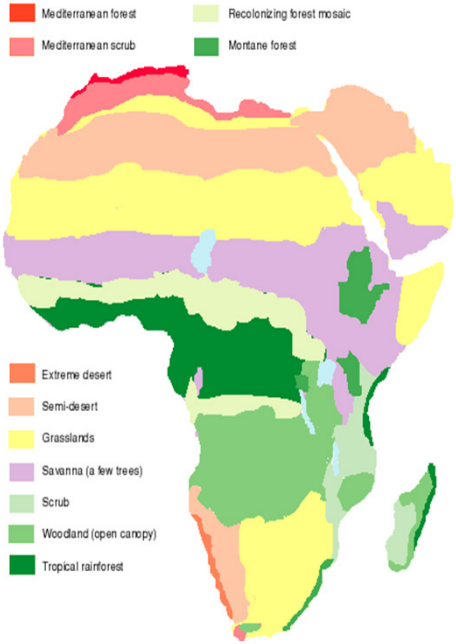
5,000 ^{14}C years ago



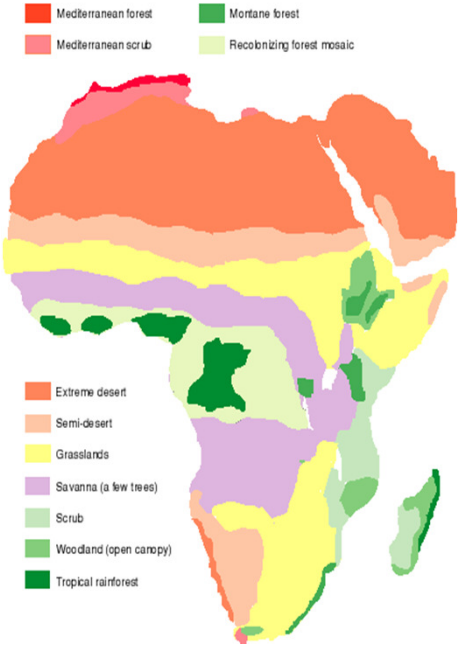
8,000 – 7,000 ^{14}C years ago



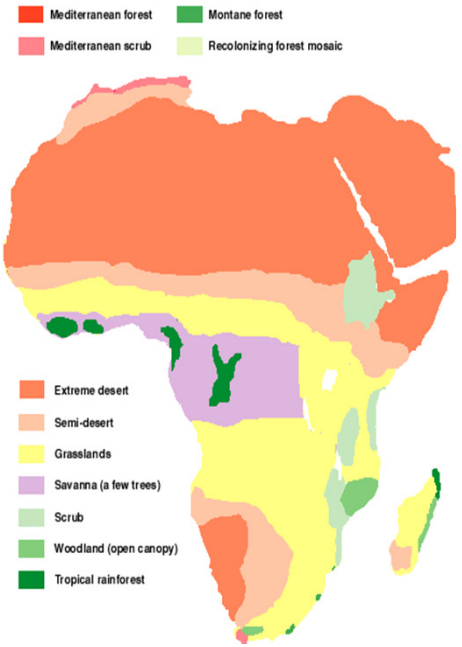
9,000 ^{14}C years ago



11,000 ^{14}C years ago



20,000 - 16,000 ^{14}C years ago



Agriculture and population size

- Great demographic impact (Hassan)
- 10 km2 for one hunter- gatherer
- 10 agriculturalists per km2

- Ratio : 1 to 100

Agriculture vs. Hunting-gathering

- Higher food yields per area
  (higher population density)
- Sedentarism (storage of food)
- Higher resistance to diseases (smallpox, measles)

