BIOGEOGRAFIJA

PORIJEKLO KULTIVIRANIH BILJAKA

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https://www.linkedin.com/pulse/smart-crop-cultivation-planning-using-data-analytics-senzagrotech

Nikolai Ivanovič Vavilov (1887-1943)

- primarna središta genetičke raznolikosti = središta porijekla kult. bilj. vrsta
→ 8 središta
(1926. g. “Istraživanja porijekla kultiviranih biljaka”):

I. kineski centar

II. indijski i indo-malezijski c.

III. centralno-azijski c.

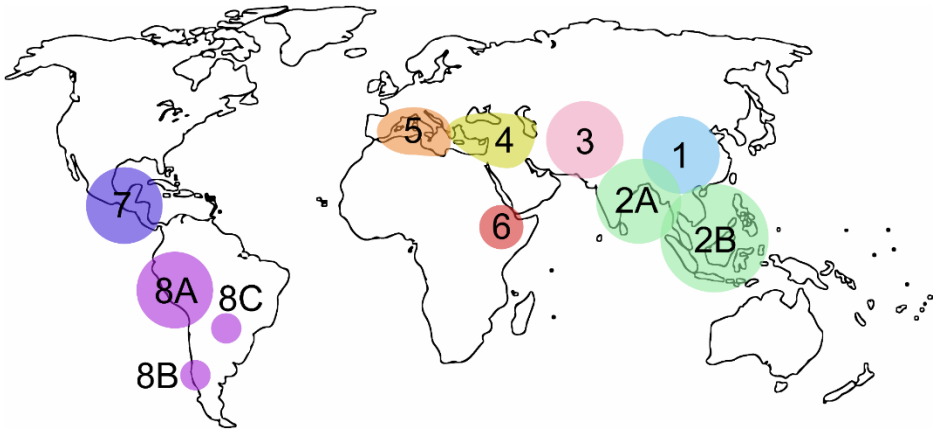
IV. maloazijski c.

V. mediteranski c.

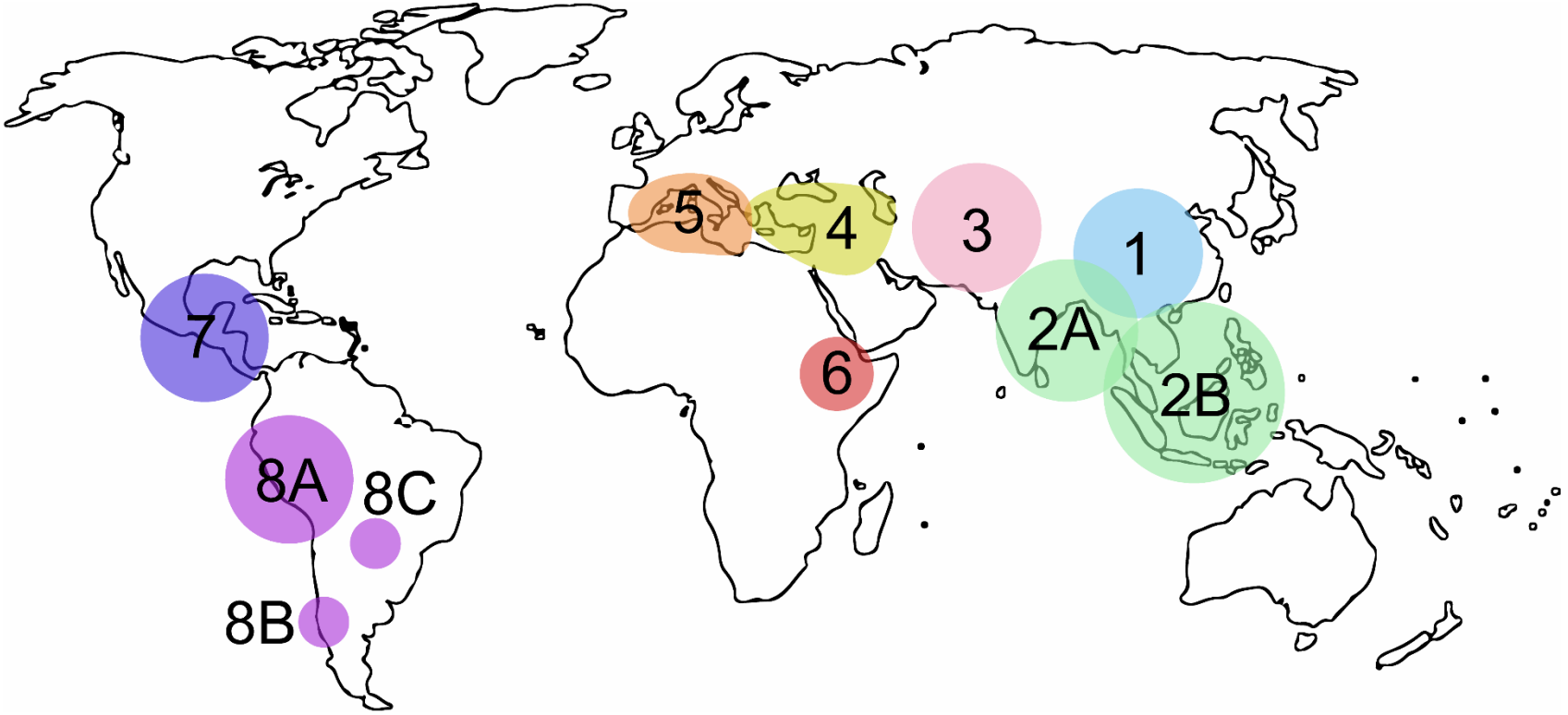
VI. etiopski c.