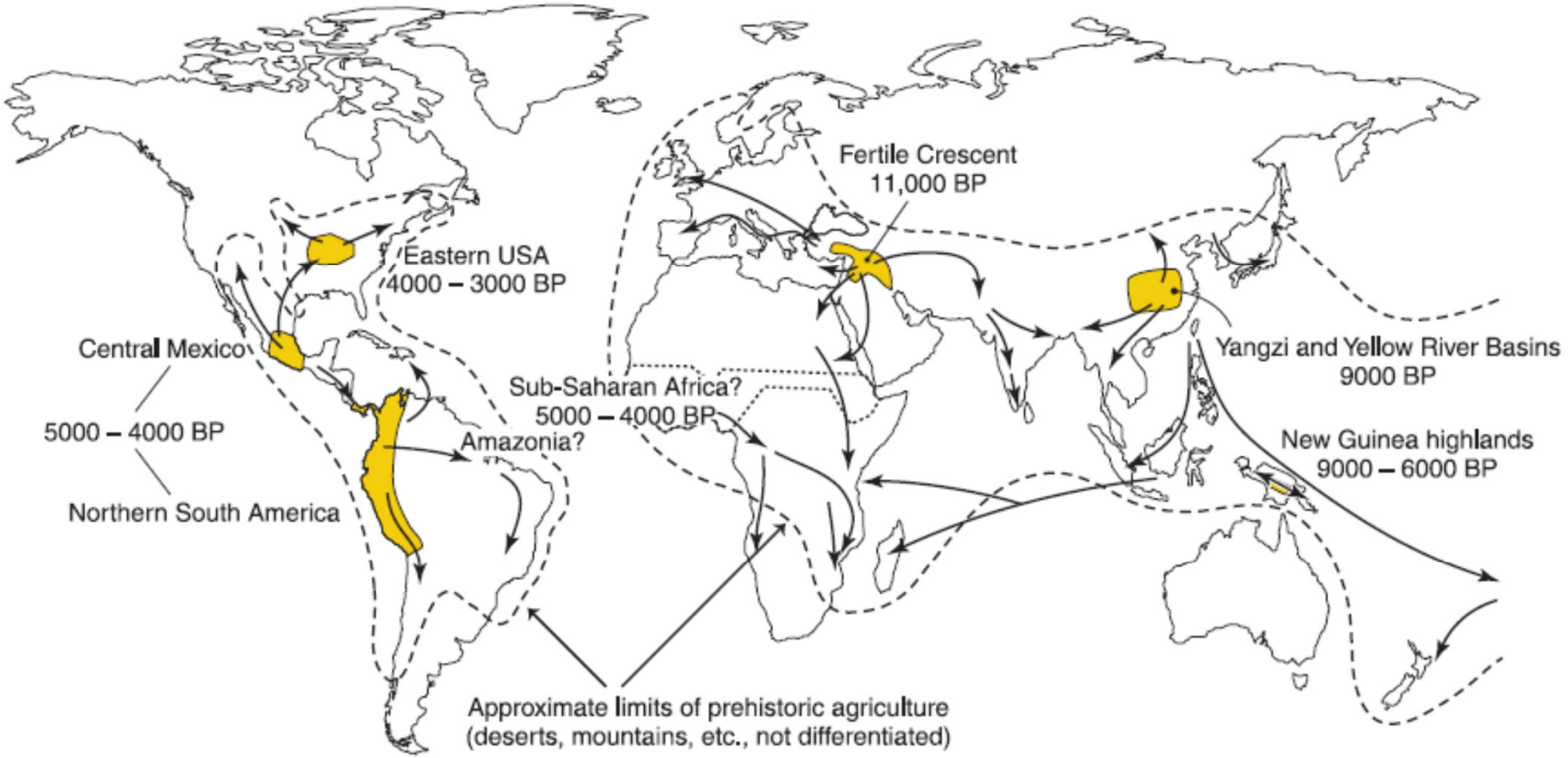


Fig. 1. Archaeological map of agricultural homelands and spreads of Neolithic/Formative cultures, with approximate radiocarbon dates.