VII. južno-meksički i srednje-američki c.

VIII. južno-američki (peruansko-ekvadorsko-bolivijski c.)



- 1934. g. uvodi sekundarna središta raznolikosti odn. porijekla
- primarni i sekundarni usjevi



The centers of origin of cultivated plants identified by Nikolai Vavilov:

1. China;
2. the Indo-Malayan region;
3. Central Asia (including Pakistan, Punjab, Kashmir, Afghanistan and Turkestan);
4. the Near East (Fertile Crescent);
5. the Mediterranean;
6. Ethiopia;
7. Southern Mexico and Central America;
8. South America (small regions of Ecuador, Peru, Bolivia, Chile, and Brazil-Paraguay).

- moderna, recentna istraživanja **nisu potvrdila Vavilovljevu teoriju** → potvrdila su središta raznolikosti, ali ona često nisu ujedno i središta porijekla

1) Vavilov je postavio tezu kako su područja s najvećom genetičkom raznolikošću vrsta ujedno i područje podrijetla tih vrsta.

Moderna istraživanja pokazala su da brojne kultivirane vrste imaju različita područja genetičke raznolikosti i podrijetla/udomaćivanja (npr. kukuruz i rajčica).

2) Prema Vavilovu, centri podrijetla kultiviranih biljaka u tropskom i suptropskom području limitirani su na gorske i brdske krajeve.

Moderna istraživanja sugeriraju da su nizine također područja podrijetla mnogih kult. biljaka.

3) Danas je poznato da *nekoliko kultura ima drugačije središte podrijetla od onoga što je sugerirao Vavilov*.

4) Osim toga, za mnoge kultivirane vrste *nije moguće utvrditi područje iz kojeg potječu* zbog nedostatka podataka.

5) Prema Vavilovu primarni centar obilježen je visokom učestalošću dominantnih alela prema centru i recesivnih prema periferiji. *Ali ovo stajalište nije prihvatljivo prema najnovijim saznanjima.*

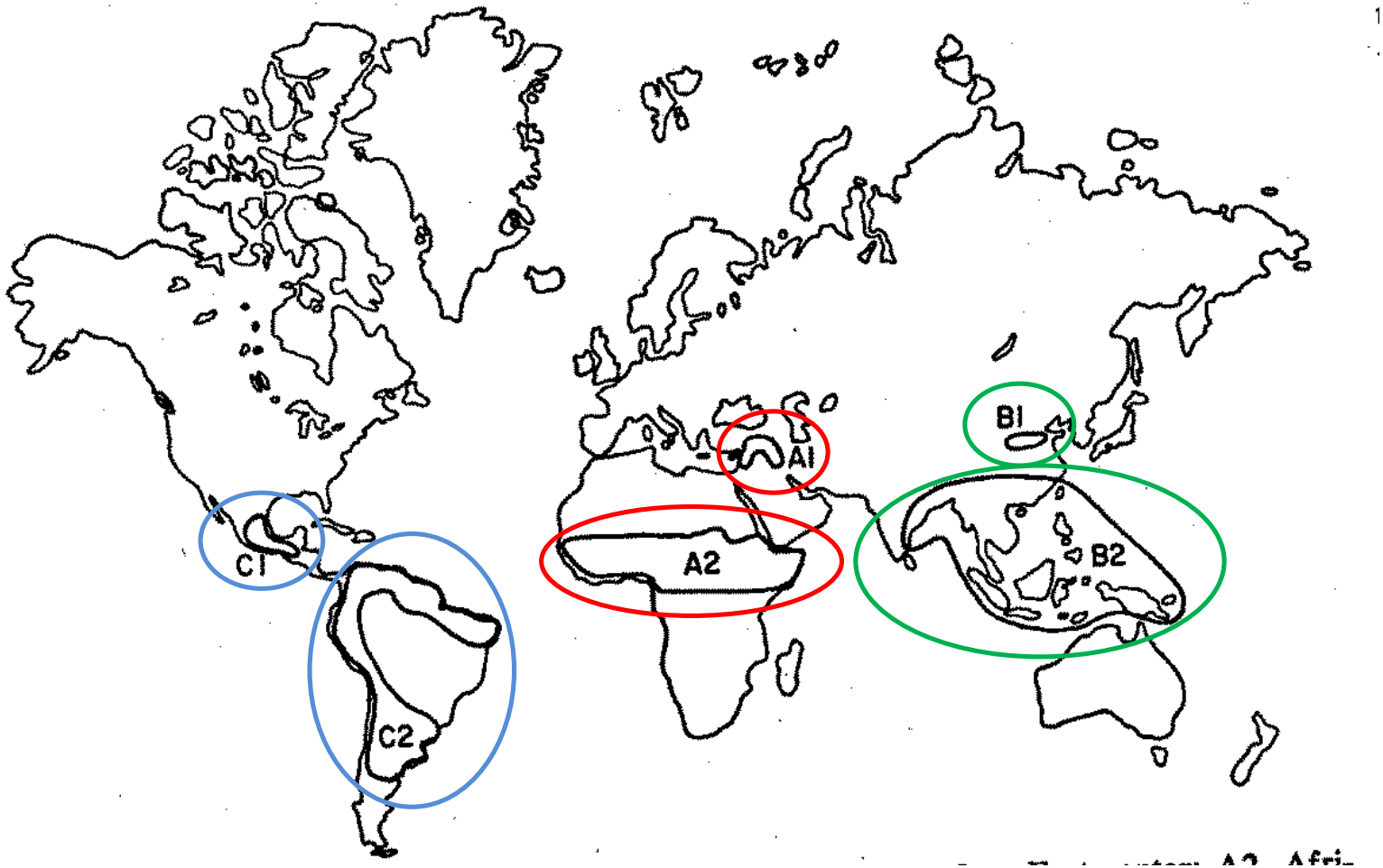
Jack Rodney Harlan (1917 – 1998)

- Vavilovljeva središta raznolikosti i središta porijekla kult. bilj. vrsta ujedno su i središta dugotrajnih poljodjelskih kultura i aktivnosti → mogu, ali i ne moraju predstavljati središta razvoja ili domestikacije kultura
- poljoprivreda se razvila u 3 neovisna područja sastavljena od središta i "nesredišta" ("noncenter") – velika raspršena područja za koja se pretpostavlja da je u njima započela domestikacija (regionalno porijeklo kult. vrsta):