Diamond and Bellwood, Science 2003

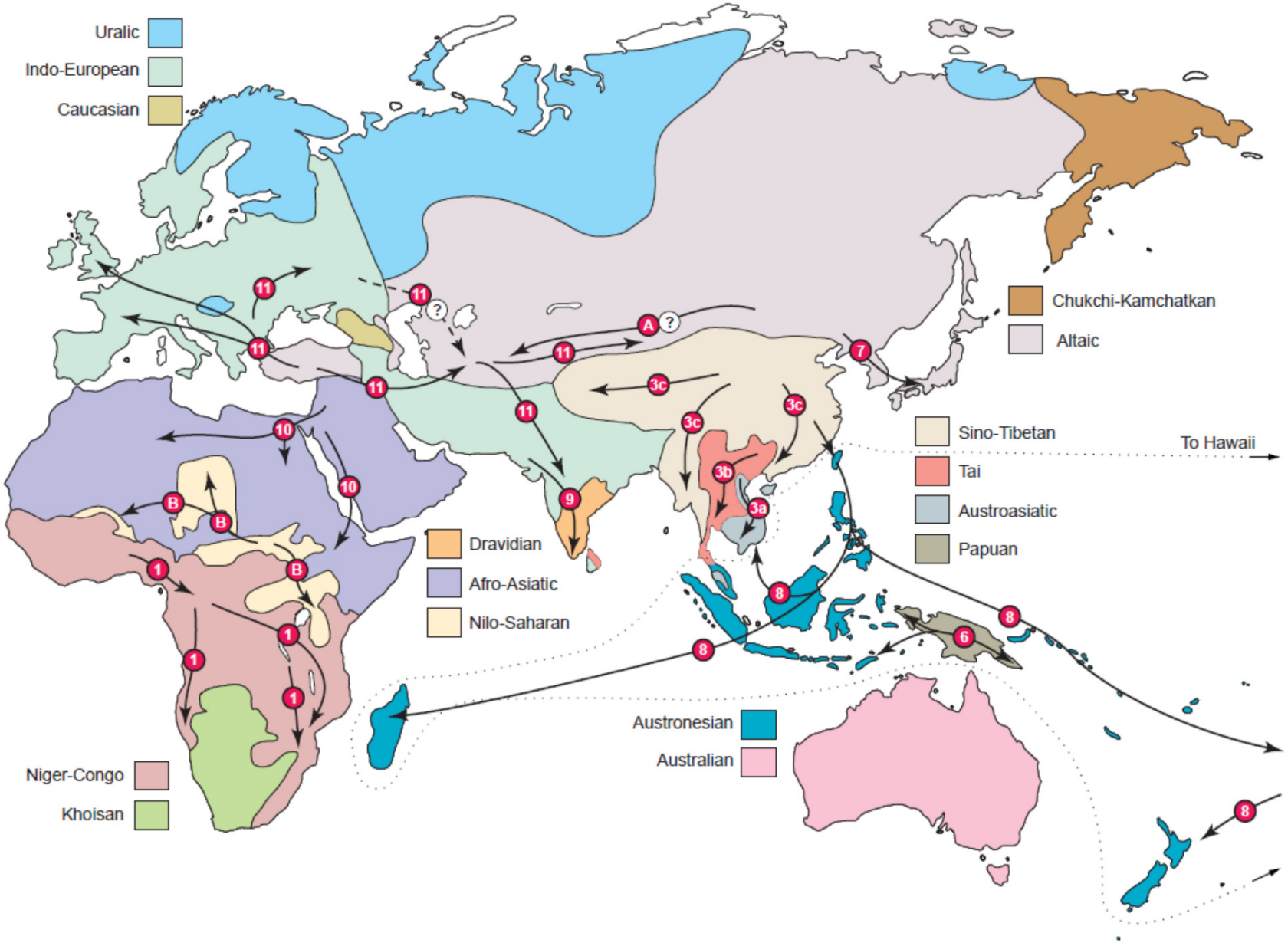
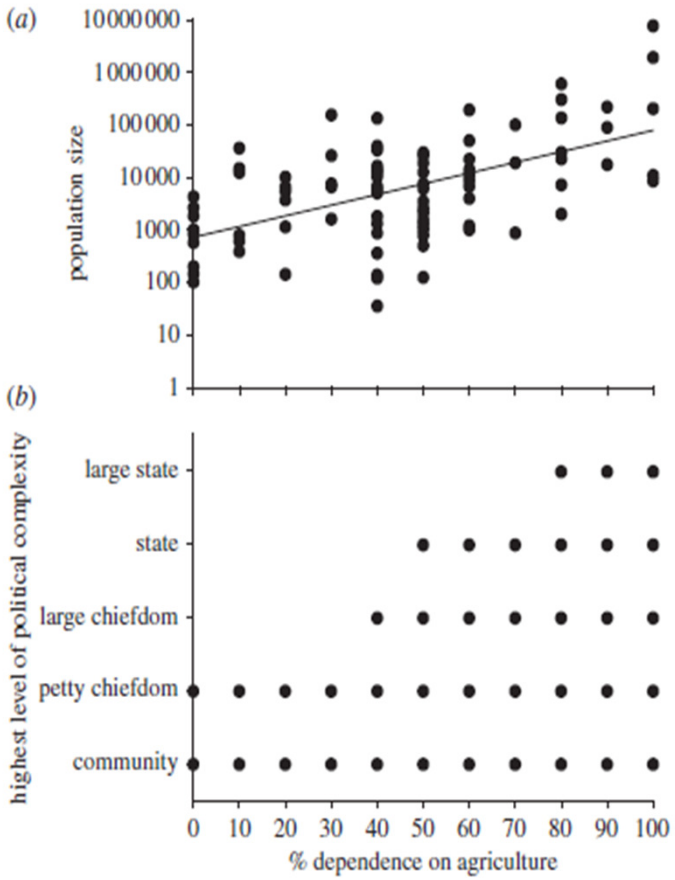


Fig. 2. Language families of the Old World and their suggested expansions. Map based on information in (*87*) and other sources. Numbered examples discussed in text are 1 (Bantu), 3a to 3c (Austro-Asiatic, Tai, and Sino-Tibetan, respectively), 6 (Trans New Guinea), 7 (Japanese), 8 (Austronesian), 9 (Dravidian), 10 (Afro-Asiatic), 11 (Indo-European). Other possible examples mentioned only briefly: A (Turkic), B (Nilo-Saharan).

Diamond and Bellwood, Science 2003

Population size and political complexity as a function of agriculture



Walker and Hamilton, 2010

Synthesis and possible explanations

- 70.000 BP: Separation between « Bantu ancestors » and « Pygmy » ancestors

(because of climatic change or volcanic winter (Toba eruption))?

- 20.000 BP: Separation between eastern and western Pygmies

(because of Equatorial forest split?)

- 3.000 BP: Separation of Western Pygmy groups

(because of increasing Bantu populations : climatic change, agriculture)