A) Bliski Istok + Afrika
B) Kina + Jugoistočna Azija
C) Srednja Amerika + Južna Amerika

- središte i "nesredište" međusobno su povezani, a kulture ne moraju nužno potjecati iz središta, niti se poljoprivreda nužno razvila u zemljopisnom "središtu" (1971. g. "Porijeklo poljoprivrede: središta i nesredišta")

- moderna, recentna istraživanja pokazuju da su ova središta rasuta i više od Harlanove pretpostavke → prihvatljivija teorija o regionalnom porijeklu (ili čak više područja razvoja) kultura, nego teorija o jedinstvenom, lokaliziranom porijeklu mnogih usjeva



- 3 središta i “nesredišta” (“noncenter”) prema Harlanu:
  - A) Bliski Istok + Afrika
  - B) Kina + Jugoistočna Azija
  - C) Srednja Amerika + Južna Amerika

(„revidirani Vavilov”)

Center	*Remarks*
1. China	136 crops were domesticated in this region including rice, sorghum, soybeans, barley, radish, cabbage, mustard, onion, cucumber, pear, apple, apricot, peach, cherry, walnut, litchi, sugarcane, and poppy. Rice was one of the first crop (~ 8,000 years ago) cultivated in the Yangtze River Valley. Pigs, roosters, and dogs were also domesticated here.
2a. Indo-Malay	This region includes parts of India, parts of China and the Malay Archipelago. Here, clove, nutmeg, black pepper, coconut, hemp, banana, grapefruit, reed and velvet beans were domesticated.
2b. Indo-Burma	This center includes North-East region of India and present day Myanmar (Burma). Here, ~117 crops including jute, sandalwood, indigo, bamboo, neem, rice, gram, pigeon pea, mung, cowpea, eggplant, cucumber, radish, carrot, mango, orange, lemon, tamarind, coconut, banana, hemp, pepper, cloves, nutmeg, reed, sesame, and cotton were domesticated.
3. Central Asia	This center includes North-Western India (Punjab, Haryana, and Kashmir provinces), Pakistan, Afghanistan, Tajikistan, and Uzbekistan. ~ 43 crops developed in this area, including three varieties of wheat, peas, lentils, horse lentil, gram, mung bean, mustard, linseed, sesame, cotton, hemp, onions, garlic, spinach, carrots, pistachio, almond grapes, pears and apples.

https://open.oregonstate.education/cultivatedplants/chapter/cropplants/

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4. Near East (Fertile Crescent)	This center includes present day Turkey, Israel, Syria, Jordan, Lebanon, Iran, Iraq, Turkmenistan and the interiors of Asia Minor. ~ 150 crops including rye, barley, oats, Einkorn wheat, Durum wheat, Persian wheat, Pollard wheat, common Bread Wheat, Oriental wheat, lentils, lupine, peas, gram, pomegranate, mulberry, apple, grapes, pears, cherries, walnut, almonds, pistachios, dates, fennel, cumin, carrots, onions, and garlic were domesticated in this region. ~ 10,000 year old fossils of rye have been found at many archeological sites in this area. Evidence of earliest rye cultivation ~13,000 years ago has been found in Syria and the remains of ~ 9000 year old domesticated sheep, goats and pigs have been found in Turkey.
5. Mediterranean	This center includes regions around the Mediterranean Sea. Here, 84 crops including durum wheat, Emmer wheat, Polish wheat, oats, peas, lupine, clover, black mustard, olives, beets, cabbage, turnip, lettuce, asparagus, rhubarb, mint, hop, sage, celery, etc. were domesticated.
6. Ethiopian Center	This center includes Abyssinia, Eretria, Somaliland, and Ethiopia. 38 important crop plants including Abyssinian and emmer varieties of wheat, millet, sorghum, cowpea, flaxseed, tef, sesame, coffee, okra, indigo, castor, and gum Arabica were domesticated in this region.

7. Southern Mexico and Central America	This center includes Southern Mexico, Guatemala, Honduras and Costa Rica. Here, maize, potato, tomato, pumpkin, capsicum, chili, papaya, guava, cashew, chocolate, cotton, passion flower, tobacco, various beans, sisal, sweet potato, arrowroot etc. were domesticated. in this region, ~7000-year-old remains of maize and 10,000-8,000 years old seeds of squash have been found in the archaeological excavation.
8a. Peru, Ecuador, Bolivia Sub center (South America)	In this region, 62 species of crop plants including potatoes, maize, lima beans, tomatoes, pumpkin, capsicum, cotton, guava, passion flower, tobacco etc. were domesticated.
8b. Chile (South America)	Several varieties of potato and strawberry were domesticated in this center.
8c. Brazilian-Paraguay (South America)	Peanuts, pineapples, cashew nuts, Brazil nuts, rubber, etc. developed here.
9. New Guinea* (Far East)	Recent research proves that ~ 7000 years ago, agriculture started independently in the mountainous region of New Guinea. In this area, bananas, reeds etc. developed.

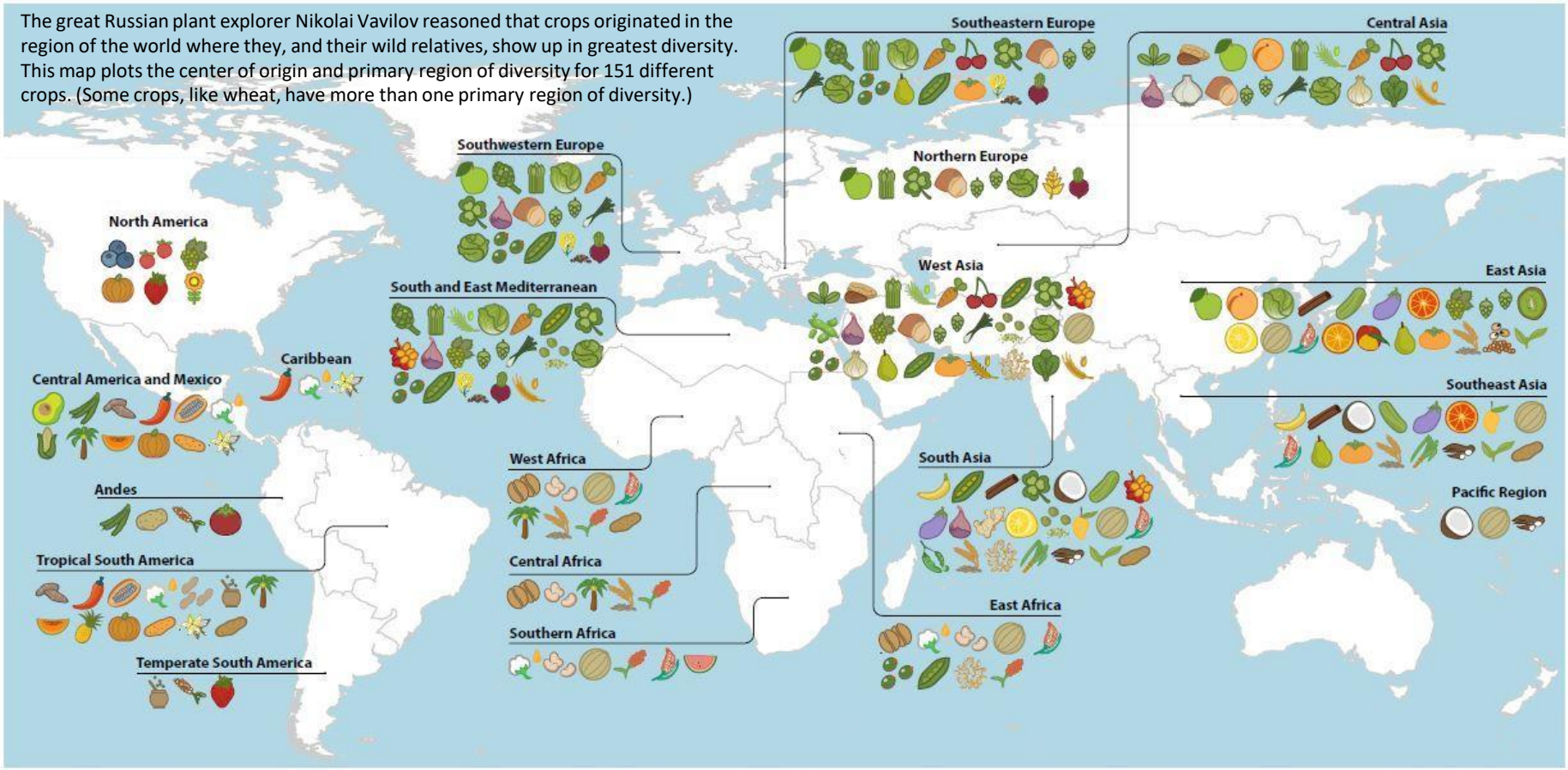
*This center was identified after Vavilov death.

ORIGINS AND PRIMARY REGIONS OF DIVERSITY OF AGRICULTURAL CROPS

Khoury CK, Achicanoy HA, Bjorkman AD, Navarro-Racines C, Guarino L, Flores-Palacios X, Engels JMM, Wiersema JH, Dempewolf H, Sotelo S, Ramírez-Villegas J, Castañeda-Álvarez NP, Fowler C, Jarvis A, Rieseberg LH, and Struik PC (2016). Origins of food crops connect countries worldwide. Proc. R. Soc. B 283: 20160792. DOI: 10.1098/rspb.2016.0792.

CIAT
International Center for Tropical Agriculture
Since 1967 Science to cultivate change

The great Russian plant explorer Nikolai Vavilov reasoned that crops originated in the region of the world where they, and their wild relatives, show up in greatest diversity. This map plots the center of origin and primary region of diversity for 151 different crops. (Some crops, like wheat, have more than one primary region of diversity.)



- Alfalfa
- Almonds
- Apples
- Apricots
- Artichokes
- Asparagus
- Avocados
- Bananas & plantains
- Barley
- Beans
- Blueberries
- Cabbages
- Carrots
- Cassava
- Cherries
- Chickpeas
- Chillies & peppers
- Cinnamon
- Clover
- Cocoa beans
- Coconuts
- Coffee
- Cottonseed oil
- Cowpeas
- Cranberries
- Cucumbers
- Dates
- Eggplants
- Faba beans
- Figs
- Garlic
- Ginger
- Grapefruit
- Grapes
- Groundnut
- Hazelnuts
- Hops
- Kiwi
- Leeks
- Lemons & limes
- Lentils
- Lettuce
- Maize
- Mangoes
- Mate
- Melons
- Millets
- Oats
- Olives
- Onions
- Oranges
- Palm oil
- Papayas
- Peaches & nectarines
- Pears
- Peas
- Pigeonpeas
- Pineapples
- Plums
- Potatoes
- Pumpkins
- Quinoa
- Rape & mustard seed
- Rice
- Rye
- Sesame
- Sorghum
- Soybean
- Spinach
- Strawberries
- Sugar beet
- Sugarcane
- Sunflower
- Sweet potatoes
- Taro
- Tea
- Tomatoes
- Vanilla
- Watermelons
- Wheat
- Yams

https://alliancebioversityciat.org/origin-crops

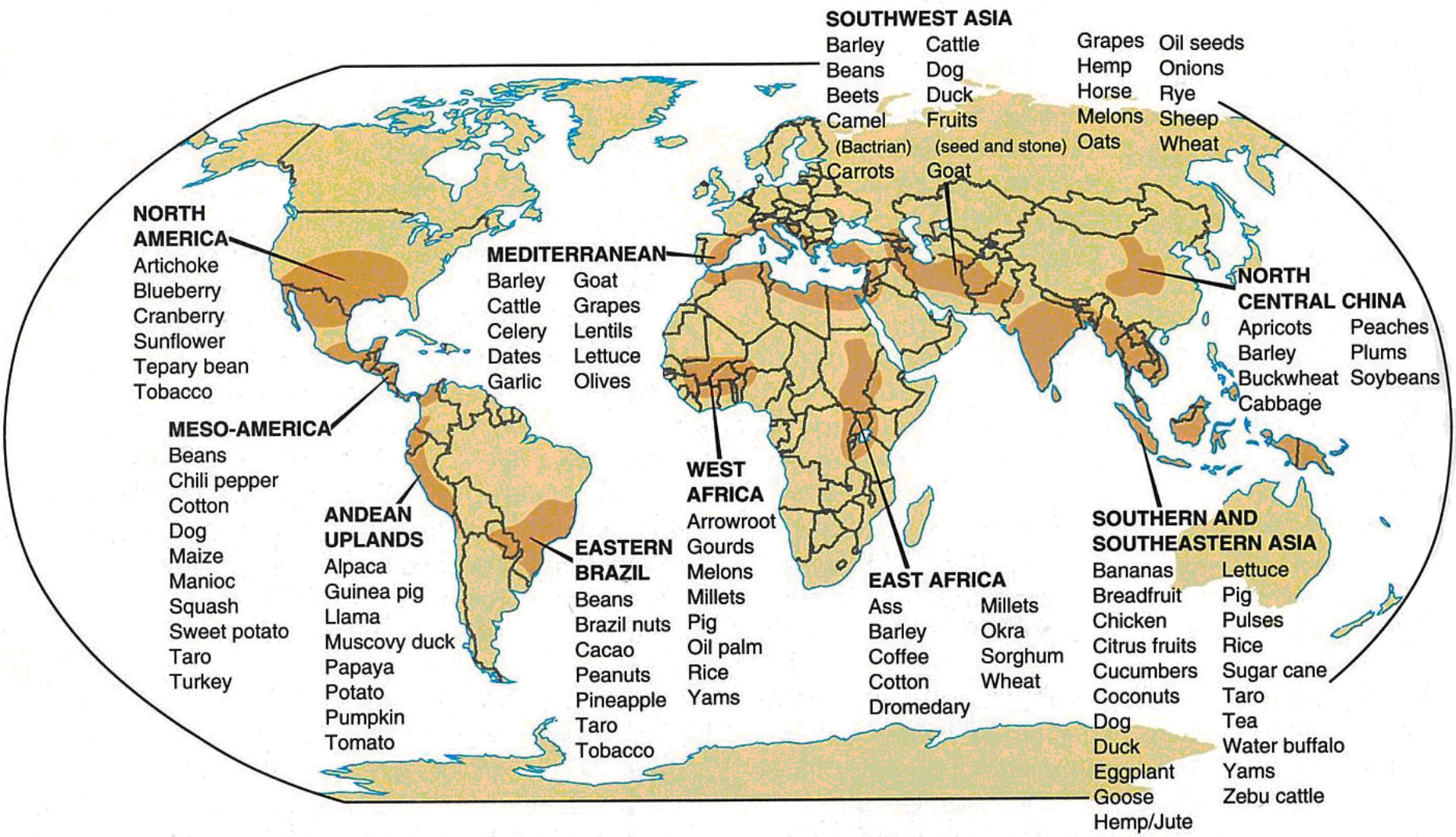
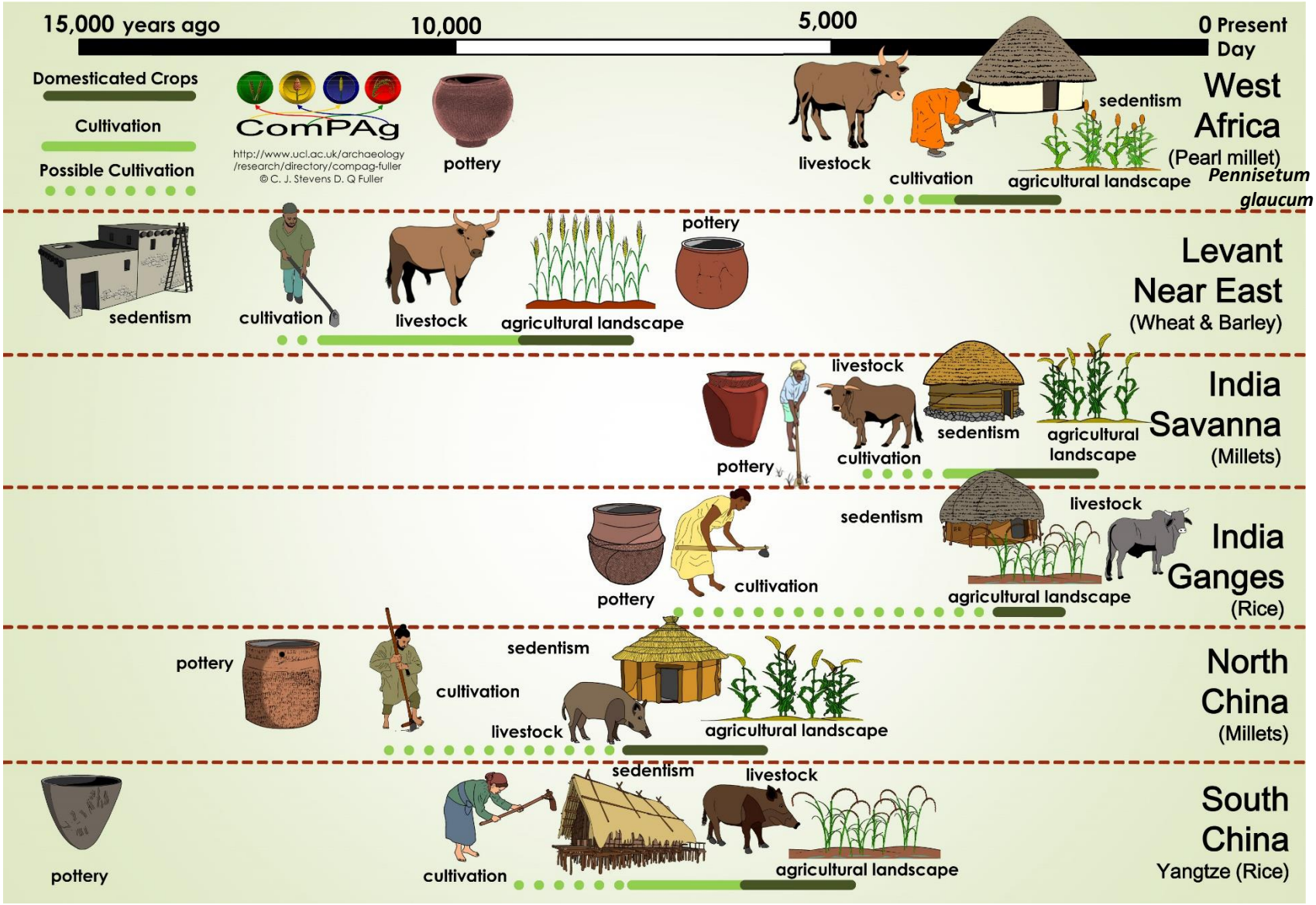


Figure 7–1. This map shows the origins of the world's food crops and domesticated animals. These plants and animals have been so widely redistributed, however, that today's leading producers of many of these are not the same as the areas in which they were first domesticated.

http://www.faculty.rsu.edu/users/f/felwell/www/Theorists/Essays/Diamond1.html



Above, a comparative timeline for the origins of agriculture and associated technologies in various parts of the Old World.

Drawn by Dr. Chris Stevens as part of the ComPAg project. https://www.ucl.ac.uk/rice/history-rice/origins-and-spread-agriculture